UNIVERSITY OF CALIFORNIA

Los Angeles

Transformations of Animal Materials

in Early Greece

A dissertation submitted in partial satisfaction

of the requirements for the degree

Doctor of Philosophy in Archaeology

by

Adam DiBattista

2021

ABSTRACT OF THE DISSERTATION

Transformations of Animal Materials
in Early Greece

by

Adam DiBattista
Doctor of Philosophy in Archaeology
University of California, Los Angeles, 2021
Professor John K. Papadopoulos, Chair

From the earliest periods of Greek history, bone, antler, ivory, and other materials were consistently created into objects for use within social practices, and archaeological evidence suggests that these objects took on new forms and functions during the Early Iron Age and early Archaic period (ca. 1100–600 BCE). Between the 11th and 8th centuries BCE, worked animal objects were sporadically used as grave goods, while by the 7th century, hundreds of such objects were dedicated at major sanctuaries across the Greek world, including at Sparta, Ephesus, and Thasos. In this dissertation, I ask how worked animal objects were created and understood during a period of great social change in the Greek world. Using perspectives from the environmental humanities, aimed at de-centering the human, as well as problematizing the nature-culture divide, I posit that worked animal objects acquired values rooted in their organic histories.

Within my dissertation, I examine how the larger patterns of ivory production in the Iron Age Mediterranean, as well as the exploitation of elephant populations in the Near East, impacted the development of ivory carving in the Greek world. The creation of these

objects coincided with a return to long-distance trade after a period of disruption brought on by the instability at the end of the Bronze Age. While the Mycenaeans used foreign trade connections to maintain a tradition of ivory carving, archaeological evidence suggests that the availability of the material was limited between the start of the Early Iron Age (ca. 1100 BCE) and the 9^{th} century BCE. With the increase of other worked animal object dedications in the 7^{th} century, ivory objects took on a variety of new forms in Greek sanctuaries. By the end of the century, craftspeople were using ivory to create larger, more complex works (e.g., the chryselephantine statues at Delphi).

This dissertation also considers how worked animal objects were employed within Greek social contexts. By comparing finds from funerary and dedicatory contexts, I demonstrate that specific types of worked animal objects (e.g., ivory carvings of recumbent animals, circular seals, miniature double axes) were reserved for use in sanctuaries and employed across the Greek world. However, certain sanctuaries also show evidence for unique forms of worked animal object dedications which were not found at other sites (e.g., worked long bone shafts at the sanctuary of Artemis Orthia at Sparta, decorated bone shafts at the Kamiros well on Rhodes). I conclude that, within the venue of dedication, worked animal objects had a specific value rooted in the organic origins of the material.

Finally, using the site of ancient Methone as a case study, I examine the production practices used to create worked animal objects. Methone shows evidence for the production of worked animal materials (including ivory) dating to between the end of the 8^{th} century/start of the 7^{th} century and the 6^{th} century, a period concurrent with the increase of dedications of such objects across the Greek world. I interpret these technical acts as a form of human-animal relationship, in which craftspeople are interacting with the organic qualities of the materials. Worked animal materials from Methone demonstrate that craftspeople used a diversity of wild and domesticated species to make a variety of objects.

The dissertation of Adam DiBattista is approved.

Sarah P. Morris

Thomas A. Wake

Willemine Z. Wendrich

John K. Papadopoulos, Committee Chair

University of California, Los Angeles

2021

For my parents.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF DRAWINGS

LIST OF TABLES

ABBREVIATIONS OF JOURNALS AND SERIES

AA	*Archäologischer Anzeiger*
Aegaeum	*Aegaeum: Annales d'archéologie égéenne de l'Université de Liège*
AEMTh	*Αρχαιολογικό Έργο στη Μακεδονία και στη Θράκη*
AJA	*American Journal of Archaeology*
AM	*Mitteilungen des Deutschen Archäologischen Instituts, Athenische Abteilung*
AOAT	*Alter Orient und Altes Testament*
ASAtene	*Annuario della Scuola archeologica di Atene e delle Missioni italiane in Oriente*
ActaAth	*Skrifter utgivna av Svenska Institutet i Athen (Acta Instituti Atheniensis Regni Sueciae)*
Aegaeum	*Aegaeum: Annales d'archéologie égéenne de l'Université de Liège*
Agora	*Athenian Agora*
AmerAnt	*American Antiquity*
AnatSt	*Anatolian Studies*
AntK	*Antike Kunst*
AntK-BH	*Antike Kunst: Beiheft*
ArchDelt	*Archaiologikon Deltion*
ArchEph	*Archaiologike Ephemeris*
ArchHom	*Archaeologia Homerica*
BABesch	*Bulletin antieke beschaving: Annual Papers on Classical Archaeology*
BAHBeyrouth	*Bibliothèque archéologique et historique, Institut français d'archéologie de Beyrouth*

BaM	*Baghdader Mitteilungen*
BAR	*British Archaeological Reports*
BAR-IS	*British Archaeological Reports, International Series*
BASOR	*Bulletin of the American Schools of Oriental Research*
BCH	*Bulletin de correspondance hellénique*
BICS	*Bulletin of the Institute of Classical Studies of the University of London*
BMOP	*British Museum Occasional Paper*
BSA	*British School at Athens Annual*
BSA Studies	*British School at Athens Studies*
Boreas	*Boreas: Münstersche Beiträge zur Archäologie*
BÉFAR	*Bibliothèque des Écoles françaises d'Athènes et de Rome*
CAJ	*Cambridge Archaeological Journal*
CJ	*Classical Journal*
CP	*Classical Philology*
CQ	*Classical Quarterly*
ClAnt	*Classical Antiquity*
ClRh	*Clara Rhodos*
CMS	*Corpus der minoischen und mykenischen Siegel*
Corinth	*Corinth: Results of Excavations Conducted by the American School of Classical Studies at Athens*
Délos	*Exploration archéologique de Délos faite par l'École française d'Athènes*
Ephesos	*Forschungen in Ephesos veröffentlicht vom Österreichischen Archäologischen Institut in Wien*
FdD	*Fouilles de Delphes, École Française d'Athènes*
GRBS	*Greek, Roman and Byzantine Studies*

Germania	*Germania: Anzeiger der Römisch-Germanischen Kommission des Deutschen Archäologischen Instituts*
HSCP	*Harvard Studies in Classical Philology*
Hesperia	*Hesperia: The Journal of the American School of Classical Studies at Athens*
Historia	*Historia: Zeitschrift für alte Geschichte*
IEJ	*Israel Exploration Journal*
IstMitt	*Istanbuler Mitteilungen*
JAS	*Journal of Archaeological Science*
JCS	*Journal of Cuneiform Studies*
JESHO	*Journal of the Economic and Social History of the Orient*
JHS	*Journal of Hellenic Studies*
JNES	*Journal of Near Eastern Studies*
Kerameikos	*Kerameikos: Ergebnisse der Ausgrabungen*
MAAR	*Memoirs of the American Academy in Rome*
MDOG	*Mitteilungen der Deutschen Orient-Gesellschaft zu Berlin*
MM	*Madrider Mitteilungen*
MeditArch	*Mediterranean Archaeology: Australian and New Zealand Journal for the Archaeology of the Mediterranean World*
Mnemosyne	*Mnemosyne: Bibliotheca classica batava*
MusHelv	*Museum Helveticum*
NatGeogRes	*National Geographic Research*
OJA	*Oxford Journal of Archaeology*
OlForsch	*Olympische Forschungen*
Olynthos	*Excavations at Olynthos*
OpAth	*Opuscula Atheniensia*
PAPS	*Proceedings of the American Philosophical Society*

PEQ	*Palestine Exploration Quarterly*
RAssyr	*Revue d'assyriologie et d'archéologie orientale*
RLA	*Reallexikon der Assyriologie und voderasiatischen Archäologie*
RÉG	*Revue des études grecques*
SIMA	*Studies in Mediterranean Archaeology*
SMEA	*Studi micenei ed egeo-anatolici*
TAPA	*Transactions of the American Philological Association*
TAPS	*Transactions of the American Philosophical Society*
WorldArch	*World Archaeology*
YCS	*Yale Classical Studies*
ÖJh	*Jahreshefte des Österreichischen archäologischen Instituts in Wien*

ABBREVIATIONS OF REFERENCE WORKS AND ANCIENT SOURCES

Aesch. *PV*	Aeschylus - *Prometheus Bound*
Alcm.	Alcman
Anth. Pal.	*Anthologia Palatina*
Ar. *Lys.*	Aristophanes - *Lysistrata*
Diod. Sic.	Diodorus Siculus - *Library of History*
Hdt.	Herodotus - *Histories*
Hes. *Op.*	Hesiod - *Works and Days*
Hes. *Theog.*	Hesiod - *Theogony*
Hom. *Il.*	Homer - *Iliad*
Hom. *Od.*	Homer - *Odyssey*
IG	*Inscriptiones Graecae*
Ov. *Met.*	Ovid - *Metamorphoses*
Paroemiogr.	*Corpus Paroemiographorum Graecorum*
Paus.	Pausanias - *Description of Greece*
Philostr. *Her.*	Philostratus - *On Heroes*
Plin. *HN.*	Pliny the Elder - *Natural History*
Plut. *Mor.*	Plutarch - *Moralia*
Polyb.	Polybius - *The Histories*
Procop. *Goth.*	Procopius - *De bello Gothico*
Ps.-Scylax	*Periplus of Pseudo-Scylax*
SEG	*Supplementum epigraphicum graecum*
Soph. *Ant.*	Sophocles - *Antigone*
Strab.	Strabo - *Geography*
Thuc.	Thucydides - *History of the Peloponnesian War*
Theophr.	Theophrastus

ACKNOWLEDGMENTS

None of this would have been possible without the support of John and Sarah. They were kind enough to make me a member of the Ancient Methone Archaeological Project (AMAP), and ensured I had everything necessary to conduct my studies. John's suggestion to incorporate the many treasures of Methone into a dissertation has morphed into a truly exciting area of research, and the many hours spent in his office discussing this dissertation were so essential. Throughout my time at UCLA, Sarah has guided my research in new directions, and her firm belief in my abilities continues to motivate me. Both John and Sarah have served as advocates and mentors who have constantly looked for ways to help me succeed, and I am truly lucky to be their student.

I also thank the other members of my committee for their encouragement and assistance with my research. I am so grateful for Willeke's guidance and leadership throughout my time at the Cotsen. Being Willeke's student taught me how to articulate my arguments more clearly, and she has always pushed me to think about material culture, craft production, and the ancient world in new and interesting ways. Finally, I thank Tom, who is a zooarchaeologist who understands animals as something more than collections of skeletal elements. He stresses that his students need to think about the movements and behaviors of an animal before trying to understand its bones, and I have tried to adopt this same animal-first attitude within my research.

So many members of AMAP provided crucial support throughout my time on the project, so I am grateful to everyone I have worked with at Methone. The *synergasia* with the Pieria Ephoria has made my research possible, so I thank Manthos Besios, Athena Athanassiadou, and Konstantinos Noulas. The conservation team was a constant source of help throughout this project, and I thank Vanessa Muros for providing assistance and many helpful suggestions. Vanessa taught me so much about organic materials, as well as the art of sharing of lab space! Thanks also to Chrysanthe Pantages for her help and her patience for my interruptions! Additionally, thank you to Tina Ross and Anne Hooton for providing amazing illustrations; Tina's hard work at the end of the 2019 season resulted in so many of the drawings in this dissertation. Jeff Vanderpool's tireless photographic work has also proved crucial to my research, and I am so pleased to share his wonderful images. Thank you also to Annette Dukes, who has helped with nearly every aspect of the AMAP project, and always made sure I had everything I needed for my research. Both Trevor Van Damme and Marianna Nikolaidou continue to provide so much insight into our excavations at Methone, and I thank both for their constant willingness to discuss site history and chronology, as well as their excellent dinnertime conversation! I also owe Trevor for looking out for me in both Athens and Boeotia.

It was a pleasure to work alongside all of the other excavators of the site, including Brandon Braun, Myles Chykerda, MaryAnn Kontonicolas, Hugh Thomas, and Emily Wilson. I want to thank Debby Sneed for all of her roles on the project, and especially for her help answering my questions about the Post-Hole Structure. I am also so thankful to Angelos Boufalis for tolerating my presence within a remarkably small trench, as well as his unfailing hospitality in Thessaloniki. Finally, I owe an immense debt of gratitude to Camille Acosta for all her help at Methone and at UCLA. Working (and putting off work) alongside Camille in both Los Angeles and Greece has been one of the highlights of my time at graduate school; I cannot imagine completing this research without her constant generosity and friendship!

The support of the faculty, staff, and fellow students at the Cotsen Institute of Archaeology was also so helpful for completing my research. The members of my cohort, Anna Bishop, Brandon Braun, Dani Candelora, Karime Castillo, and Georgi Kyorlenski, were a source of encouragement and humor throughout this process. Additionally, the generosity of Charlie Steinmetz and his family, as well as the other Friends of Archaeology, provided many opportunities for travel and research which enriched this project.

I am also grateful to all the individuals working within museums who allowed me to view their collections, including Anastasia Christofilopoulou at the Fitzwilliam Museum, Marianne Bergeron at the Ashmolean Museum, as well as Charles Arnold, Ben Harridge, and Alex Truscott at the British Museum.

I must also thank my undergraduate mentors at Boston University: Andrea Berlin and Mac Marston. Andrea is an inspiring teacher, whose kindness and support allowed me to believe that graduate school was a possibility. Mac invested so much of his valuable time and extended countless opportunities to me; I am forever indebted to him for all of the help and support he has provided.

My entire family has remained a steadfast source of encouragement and support throughout this process. I thank Anthony and John for putting up with their absent brother. If I have made any particularly effective arguments in this dissertation, then I am grateful to them for honing my rhetorical skills at our dinner table. I owe so much to my parents, who have been fostering my dream of archaeology for the past two decades. They are tireless supporters, whose belief in my abilities was a guiding force throughout my time in graduate school. I cannot thank my mother enough for editing countless drafts and wrestling with long sentences; all unwieldy grammatical constructions are my own fault! Knowing my father would move mountains to help me, and had all the tools to do so, meant that all my worries were minor.

Finally, I owe so much to Leah for her patience. She has lived with the highs and the lows of this process, providing suggestions, support, and even fantastic illustrations! Alongside her, even writing a dissertation was joyous.

VITA

2014	B.A. (Archaeology) Boston University, Magna Cum Laude, Phi Beta Kappa
2016	M.A. (Archaeology) University of California, Los Angeles
2019	Mellon-Excellence in Pedagogy and Innovative Classrooms Fellowship

CHAPTER 1

Introduction

1.1 Humans and Animals

For centuries, the relationship between the human and non-human has occupied a central place among belief systems across the world. Some of the earliest instances of figurative depiction attest to the fascination with the intersection between human and non-human animal bodies: representations and therianthropic beings adorn the walls of caves like Les Trois Frères, Lascaux, and Gabillou;[1] hybrid creatures that reject a clear boundary between human and animal. In another example from the Hohlenstein-Stadel cave in Germany, an Upper Paleolithic figure carved in mammoth ivory shows a lion standing on two feet, rendered in an unmistakably human manner (known as the "Loewenmensch," see fig. 1.1).[2] For as long as individuals have been representing symbolic thought, the relationship between humans and animals has been a recurrent theme. This concept also permeates some of the earliest literary works, including the epic of Gilgamesh. Enkidu, "the child of nature," lives like an animal before being domesticated by the influence of Gilgamesh, Shamhat, and the temptations of life inside the walls of Uruk.[3] The fundamental tension between human and non-human forces continued as a recurrent theme in the Aegean and Near East with one of the most enduring images of the Bronze and Iron Ages: the Master or Mistress of Animals. This motif of an individual holding two animals at bay was a visual formula that was

---

[1] Palacio-Pérez and Redondo 2014, 259–63.

[2] Wynn, Coolidge, and Bright 2009; Ebinger-Rist, Wolf, Wehrberger, and Kind 2018.

[3] *The Epic of Gilgamesh*, I. 175–80

continuously repeated, seemingly irresistible to the societies across the Mediterranean and Near East.[4] Its popularity speaks to an essential human obsession and insecurity with the boundary dividing the human and the non-human worlds.

The fascination with the separation between humans and animals is not confined to the ancient world; early Christian, Medieval, and Enlightenment philosophic thought all show a similar preoccupation with the attempt to place humans in a hierarchical ordering, the so-called Great Chain of Being. A strict division between the human and animal was further reified in René Descartes' conception of the animal as a "*Bête machine,*" a soulless automaton (see § 2.1.1). Even the modernism of the 20th century has not deterred individuals from probing this deeply ancient concern. In Franz Kafka's *The Metamorphosis,* one of the defining works of its era, transformation into an *ungeheures Ungeziefer* becomes a powerful representation of alienation in the contemporary age. Thousands of years after the Upper Paleolithic, from Gilgamesh to Gregor Samsa, societies across time are still compelled to investigate, probe, and redefine whatever boundary separates the human from the non-human. Anthropological research has shown that there is no single understanding of what separates humans and animals. Furthermore, posthumanist thinkers like Donna Haraway have continued to problematize the status of the human body as something immutable, rather envisioning more permeable corporeality that is intersected by both technology and non-human, biotic kin (see § 2.1.3). These approaches indicate a wealth of ways to think about humans and animals wholly different from the Cartesian divide and the Great Chain of Being. While strains of Western thought developed in the era of the Enlightenment continue to be a hugely influential force, such ideas offer only one perspective on the relationships between humans and animals.

These literary, philosophical, and artistic examples are a testament to the extent that the study of relationships between humans and animals in the ancient and modern world is a multi-disciplinary endeavor. Fields such as art history and literary analysis, often in-

4 Spartz 1962; Crowley 1989, 28–33; Barclay 2001.

cluded as elements of the environmental humanities, have all offered perspectives on the ways humans demarcate themselves from animals. While these fields continue to add to the discourse on humans and animals, I contend that archaeology is uniquely suited to studying the engagements between the human and non-human worlds. Zooarchaeology has long been the subfield responsible for the investigation of animals in the ancient world, often with an anthropocentric perspective on the dietary or economic roles of animals in the lives of humans. More recently, zooarchaeological research has moved beyond those issues, with more of a focus on the symbolic and ritual uses of animals. My approach to investigating the relationships between humans and animals in the ancient world studies the practices surrounding the manufacture and use of objects made from durable animal materials, such as bone, antler, and ivory. As artifacts made from animal materials, but divorced from dietary or subsistence concerns, these objects are often viewed as neither under the purview of zooarchaeologists nor other archaeological researchers. However, it is their otherness, their status as neither "artifact" nor "ecofact," that makes them such an appealing research subject. These objects are a direct and tangible remainder of interactions between human and animal bodies, a union that resulted in the creation of a meaningful item.

In this dissertation, I adopt a material-based perspective that views the creation of a "cultural product" from a component of an animal body as a moment of transformation, a locus for ongoing dialogue between the human craftsperson and the active, agentive, and organic material. Rather than a conversion from "ecofact" to "artifact," worked animal objects exist at the intersection between human and non-human forces. Humans might use these objects to harness the powers of their animal origins, deploying them within meaningful social contexts (see § 2.1.3). Additionally, I advocate for the adoption of alternate ontologies of corporeality and animality. Within these perspectives, worked animal objects may also be seen as living (if disconnected) extensions of animal bodies (see § 2.1.2). Drawing on perspectives from human-animal studies, I demonstrate the need for non-modern, non-Western perspectives on the boundaries and relationships between the human and non-human in the

Greek world. Studying worked animal objects with a rigid and rational (i.e., a focus on calories or utility) framework ignores the wealth of possibilities for how and why individuals might use an object made from an animal material.

In this dissertation, I focus specifically on worked animal objects from Greece in the Early Iron Age and Archaic period. While some worked animal objects have gained prominence in archaeological and art-historical scholarship, generally only high-value (i.e., ivory) objects or items with strong stylistic qualities have been the subject of study in Greek archaeology. Despite their symbolic and active potential, little attention is directed toward the material qualities of these objects. The modern view that renders the "raw material" inert, and which seeks to segregate objects into categories of either "ecofact" or artifact, also ignores how these objects may have functioned within their social contexts. In this dissertation, I interpret animal objects as having meanings rooted in the material itself, and which cannot be ignored when analyzing the object in its larger cultural context. Neglecting the animality of items made from bone, antler, or ivory is a presumption that risks a fundamental mischaracterization of these objects. To paraphrase Ian McNiven and Ricky Feldman: expecting that any faunal assemblage has not been the subject of some ritual action assumes a specific modern ontology about the status of the non-human.[5] Beyond their strong symbolic potential, these materials may have been seen as active, partible elements of the animal from which they originated. However, such interpretations of worked animal objects are most often reserved for non-Western or prehistoric societies. Despite that the West has chosen to view the ancient Greeks as their intellectual and societal forbears, individuals living in the Aegean in the ancient world undoubtedly possessed different understandings of what it meant to be a human or an animal. With the numerous animal transformations, therianthropic, and hybrid human-animal creatures populating the mythohistoric landscape of Greece (see fig. 1.2), the cultural constructions of human and non-human were critically different in the past than they are today. These ontological differences necessitate that items

[5] McNiven and Feldman 2003, 189. See also § 2.1.3.

made from the bodies of animals are not interpreted as mere objects.

1.2 Central Argument

I argue that worked animal objects in the early Greek world were created in distinct ways and reserved for specific purposes that valued the once-living properties of the material. Moreover, I assert that the creation of worked animal objects is, in itself, a human-animal relationship enacted by craftspeople. This argument is based on several lines of evidence, including an analysis of the use of objects made from animal materials found across Greece. Archaeological evidence shows the growth of worked animal object dedications during the 7^{th} century BCE, representing a marked shift from the beginning of the Early Iron Age in the number of objects and attributes of these assemblages. I argue that the creators and dedicants of these objects chose animal materials for their active and agentive properties: the particular value of these objects was drawn from their organic history and connection to the animal world. In order to understand the relationship between craftspeople and animal materials, I conducted an analysis of the worked animal object assemblage from the production site of ancient Methone. Using Methone as a case study, I evaluate the ways the relationships between humans and animals (and the non-human world more generally) may have shaped the production of animal materials at the site. Additionally, my analysis of patterns of production at the site shows how multiple modes of production (perhaps within varying social arrangements) contributed to the creation of these objects at Methone. I also examine manufacturing features as a means of better understanding the physical and kinesthetic relationships between producer and material.

1.2.1 Central Questions

Worked Animal Object Usage

The following questions examine patterns of worked animal object usage in the Greek world at large, with more explicitly quantitative or testable propositions. As these questions are looking at large-scale trends, they are mostly addressed in chapters 3 and 4.

- Are there differences between worked animal objects within funerary contexts and those from dedicatory assemblages?

  This question seeks to understand whether the individuals who possessed and deployed worked animal objects viewed them as having contextually specific uses, and I argue that there is a strong qualitative and quantitative difference between the use of these objects in funerary and dedicatory practices (see § 4.1). While worked animal materials were sometimes used as grave goods, in certain periods they were almost exclusively used as offerings, implying that these objects were uniquely suited as gifts to a deity. In addition to their special value within dedicatory practice, I argue that the forms of these objects indicate animal materials were selected for their organic histories.

- Are the same types of worked animal objects repeatedly dedicated?

  By ascertaining whether the dedication of worked animal objects represents either a more universalizing social phenomenon or a heterogeneous collection of individualized acts, I am attempting to determine whether there were any shared attitudes toward these materials. My analysis showed evidence for inter-sanctuary practices resulting in the dedication of several distinct types of worked animal objects across the Greek world. Additionally, practices limited to smaller regions or individual sanctuaries showed community-specific relationships to objects that appear rooted in the material. A series of object-types were also repeatedly dedicated across sanctuaries (see § 4.6), indicating shared sets of beliefs involving the use of animal materials in dedicatory contexts. While there is no shortage of more idiosyncratic worked animal objects within sanctuaries, consistent and repeated forms of dedication permeated religious practice in the 7th century BCE.

Worked Animal Material Production

These questions explore the relationship between producers and the animal materials they handled, ultimately guiding the idea that producers were enacting a specific human-animal relationship during the creation of these objects. Rather than being explicitly testable, the "answers" to these questions are the result of the interpretation of animal objects (mostly from the Methone assemblage) within material-focused perspectives. As a result, these questions are primarily addressed through an analysis of the Methone assemblage in Chapter 5.

- Did producers treat separate types of animal materials in different ways?

  Craftspeople possessed a unique perspective on these materials, handling them when they were a "raw material" and facilitating their transformation into a "finished object." While a non-craftsperson may not have been able to distinguish among antler, bone, and ivory, producers understood the unique properties of each of these materials. The inherent differences among animal materials ensured that they were put to different purposes (e.g., bone or antler was much more likely to be used for a tool than the brittle and pliable horn), but this question asks whether there are any attitudes toward materials that cannot be attributed wholly to their biological structure.

- How did human-animal relationships affect the production of worked animal materials?

  This question is asking how worked animal objects can be seen as an extension of existing relationships with the non-human world. Animal materials have to be collected (such as in the case of shed antler), hunted, or harvested from the corpses of animals after they were killed; these materials enmesh craftspeople within existing social arrangements between human and non-human elements. The evidence surrounding antler collection and its use as a tool-component suggest that particular relationships among humans, animals, and their shared landscapes patterned how these objects were made and used. As an example, analysis of antler collection at Methone suggests that producers were treating this specific material in a way that may reflect the relationship between humans and deer (see § 5.4.1).

1.3 Methodology

1.3.1 Study of Published Material

I evaluated published archaeological assemblages dating from the start of the Early Iron Age (ca. 1100 BCE) to the end of the 6th century BCE, with the vast majority of the objects dating to the period between the end of the 8th century BCE and the middle of the 6th century BCE. Examining how objects were used during earlier periods (11th–9th centuries BCE) serves as a valuable contrast for the different societal approach to these materials occurring during the 7th century BCE. A survey of the published archaeological record is helpful in ascertaining general trends, as well as in estimating the minimum numbers of worked animal objects found at a site. Items from published sources were recorded using an object-driven relational database, in which each entry in the main table of the database equates to a single object or a closely related group of objects (e.g., three similar fragments of one or more objects made from the same material and presented as a single group within a publication). At a minimum, each entry required a site, count, and material. I also used this database to record several other optional data points, including an "identifier" (i.e., the way the original author referred to the object), measurements, groupings made by the author (i.e., a classificatory scheme for a subset of objects found at one site), and additional findspot information.

However, many of the publications only present parts of the total excavated assemblage or fail to list exact numbers of objects. While the final tally of objects from the sanctuary of Artemis Orthia is 638, this is almost certainly a conservative estimate based on R.M. Dawkins' references to other, unpublished objects.[6] The opposite problem may also be true

[6] In the case of one type of object from the sanctuary of Artemis Orthia, Dawkins (1929a, 238) publishes only a single image, but says "they were found by the hundred."

at some sites, in which fragmentation inflates the number of objects that I chose to record within the database. The Idaean Cave is perhaps the best example, as its excavator J. A. Sakellarakis argues that the 1,034 fragments make it the largest assemblage of the material found in a sanctuary. However, the most recent publication of the site did not provide entries for each of the fragments, so the final number I recorded may also be unrepresentative of the actual number of objects deposited there.[7]

The choices of craftspeople surrounding specific animal materials were a central part of this research, so I strove to record them as accurately as possible. For publications in which it was clear that the author studied qualities of the material (e.g., Clarisse Prêtre's *La fibule et le clou: ex-voto et instrumentum de l'Artémision*), I recorded the author's original attribution. However, some publications list every object in the assemblage as a single category of material, but the images or descriptions seem to contradict that attribution. One such example is the Argive Heraion, in which Richard Norton lists all 86 objects under the heading of the "The Ivories." Some of the individual entries from the Heraion specify that the objects were made from ivory, but most have no material listed. It appears that the Heraion publication considered the term "ivories" as a catchall for worked animal objects. In cases of ambiguous publications like the Argive Heraion, I recorded the majority of the objects as an unknown material.[8] In some cases, I was able to determine that objects were ivory based on high-quality photographs showing distinct characteristics of the material.[9] As the previously published material is not always published in full, and may characterize the material incorrectly, I consider the survey of animal material objects provided in Appendix B as only an approximation of the total excavated assemblage of worked animal objects in

7 Sakellarakis 2013, 168. See also § 4.3.10.

8 The sanctuary at Kythnos posed a similar issue, as Despoina Varvarinou-Vai (2017, 193) does not make specific material attributions. Instead she writes that based on the composition, hardness, and color of the objects, "many of them were made of ivory." The images provided of some of the dedications indicate that some were unequivocally made of ivory.

9 Specifically, the Schreger pattern or the cone-within-cone splitting, see section 5.2.4.

the early Greek world.

1.3.2 Direct Study of Museum Collections

In addition to the published materials, I was able to handle, observe, and apply low-level microscopy to 337 objects from the assemblages of the Kamiros well and the nearby Papatislures cemetery, sanctuary of Artemis Orthia, and the Archaic Artemision at Ephesus housed in the collections of the Fitzwilliam Museum, Ashmolean Museum, and British Museum (see table 1.1). Before integrating these objects into my main database, I recorded them in a separate database which was designed to be used with objects that I was able to handle and observe with microscopy. This database provided a more detailed means of recording attributes about the material, including the effects of taphonomic processes, as well as modifications made by craftspeople or the owners of these objects. I classified modifications as either manufacturing features, possible use wear, butchery/consumption, or unknown. I also attempted to characterize these changes to the material as abrasive, made by a cut, incised, or pierced, with several more specific sub-categorizations (see table 1.2 below). As some of these objects appeared in previous publications, I was able to record correct material attributions based on my observations.

Table 1.1: Objects directly studied in museum collections

Site	**British Museum**	**Fitzwilliam Museum**	**Ashmolean Museum**	**Totals**
Kamiros	134			134
Papatislures Cemetery	24			24
Artemis Orthia	33	17	61	111
Ephesus	68			68
Totals	**259**	**17**	**61**	**337**

Table 1.2: Categorization of production techniques

Abrasion	**Cutting**	**Incision**	**Piercing**
General Abrasion Polish	General Cut Chisel/Plane Carving Saw Hack Lathe Cut	General Incision Compass Incision Incised Hole Scribing	General Piercing Metal Piercing Unknown Piercing Drill Hole

1.3.3 Direct Study of the Methone Material

A large portion of my research surrounds the study of worked animal objects and production waste from the site of ancient Methone. Methone was excavated by both the Pieria Ephoria and a synergasia between the Ephoria and a research team known as the Ancient Methone Archaeological Project (hereafter: AMAP; see also § 5.1). As a member of AMAP, I was able to direct a major portion of my time and attention to the recovery and study of worked animal materials. My role within the project as both a researcher and field supervisor meant that I was able to develop protocols for how worked animal materials were handled; additionally, I observed all the faunal materials recovered by excavators, ensuring that no worked animal materials or production waste were unexamined. My work and that of my team members resulted in an extensive recovery of material that might have been missed in other circumstances, including exceptionally small pieces of production waste found in flotation samples, as well as highly fragmented ivory collected in the field. As a result, the AMAP excavations provided one of the richest and most thorough bodies of evidence for the production of worked animal objects in the Greek world.

My standards for what qualified for worked animal material were deliberately broad, including objects which may have been production waste. Each material had different qualifications for categorization as a worked animal material depending on its relationship to dietary practice. Any ivory, regardless of its size, was considered a worked animal material because it was an imported good. Non-ivory teeth (e.g., bear tooth, *suidae* tooth) were almost always unambiguously modified, and unmodified examples (mainly *suidae* teeth) were not considered. I classified all instances of antler, regardless of anthropogenic modification, as a worked animal material. Deer were likely a part of the diet at Methone, although based on a preliminary study of the faunal material from the AMAP excavations,[10] both antler and deer bone were fairly rare. Antler was still more common than deer bone, suggesting that

[10] This material does not include any material previously excavated by the Pieria Ephoria.

any antler found in the assemblage was a result of production activities. Like antler, horncore also has the potential to be deposited as a result of dietary practices.[11] As a result, I classified only those examples of horncore showing modification as a worked animal material and did not consider any unmodified horncore. This approach prevents overrepresentation of highly fragmented horncore, as well as pieces that may have been deposited within a dietary waste stream.

Bone required a more flexible approach because butchery and dietary modifications may resemble the results of production practices. My goal was to apply suitably loose standards while excluding unambiguously butchered materials. I did not consider bones whose only modification was a light fillet mark, as well as ribs that showed more substantial cut marks; both are staples of dietary modification. Bones with broad hack marks were considered on a case-by-case basis, as many may have been the result of butchery. Some bones, such as ID 441, were more ambiguous. ID 441 is a metapodial with hack marks around its distal end. Most metapodials in the assemblage showed clean saw marks, suggesting that producers were maximizing the bone for use as a production material. However, the cut marks on ID 441 exhibited a different approach to the material, indicating that it may have been butchered. Regardless, it was still cataloged, with the caveat that it is possibly "related to the dietary waste stream." While this approach is conservative, it assures that production waste is not ignored.

As in my direct study of the museum material, I recorded my observations of modifications resulting from production and use within a database using the same set of criteria (see table 1.2). I was also able to record more precise contextual information about the findspots of these objects. In addition to my study of the material excavated by AMAP, I was also able to analyze the finds from the previous excavations of the Ephoria (see Appendix A). Recovery methods differed between the two excavations: worked horncore was not collected to the same extent in previous excavations as it was in the AMAP excavations, and it is

[11] While the horn is not part of any diet, any cranial element might easily be discarded during butchery.

unlikely that potential production waste was saved at the same rate. However, the previous excavations were careful to recover thoroughly both objects and production waste, resulting in a large and rich assemblage of worked animal materials. The objects and production waste recovered from Methone are profiled in Chapter 5, as well as in Appendix A.

Chapter Overview

The following is a guide to the chapters of the dissertation (not including the introduction and conclusion). A description of each chapter follows, showing which central questions the chapters cover.

Chapter 2 *Human-Animal Relationships*

Chapter 2 is a review of the theoretical paradigms surrounding the interpretation of the relationship between humans and animals. This chapter explores how a Western ontology that imposes a strict barrier between humans and animals remains a barrier for understanding how worked animal objects functioned in their original contexts. Alternate ontological perspectives, drawn from anthropological and ethnographic research offer a variety of understandings of animal materials that differ from the ideas of the modern West. In addition, Posthumanist ideas similarly critique the nature-culture dichotomy, offering (often radical) conceptions of the discontinuous boundaries separating the human and non-human. These perspectives also provide alternative ways of thinking about how humans consider their status in relationship to "wild" and "domestic" or "tame" animals.

Additionally, I explore how the process of creating animal materials becomes a human-animal relationship in itself, in which the materials are alive and agentive. Using theoretical perspectives primarily drawn from Marcel Mauss and Marcia Anne Dobres, this chapter also highlights the importance of technology as a socially constituted act, which involves the social conditioning of the actual physical actions involved in craft production. Finally, this chapter proposes that animal materials may be agents in the process of creation. While Dobres stresses the need to see technology as rooted in human practice, this section incorporates Haraway's ideas in order to broaden the social realm as an environment co-created by human and non-human actors. Within a world that is neither natural nor cultural, organic materials have the potential to be active components of their transformation into worked animal objects.

Chapter 3 *The Context of Ivory Production in the Iron Age Mediterranean*

This chapter focuses on ivory (mostly ivory derived from an elephant species), an animal material with its own set of connotations and meanings in the Greek world and the Mediterranean more generally. This section of the dissertation examines the relationship between individuals and a specific animal material, revealing that the particularities of the lives of elephants, and the actions of the humans who interacted with them within their habitats, have clear ramifications for the use of this material in the ancient world. This chapter begins with an attempt to identify the sources of ivory in Post–Bronze Age Greece through analysis of archaeological, paleontological, literary, and historical data. As ivory (hippopotamus and elephant) is one of the only animal materials in the early Greek corpus whose use necessitates long-distance trade, this chapter explores the geographic and political factors that conditioned its use. The source of Greek ivory in the 7th century BCE is complicated by the prevailing idea that the Syrian elephant went extinct some time in the 9th century BCE. This chapter explores both the origins and extinction of the Syrian elephant, arguing that the reliance on textual sources like the Assyrian annals may obscure the biological realities of an elephant population in northern Syria. The second part of the chapter identifies the ways ivory was understood in Greece, arguing that by the end of the 7th century BCE, ivory was being put to new uses, suggesting specific connotations surrounding the material. Additionally, this chapter attempts to show that the social environments for the production of ivory may have been different from other worked animal materials, as access to ivory was inherently more limited in Greece.

Chapter 4 *Worked Animal Materials in the Wider Greek World*

The fourth chapter is an analysis of how all types of worked animal objects were used across the Greek world. This part of the dissertation addresses a central question of whether individuals reserved worked animal objects for specific purposes; an analysis of the objects found in burial and dedicatory contexts shows a pattern among the types of objects dedicated at sanctuaries, distinct from those deposited in graves. The next part of the chapter highlights several sanctuaries with the largest and most significant assemblages of worked animal objects. Each of these sections details the chronological span of the dedications (most often beginning midway through the 7^{th} century BCE) and explores patterns of deposition in the site. Additionally, types of worked animal object dedication that are distinct to a site (e.g., decorated shafts at Kamiros) are interpreted using the theoretical perspectives introduced in Chapter 2. Finally, the fourth chapter also establishes more general patterns of worked animal object dedication by profiling the objects which were present at multiple sanctuaries.

Chapter 5 *Worked Animal Materials at Ancient Methone*

Chapter 5 explores how worked animal materials were used and understood at the site of ancient Methone. The chapter provides an archaeological overview of Methone and details the distribution and deposition of worked animal objects and production waste found at the site. The chapter begins with a synopsis of the occupation history of the site, as well as the details of its excavation history. Subsequently, it identifies the animal materials used at Methone, outlining their biological and morphological differences. The second half of the chapter explores how craftspeople used animal materials at Methone, including forms that the objects took, the production techniques used at the site, and the patterning and organization of objects and production waste. This chapter similarly uses the theoretical perspectives introduced in Chapter 2 to interpret how connections to the non-human world conditioned the creation of animal materials. By examining both the structure of production, as well as the engagements between humans and animals that led to the acquisition of these materials, I seek to understand how animals enmesh themselves in the creation of these objects.

Appendix A *Catalog of Objects and Production Waste at Methone*

Appendix A describes each worked animal object recovered throughout the excavations at Methone. Objects from Methone are referenced throughout the dissertation with the prefix "ID" (e.g., ID 1) and are grouped into one of several main categories in the following order: antler objects, antler raw material and production waste, ivory objects, ivory production waste or raw material, bone or ivory objects, bone or antler objects, bone objects, other tooth objects, and horncore production waste. This section also provides contextual information, measurements, and comparanda.

Appendix B *Sources for Worked Animal Objects Across the Greek World*

The second appendix lists the sources for each of the sites where worked animal materials were discovered, as well as a count of the material based on the publications (table B.1); additionally, each site shows a breakdown by material type (table B.2).

Figures

Figure 1.1: Loewenmensch of the Hohlenstein-Stadel Cave. Image by Dagmar Hollmann / Wikimedia Commons, License: CC BY-SA 4.0.

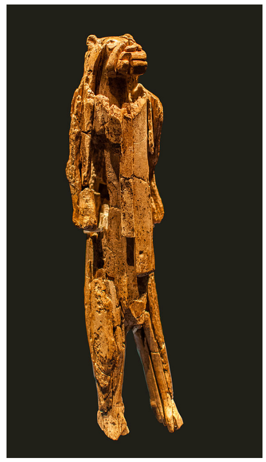


Figure 1.2: Images of hybrid creatures and therianthropy: *a*, a Geometric bronze showing a man and centaur (the Metropolitan Museum of Art, accession number: 17.190.2072); *b*, a 5$^{\text{th}}$ century BCE Attic neck-amphora showing Europa carried by Zeus in bull form (the British Museum, asset number: 813681001, © The Trustees of the British Museum).

(a)

(b)

CHAPTER 2

Human-Animal Relationships

2.1 The Ontological Status of Humans and Animals

It is impossible to understand fully how individuals in the past viewed animals and places they inhabited, or what sort of ontologies of nature and culture were present in the ancient world. However, the field of human-animal studies highlights the breadth of understandings surrounding the relationships among humans, animals, and nature. There is no single theory of human-animal relationships; rather there are a series of approaches drawn from anthropology,[1] biology,[2] geography,[3] gender theory,[4] posthumanist studies,[5] and other fields. The interdisciplinary study of human-animal relationships (sometimes called human-animal studies) has different aims and perspectives, but generally is concerned with "the spaces that animals occupy in human social and cultural worlds and the interactions humans have with them."[6] Much archaeological and zooarchaeological research overlaps with the aims of human-animal studies; many recent books, articles, and edited volumes look at the role of animals beyond aspects of diet, subsistence, and economy.[7] With its potential for large

---

1 Ingold 1988a; DeMello and Mullin 2010.

2 Sebeok 1988.

3 Philo and Wilbert 2000; Tuan 1984.

4 Adams and Donovan 1995; Haraway 1989.

5 Haraway 2003; Taylor 2012.

6 DeMello 2012, 4.

7 Crabtree 1990; O'Day, Neer, and Ervynck 2004; deFrance 2009; Russell 2011; Albarella and Trentacoste 2011; Sykes 2014.

timescales, and direct evidence in the form of faunal materials, archaeology contributes a record of long-term interactions between humans and animals. More recently, archaeological scholarship has attempted to draw explicitly on the field of human-animal studies.[8] A human-animal studies approach to the archaeological record necessitates interpretations of animal materials that are not limited to diet and subsistence needs. Instead, human-animal studies offer several bodies of discourse that provide a means of alternative interpretations of the role of animal materials in ancient societies. These perspectives include a re-evaluation of the cultural understanding of boundary dividing the human from the non-human in the Modern West, as well as an emphasis on the possibilities of alternative ontologies of nature, culture, and the animal.

2.1.1 Descartes and the Legacy of Western Thought

One of the major aims of human-animal studies is to show that ideas derived from Descartes and other early modern European thinkers still influence current understandings of animals.[9] The long intellectual history of the human-animal boundary partially stems from the Biblical notion of man's dominion over the planet, the medieval concept of the "Great Chain of Being," as well as the writings of Thomas Aquinas.[10] A hierarchy of humans and animals is not exclusive to Western thought, as many non-Western societies differentiated and ordered classes of animals. Early Chinese world views expressed an idea of human supremacy, which was only achieved by the "human species' ability to adapt to each of the other animal 'phases' and its ability to change according to changing circumstances."[11] While early Chinese thought exhibits hierarchical thinking, it emphasizes the likeness between the human and non-human. Moreover, many interpretations of the Quran indicate

---

8 For a broader discussion of archaeology in relation to anthropology and human-animal studies, see Hill 2013.

9 Midgley 1988; Derrida 2002.

10 Aquinas, *Summa Theologica* 1.96; DeMello 2012, 36–41; Descola 2013, 202–6.

11 Sterckx 2002, 81–82.

a distinct concern for the non-human, although some have also identified anthropocentric attitudes within Islamic thought.[12] Hierarchical conceptions of humans and non-humans are not unique to any intellectual tradition, but this concept within Western thought has had a substantial effect on current perceptions of animals. One of the most influential ideas on the divide between humans and animals is associated with Descartes, who established the doctrine of the *bête machine* in his *Discours de la Méthode.*[13] Within the text, he argues that animals are like machines, who lack souls and purpose, writing:

> [T]he fact that [animals] do something better than we do does not prove that they have any intelligence, for, were that the case, they would have more of it than any of us and would excel us in everything. But rather it proves that they have no intelligence at all, and that it is nature that acts in them, according to the disposition of their organs— just as we see that a clock composed exclusively of wheels and springs can count the hours and measure time more accurately than we can with all our carefulness.[14]

The effects of Cartesian thought had major ramifications for both the intellectual tradition, as well as for the treatment of animals within European society. Andreas-Holger Maehle describes how "zealous Cartesians" advanced the idea that animals could not feel pain. He cites an incident where one such Cartesian, Bernard le Bovier de Fontenelle (1657–1757), kicked a pregnant dog and expressed no remorse, claiming that it could not feel anything.[15] The words of Descartes had direct consequences for his followers and the many thinkers who came after; Cartesian thought was hardly a minority view, rather a variation on a much longer tradition beginning before his life and continuing afterward. This intellectual "epoch" was described by Jacques Derrida, who identifies an era of thinkers beginning with Descartes who have not seriously engaged with the idea that animals could comprehend the presence

---

[12] Sarra Tlili (2018) demonstrates various flaws in the of the discourse surrounding this subject, some of which are a result of scholars' biases about what constitutes ethical views toward animals in the West.

[13] Newman 2001.

[14] Descartes 1998, 33, 5.58–60.

[15] Maehle 1994, 86–87.

of the human.[16] Derrida contends these thinkers have "never been seen by an animal that addressed them."[17] While there is no shortage of recent biological, philosophical, and anthropological perspectives that seriously examine animal intelligence, the legacy of the *bête machine* remains deeply entrenched in Western thought.

2.1.2 Ontological Alternatives to Nature and Culture

The rejection of the Cartesian border separating humans from animals is connected to the debate on the relationship between nature and culture. Despite the modern acceptance of a nature-culture dichotomy, there is a wide range of ideas surrounding the division between them.[18] Efforts to challenge the nature-culture divide often argue that it is a specific ontological position, one which is not universally shared. Philippe Descola has sought to characterize other ontologies that perceive nature and culture differently, categorizing them into the divisions of animism, totemism, naturalism, and analogism (see table 2.1).[19] Descola's characterization of different ontologies seeks to articulate the many different ways societies understand themselves in relation to other animals and the natural world more generally. However, Tim Ingold strongly objects to Descola's segregated taxonomy of ontologies.[20] According to Ingold, Descola's approach is rooted in anthropological practices concerned with the classification of existing ontological templates. Moreover, Ingold views the a priori separation of "physicality" and "interiority" as problematic and rooted in the idea of the "containment" of an interior self, soul, or consciousness. Instead, Ingold looks to ideas of circulation and "becoming," which dissolve the boundaries between interiority and

16 Derrida (2002, 383) also includes the following thinkers: Immanuel Kant, Martin Heidegger, Jacques Lacan, and Emmanuel Levinas.

17 Derrida 2002, 382–83.

18 Glacken 1967; Haila 2000; Ingold 2000; Descola 2013; Arias-Maldonado 2015.

19 Descola explains that "both because of [his] distaste for neologisms and also in order to conform with a practice as old as anthropology itself, [he has] chosen to use notions that are already well established but to confer upon them new meanings" Descola 2013, 121.

20 Ingold 2016, 3.

physicality.[21]

Table 2.1: Descola's distribution of existing beings according to interiority and physicality, after Descola 2013, 233, fig. 2.

Ontology	**Interior Relationship Between Human and Non-Human**	**Physical Relationship Between Human and Non-Human**
Analogism	Dissimilar interiorities (gradual discontinuity of the components of existing beings)	Dissimilar physicalities (gradual discontinuity of the components of existing beings)
Animism	Similar interiorities (continuity of souls)	Dissimilar physicalities (discontinuity of forms, which may lead to heterogeneous points of view)
Naturalism	Dissimilar interiorities (discontinuity of minds)	Similar physicalities (continuity of matter)
Totemism	Similar interiorities (soul essences are identical and all members of a class conform to one type)	Similar physicalities (substance and behavior are identical)

Regardless of the advantages or disadvantages of Descola's approach, his articulation of several different ontological modes is just one indication of how any understanding of nature and culture in the ancient world requires consideration of alternative ideas. Ingold's critique favoring a wider spectrum of human perspectives on existence within the world also has ramifications for the interpretation of worked animal objects. Based on ethnographic studies of the Cree Indians of Quebec, whose mindset he considers "hunter-gatherer," Ingold argues that the viewpoints of the Cree are constituted within the natural world, and so these individuals are not constructing their worlds, but rather engaging and "dwelling" within them.[22] An ontology of being in which humans are not separating themselves from the rest of "nature" results in humans and animals participating in the same world; Ingold writes that "within this one world, humans figure not as composites of body and mind but as undivided beings, 'organism-persons', relating as such both to other humans and to non-human agencies and entities in their environment."[23] While it is reckless to apply

[21] Ingold 2016, 10–12.

[22] Ingold 2000, 42.

[23] Ingold 2000, 47.

Cree perspectives to the ancient world,[24] these beliefs offer a stark contrast to the modern nature-culture divide and the Cartesian border between human and animal consciousness. Like much of the work within human-animal studies, Ingold's portrayal of hunter-gatherer mindsets shows how modern ideas about animals are wholly inapplicable to both non-western and ancient societies.

Ingold's view of Cree beliefs is part of an alternative understanding of humans and animals which could be understood as a "relational ontology," in which "animals and other 'things' act as independent, sentient agents and are constituted socially."[25] Within relational ontologies, material culture plays a role that is not merely symbolically constructed, but rather active and agentive. Some non-Western societies practice relational ontologies in which animal materials still carry aspects of the behaviors and actions of living animals. Eduardo Viveiros de Castro describes indigenous Americans harnessing animal aspects or "affects" through clothing made from fur or feathers.[26] Chantal Conneller, drawing on Viveiros de Castro, argues that non-Western ideas of animal bodies have major ramifications for the interpretation of animal objects found in archaeological contexts.[27] As individuals in some non-Western societies view animals as collections of traits that can be harnessed, parts of animal bodies do not become inert when they are separated from the animal. Instead, they still carry the potential to deploy these animal ways of being. Conneller writes that in these societies "things are never made anew, but always transformations of something else."[28]

While the studies of Viveiros de Castro and Ingold are specific to indigenous Americans, they show how ontologies of nature and culture can differ vastly from the understandings produced by the modern Western world. For individuals practicing relational ontologies,

24 For her critique of Ingold, see Oma 2010.

25 Hill 2013, 120.

26 Viveiros De Castro 2004, 482.

27 Conneller 2004, 44, 2012, 119; Viveiros De Castro 2004.

28 Conneller 2004, 119.

material culture (especially animal materials) can act as an expression of the relationships between humans and the landscape. Material culture is the result of an engagement with the landscape, in which individuals are transforming aspects of their worlds. As a result, materials can preserve a spatial or temporal connection to place from which they originated. Just as animal materials have the potential to harness behaviors or traits, they can also continuously embody spatial associations. In Andrew Jones' study of animal deposits at Neolithic Orkney, he argues that individuals used animal remains within grave deposits to express connections to specific landscapes.[29] Jones contends that, within Neolithic Orkney, animals embodied place metonymically in a process which "involved the appropriation of certain powerful and special animals which were part of the lived and encultured landscape, and indicates the highly specific identities constructed between people, the landscape and animals."[30] Within alternate ontologies, there is no wholesale conversion from natural to cultural. As a result, animal materials retain elements of the world from which they originate, spaces which may never have been separated in the minds of individuals in the past.

Partible Animal Bodies

The scholarly focus on the materiality of the human body has emphasized that the remains of humans still retain influence and agency within the social realm.[31] A similar argument has been made for animal materials by Conneller, who has discussed their agency as a result of their connection to their "animality."[32] Conneller argues that animal materials are able to "drag the effects of past encounters with them and present opportunities for future action."[33] Studies of the materiality and alternate cultural constructions of human bodies offer a means of understanding how animal materials "drag" their pasts with them. These

---

29 Jones 1998.

30 Jones 1998, 319.

31 Sofaer 2006, 62.

32 Conneller 2004, 2012.

33 Conneller 2012, 54.

are ideas are in strong contrast to Western notions of immutability, and idea which partially stems from the work of Descartes, who advocated for an "ontology of true and immutable natures—entities which have a determinate mode of being in and of themselves."[34] The idea of an immutable body (human or otherwise) is a major conceptual boundary to any understanding of the ancient cultural contexts surrounding animal materials.

Other perspectives on corporeality, such as those illuminated by Marilyn Strathern's work in Melanesia, demonstrate alternate ways that society constructs the body. Strathern demonstrates how Melanesian conceptions of the body are built upon both the amalgamation of peoples' actions and their relationships with others.[35] This creates the potential for bodies to be partible; Strathern writes that "the condition of multiple constitution, the person composed of diverse relations, also makes the person a partible entity: an agent can dispose of parts, or act as a part."[36] Drawing on Strathern, Julian Thomas argues that an ethos of partibility governed Neolithic British burials, which contained broken and reassembled pottery alongside groups of human bodies that were re-ordered and deposited over a long period; he writes that "both artefacts and bodies could be broken down into parts, and artefacts at least were made by putting different substances together."[37] Alternate perceptions of a mutable or partible body provide a model that, according to Thomas, raises the "possibilities of other humanities."[38] Under an alternative conception of partibility, working animal materials does not represent a deconstruction of the body, but rather a transformation.

Based on both ancient and modern philosophical views of animality, animal bodies may have been viewed as especially partible. Conneller, drawing on Gilles Deleuze and Felix Guattari, describes how animals are not a "series of passive traits," but instead encompass a

34 McGuire 2007, 111; see also Nolan 2020.

35 Strathern 1988, 208.

36 Strathern 1988, 324.

37 Thomas 2002, 42.

38 Thomas 2002, 34.

spectrum of their behaviors.[39] Deleuze and Guattari describe a wolf as "not fundamentally a characteristic, or a certain number of characteristics; it is a wolfing."[40] "Wolfing" describes a collection of behaviors, traits, and "affects," a term used by both Viveiros de Castro (see above) and Deleuze and Guattari. For Deleuze and Guattari, the affect is a "becoming," representing a range of actions in which the animal can be a part.[41] They write:

> We know nothing about a body until we know what it can do, in other words, what its affects are, how they can or cannot enter into composition with other affects, with the affects of another body, either to destroy that body or to be destroyed by it, either to exchange actions and passions with it or to join with it in composing a more powerful body.[42]

The ability to be transformed into something else while retaining aspects of their animality is a fundamental "affect" of animal bodies. This "becoming" was woven into the fabric of religious practice in the Greek world, as objects constructed from worked animal materials were consciously made to interrogate ideas about animality (see § 4.6.4).

2.1.3 Naturecultures

Human-animal studies incorporate a wide range of approaches that are not necessarily drawn directly from anthropological or philosophical disciplines. The work of Donna Haraway, while deeply concerned with ideas of anthropology and philosophy, remains separate from these fields. Often classed as posthumanist,[43] Haraway's work envisions radical re-imaginings of the human body, and the spaces (including the body itself) shared between the human and the non-human. In her *Cyborg Manifesto*, Haraway uses the metaphor of the

---

39 Conneller 2004, 44.

40 Deleuze and Guattari 1987, 239.

41 Deleuze and Guattari 1987, 256. Haraway (2008, 29–30) provides a staunch critique of Deleuze and Guattari, arguing that their view of animals only encompasses "sublime wolf packs," and has nothing but contempt for "little house dogs and the people who love them."

42 Deleuze and Guattari 1987, 257.

43 Haraway (2008, 17) writes: "I never wanted to be posthuman, or posthumanist, any more than I wanted to be postfeminist."

cyborg "as a fiction mapping our social and bodily reality and as an imaginative resource suggesting some very fruitful couplings."[44] One such coupling is a broken boundary between humans and animals; she writes: "a cyborg world might be about lived social and bodily realities in which people are not afraid of their joint kinship with animals and machines, not afraid of permanently partial identities and contradictory standpoints."[45] Haraway's metaphor envisions a future in which the human body is perceived as far more mutable than in current understandings of the modern West, she instead imagines a world in which the body is a result of new constructions.

Haraway's work on the inevitable boundedness between human and other biotic non-humans provides a valuable perspective on the importance of human-animal interaction within the ancient world. Referencing the anthropological work of Strathern, Haraway offers her perspective on the nature-culture divide: the "natureculture."[46] The idea of natureculture is meant to challenge the modern dichotomy of nature and culture, and acknowledges that these concepts are inextricable and cannot stand outside one another.[47] Although she draws on Strathern, Haraway's argument is primarily biological. With the "natureculture," Haraway envisions a history of life that is predicated on the interactions of dissimilar organisms and species; she writes that "co-constitutive companion species and co-evolution are the rule, not the exception."[48] Within a natureculture, humans, animals, bacteria, fungi, and other aspects of life are constantly interacting and shaping one another. As a result, the relationships of humans, animals, and the biotic landscapes on which they play out are all integrated to some degree.

As species cannot exist in isolation, interaction is at the heart of the natureculture. By

---

44 Haraway 2016, 6–7.

45 Haraway 2016, 15.

46 Haraway 2003; Strathern 1980.

47 See also Latimer and Miele 2013, 11.

48 Haraway 2003, 32.

redefining the standard for interspecies interaction and companionship, Haraway argues for the "implosion of nature and culture in the relentlessly historically specific."[49] The history of humans and culture is one constituted in a web of many species. While Haraway's main example of a companion species is the dog, scholars like Anna Tsing argues that fungi have played an integral role as companion species in human history.[50] In a phrase repeated by Haraway, Tsing writes that "human nature is an interspecies relationship."[51] In these world-views, humanity is the result of co-evolution, built on conscious and unconscious encounters and relationships with other species.

Different concepts of nature and culture expressed in Haraway's naturecultures, and the alternate ontologies described by Descola, Viveiros de Castro, Ingold, and Hill all demonstrate a spectrum of beliefs which impart an agentive role to animals and animal materials within the world. Individuals in the Greek world likely did not possess a fully relational ontology, in which humans and animals are both afforded status as persons. Early Greek writers express clear distinctions between humanity and nature; in Hesiod's *Works and Days*, he describes Zeus creating different laws for humans and animals.[52] However, there are indications that nature played an active role in early Greek thought. Mark Payne analyzes the role of the natural world within Homer and argues that there is an effort within the texts to show a nature that "blurs the distinction between the human and the nonhuman."[53] Within Homer's narrative, mythological interludes become moments during which nature is the primary focus; Payne writes, "the natural world, in these Homeric scenes, is an alternative to—rather than a carrier of—human meanings. It is uncanny, sublime, terrifying, fantastic—anything but a quiet frame for human action or something with respect to which

49 Haraway 2003, 16.

50 Tsing 2012.

51 Tsing 2012, 144.

52 Hes. *Op.* 275–80.

53 Payne 2014, 2.

human beings have not yet experienced a sense of their own difference."[54]

Regardless of the specific ontological understanding of animals and the natural world, individuals understood the landscapes around them as a confluence of natural and cultural forces: a natureculture. Moreover, ideas from relational ontologies provide a means of thinking about material culture, especially those that retain a clear connection to the animal world (e.g., fur, feathers, pendants made from teeth). Relational ontologies do not provide a perfect model for understanding ancient Greek perceptions of the natural world or worked animal materials in Greece. Rather, they are what Bruno Latour calls a "bomb" in his description of Viveiros de Castro's use of perspectivist ontology in studies of indigenous Americans.[55] Latour's idea of the "bomb" is an idea "with the potential to explode the whole implicit philosophy so dominant in most ethnographers' interpretations of their material."[56] Although individuals in the early Greek world did not necessarily employ a relational ontology, they had more flexible understandings of humans, animals, and nature than that of the modern world. Ideas from alternate ontologies challenge and de-center contemporary views of nature and animals. These alternative understandings of animals necessitate new interpretations of animal materials within early Greek cultural contexts. Objects made from bone, antler, or ivory may retain qualities of the animals from which they originate, express an active connection to the landscape, or both.

2.2 Alternate Approaches to Wildness and Domestication

While the ideas of what constitute "wild" and "domestic" may have something closer to a shared meaning for the modern West, these terms may not have direct equivalents in the ancient world. The question of how different societies characterize animals, an element of the larger discussion surrounding scientific classification and folk taxonomy, remains a

---

[54] Payne 2014, 3.

[55] Latour 2009, 2.

[56] Latour 2009, 2.

prevalent feature of anthropological and philosophical discourse.[57] As a result, alternative ideas about the wildness or tameness of animals offer other ways with which to think about the relationships between humans and animals in the ancient world.

2.2.1 Transformations of Hunted Animals

Hunting represents a social practice which brings humans into animal habitats, and it is rich with potential for novel or significant human-animal interaction. Across cultures, hunting is infused with ritual and symbolism; it functions as a way of generating and maintaining societal, class, and gender roles.[58] Hunting also offers a venue that provides opportunities for the negotiation of the ontological roles of humans and animals. In societies that practice relational ontologies, ritual frameworks may require individuals to break down the boundaries between human and animal in order to successfully hunt. Based on archaeological and ethnographic research of Torres Strait islanders, McNiven argues that the hunters "manipulate the ontological proximity of humans and prey."[59] Present ethnographic accounts of the Torres Strait Islanders show that they deploy charms made from soft tissue of dugongs to assist with hunting marine mammals (see fig. 2.1). They may also consume parts of the dugong as a way to acquire "special knowledge" of the animals.[60] McNiven argues that the use of the charms and ritual consumption results in a temporary redefinition of "human" and "dugong." He writes:

> [A]n interpersonal cognitive and sensory consubstantiation was established and enabled that directed hunters towards dugongs and dugongs towards hunters. As the ontological boundary between humans and dugongs was momentarily blurred, ambiguous and delicately balanced during these ritual encounters, it is possible that the human identity and personhood of hunters was seen to be in

57 Clark 1988.

58 Turner 1962; Howe 1981; Barringer 2003; Willerslev 2007; Hill 2011.

59 McNiven 2010, 216.

60 McNiven 2010, 221.

an ontologically unstable and liminal state.[61]

In a process specific to hunting, the Torres Strait Islanders use aspects of the animal body to induce a transformation, changing themselves in the process. This redefinition persists beyond just the act of hunting. McNiven shows that the Torres Strait hunters continue their relationship with the dugongs into death, as their graves are often decorated with dugong skulls and ribs.[62]

While Torres Strait hunters purposely altered the boundaries between themselves and their prey, hunters in other cultural groups view their prey as fundamentally similar to themselves from the outset. In Rane Willerslev's ethnography of the indigenous Siberian Yukaghir hunters, he describes how the hunters mimic the movements of their prey to bring the animal into the open. The act of mimicry helps the hunters experience their own bodies and the bodies of their prey simultaneously.[63] Willerslev argues that the Yukaghir practice a form of "animist" relational ontology during the hunt; he defines animism as "the traditional term for this set of beliefs, whereby nonhuman animals (and even nonanimals such as inanimate objects and spirits) are endowed with intellectual, emotional, and spiritual qualities paralleling those of human persons."[64] Unlike the Torres Strait Islanders, the Yukaghir do not undergo any metamorphosis. Instead, the Yukaghir experience both perspectives: the hunter as elk and the elk observing the hunter. Willerslev argues that the rapid shifting in perspective means that the hunter helps to define himself in this encounter; he writes that the hunter "can find himself mainly in the elk, which therefore comes to hold the 'secret' of what he really is. Paradoxically, then, the hunter cannot easily deny the elk's personhood, because this would in effect mean rejecting his own personhood."[65] Both groups stress more

[61] McNiven 2010, 222.

[62] McNiven 2010, 227.

[63] Willerslev 2007, 97.

[64] Willerslev 2007, 2.

[65] Willerslev 2007, 99.

fluid corporeality and distinctly non-Western, non-Cartesian ideas about the boundaries between humans and animals. These two examples are illustrative of the range of perspectives within relational ontologies that individuals may have practiced in the past, both within and outside of the hunt.

Not only are hunters in non-Western societies drawing on different understandings of animals in relation to humans, but they also may view the hunt as something separate from exploitation or domination of prey. Ingold sees the idea of an "essentially antagonistic" relationship between hunters and prey as a major component of a Western narrative of prehistory.[66] As an alternative, Ingold proposes an understanding of hunters and prey as partners in a relationship based on trust. Hunting is an extension of a larger set of interactions between humans and the natural world, in which humans are reaffirming their good relations and their place within nature. He argues that hunting is an "attempt to draw the animals in the hunters' environment into the familiar ambit of social being, and to establish a working basis for mutuality and coexistence."[67] Ingold cites Cree beliefs, in which animals offer themselves to the hunters as part of an ongoing positive relationship.[68] The act of the hunt, while a singular moment in time, is an expression of the hunter's relationship with the animals, which may be lifelong (as in the case of the Torres Strait hunters). Ingold's view of the relationship between hunters and animals mirrors Haraway's notion of "becoming with;" in each, the act of self-definition takes place in a larger pattern of interaction (Haraway's "dance of relating").[69] As an example, activities like antler collection on the landscape (see § 5.4.1) and hunting may have been compatible, non-antagonistic social acts based on a long-term relationship between two species. Hunting and antler collection, regardless of whether both actions are expressions of the same attitude toward deer, both provide venues for the

66 Ingold 1994, 3.

67 Ingold 1994, 12.

68 Ingold 1994, 9; see also Tanner 1979.

69 Haraway 2008, 25.

creation of meaning during moments of interaction. Within a framework for hunting like that which Ingold describes, an unsuccessful hunt would not be attributed solely to human actions. Instead, animals are choosing not to present themselves to hunters; certain non-Western conceptions of human-animal relationships might view being hunted as a decision of the animal. As a result, the animal materials gained through hunting might be seen as a similar extension of animal agency. Animals may be offering themselves up to be transformed by humans into something which does not abdicate its non-human origins.

Within the Greek world, hunting had social and symbolic significance; there is a long record of visual and textual depictions of the hunt. In the Bronze Age, hunting scenes are a common motif across media in Mycenaean art.[70] Furthermore, the boar tusk helmet is both a significant part of iconography, and a distinct aspect of elite Mycenaean material culture (see § 5.4). Yannis Hamilakis argues that hunting fulfilled several functions in the Mycenaean world; he writes that it is a means of "generation and legitimation of authority, but also as a source of metaphors for 'otherness', real or perceived enemies, and warfare."[71] Vase painters of the Protogeometric period rarely depicted figures, resulting in only a few hunt scenes;[72] by the Late Geometric period, hunting imagery re-enters the vase painting repertoire as a regular feature.[73] This continues through the Archaic period, in which scenes like the boar hunt are a common subject for vase painters.[74] Within the corpus of Attic vases, most depictions of boar and deer hunts come from the second half of the 6th century BCE.[75] There are also some examples of hunting within the early textual record, such as

70 Hans-Günter Buchholz 1973; Morris 1990; Hamilakis 2003; Harris 2014.

71 Hamilakis 2003, 244.

72 Kopcke 1977; Coldstream 1984.

73 Coldstream 1994, 91.

74 Specifically the Kalydonian Boar Hunt. For commentary on the François Vase, and other depictions of the Kalydonian Boar Hunt, see Barringer 2013.

75 Barringer 2003, 15.

within the Homeric texts.[76] Judith Barringer demonstrates that hunting in the Greek world was a multifaceted act, connected to societal ideas about gender, class, mythology, and pederastic courtship in the Archaic and Classical Athens; she writes that the hunt is "a defining activity of the masculine aristocracy and that those social connotations pervade its many depictions in art and literature."[77] Barringer's research is based on Athenian vases that postdate many of the notable assemblages of worked animal objects, and her ideas about hunting cannot necessarily be retrojected onto the early Iron Age and early Archaic period. Yet Barringer's work remains a helpful exploration of the social connotations of hunting in the later Greek world. The relationship between animal encounters and self-definition runs throughout Barringer's analysis: hunting served as both a formal and informal maturation rite[78] and it allowed individuals to maintain and express their aristocratic status (specifically in late-6$^{\text{th}}$ century BCE Athens).[79] Hunting is an encounter in which humans enter an animal space and emerge transformed. It underscores the extent to which hunting operates as an aspect of natureculture; Greek societal roles are negotiated through animal encounters, within "natural" spaces.

2.2.2 Domesticated Animals and Domination

While the symbolic importance of the relationship between humans and wild animals is often a more conspicuous aspect of life in the ancient world, domesticated animals were also an integral element of everyday existence in the past. Individuals lived in close proximity to animals that provided food, secondary products, labor, and companionship. While encounters between humans and wild animals may have been a rare occasion, domesticated animals permeated everyday life. The relationships between domesticated animals and hu-

[76] One example being scenes like the story of Odysseus' scar from the boar hunt at Parnassus. Hom. *Od.* 19.389–505. See also Lonsdale 1990.

[77] Barringer 2003, 7.

[78] Barringer 2003, 12–15.

[79] Barringer 2003, 42–46.

mans helped to structure the experiences of individuals in the past. Animals were a key part of the social fabric, connecting people and goods. Agropastoralists frame their lives around the needs of their animals by investing time into raising and training, as well as scheduling grazing and milking. Secondary products such as milk, wool, and even dung were essential aspects of society, creating an interdependency between humans and animals. In Andrew Sherratt's model of a "Secondary Products Revolution," the adoption of milk, wool, and traction had a profound influence on the social structure of the Near East and Europe.[80] Sherratt highlights increased mobility, interregional trade, and the development of new land-use systems as the result of secondary products.[81] Sherratt's focus is primarily functional, although the close connection to domesticated animals and the use of secondary products also brought about a host of new ideologies surrounding animals. While Sherratt's revolution is an early development, the legacy of these entrenched interrelations persists into the Greek world. From the Neolithic to the Bronze Age, Paul Halstead suggests that a range of agropastoral strategies were practiced in Greece, including small-scale forms of pastoralism, mixed farming, and specialized husbandry geared toward milk and wool production.[82] He writes that "socially, the difficulties faced by individual households in maintaining viable breeding herds and in consuming the larger animals (cattle) may have ensured a major role for exchanges of both livestock and meat in cementing relationships between neighbours."[83] The variety of possible agropastoral strategies ensures that animals were a component of many social relationships in the ancient world. Domesticated animals play an active role in physically bringing people and goods together (i.e., traction/draft animals), as well as guiding humans across the landscape (i.e., pastoralism).

A prevalent view of humans and domesticated animals is that these relationships are

---

80 Sherratt 1981, 1983.

81 Sherratt 1981, 185.

82 Halstead 1996.

83 Halstead 1996, 35.

characterized by coercion, enslavement, and dominance.[84] Ingold hypothesizes that non-Western societies practicing some form of agropastoralism (rather than only hunting and gathering) are "founded on a principle not of trust but of domination."[85] He argues that the tools of the pastoralist (e.g., whip, harness, yoke) are to maintain control through physical force. According to Ingold, this hierarchical relationship between humans and domesticated animals is not antithetical to a relational ontology. He cites Karl Marx's belief that the relationship between humans and domesticated animals could not be considered as that of masters and enslaved people.[86] Instead, Marx sees animals as lacking "intentional agency," and therefore cannot see humans as masters.[87] Ingold argues that pastoralists see animals as essentially similar to themselves, so they must exert force to dominate them. He writes:

> They may rank animals hierarchically below freemen, but they are not assigned to a separate domain of being. And although the relations they establish with animals are quite different from those established by hunters, they rest, at a more fundamental level, on the same premiss, namely that animals are, like human beings, endowed with powers of sentience and autonomous action which have either to be respected, as in hunting, or overcome through superior force, as in pastoralism.[88]

Ingold's perspective allows for a world in which domestic animals and humans are both agentive forces, even if humans are constantly restricting the will of animals.

The constancy of human-domesticated animal relationships suggests the potential for humans to have greater emotional investment in the domesticated animals with whom they share their world. Kristin Armstrong Oma sees the complexity of these relationships as some-

---

84 Clark 1988, 17; Tapper 1988; Clutton-Brock 1994, 31; Ingold 1994; DeMello 2011.

85 Ingold 1994, 16.

86 Ingold 1994, 17.

87 Marx 1964, 102.

88 Ingold 1994, 18.

thing other than domination.[89] Contrary to Ingold,[90] Oma believes that societies practicing husbandry are engaged in relationships with animals that are predicated on trust rather than domination.[91] She uses the model of the social contract, in which humans and animals have entered into an unspoken pact based on mutual aid. At the center of this contract is an ethos of trust which acts as the guiding principle of the relationship. Oma draws on actual experiences between humans and animals within disciplines of animal training[92] and equine studies[93] to show that animals are agentive forces who take a part in setting the terms of the social contract. Similarly, Haraway envisions the more mundane interactions between humans and animals ("companion species, *cum panis*, messmates at table together") as the foundation of companion lives between species.[94] Haraway's appeal for attention to the everyday interactions is a reminder that any study of human-animal relationships should not only consider animals in the abstract. It is also a testament to how much the archaeological record cannot provide, as zooarchaeological remains rarely capture the morass of everyday existence that entangled humans, animals, and their products in the ancient world. Moreover, ascribing any degree of importance to animal materials in their cultural contexts should also suggest that humans ascribed importance to the source of those materials, even those derived from a common, domesticated animal.

2.3 Technology and Bodily Practices

The process of creating worked animal objects is yet another space for interaction and the generation or reassertion of human attitudes towards animal bodies. The creation of these

89 Oma 2010.

90 Ingold 1994.

91 Oma 2010.

92 Hearne 1987.

93 Noske 2005.

94 Haraway 2008, 208.

objects is a process that leaves tangible evidence, including tools and waste. The study of these practices necessitates a view of technology as both a social and corporeal act. Moreover, the effect of social environments upon the movements and actions of an individual's body provides the basis for studying technical choices within production environments. These ideas are widespread in anthropology today, but are rooted in Marcel Mauss' *Techniques du corps,* a work in which he articulates that the enactment of physical actions was the expression and reaffirmation of certain social traits. Mauss cites a variety of "techniques of the body" that are seemingly biological, but are actually socially mediated; these include walking, giving birth, and even sleeping.[95] In defining a *habitus* of the body, Mauss describes an assemblage of "physiopsychosociological" (*physio-psycho-sociologiques*) traits of bodily action that are both consciously and unconsciously learned.[96] *Habitus* was subsequently adopted by Pierre Bourdieu in *The Logic of Practice,* to describe an "embodied history" of principles that structure and generate future social arrangements and physical actions.[97] In both Mauss' and Bourdieu's meaning of the term, *habitus* describes a recursive and self-reinforcing relationship between action and structure; enacting *habitus* further reaffirms its place within the life of both the individual and the larger social group which share it. Mauss' ideas about the relationship between the body and the social world, *habitus*, and practice theory have all become central elements within the archaeological study of technology.

In Dobres' *Technology and Social Agency,* she utilizes a practice framework to understand technology as an enacted element of the social world. Dobres views technologies as ways of being, acting as modes of interaction with the material world. They are also simultaneously kinetic, tactile, sensual, and social. Within the social world, technological practices are a locus for the creation of meaning. She writes that "people give meaning to and transform their world through the immediacy of the direct and socially constituted experiences

95 Mauss 2006, 86–91.

96 Mauss 2006, 92.

97 Bourdieu 1990, 56.

they have when working materials."[98] Drawing on Margaret Conkey, Ian Hodder, and Pierre Lemmonier,[99] Dobres stresses the fact that individuals performing technical acts are creating both objects and meanings simultaneously; as a result, the social, functional, and symbolic aspects of technology cannot be separated. Dobres' view of technology as the integration of practice and meaning also draws on Mauss' concept of the "total social fact,"[100] societal practices (e.g., the potlatch) which encompass every institution simultaneously. Mauss writes that "all these phenomena are at the same time juridical, economic, religious, and even aesthetic and morphological."[101] Using both the ideas of *habitus* and the "total social fact," Dobres stresses that technology cannot be segregated from any other aspect of social practice; she writes that "partitioning culture into its components and drawing separate circles around technology, social organization, and beliefs creates an objectified understanding of a decidedly intersubjective dynamic."[102]

As the corporeal aspects of technology are an inseparable part of the social world, the archaeological study of production techniques offers a way to study the social environment of technological practice. Social environments are the arenas for the processes of knowledge transmission among craftspeople of different skill levels. Drawing on several sources,[103] Dobres highlights how gestures are learned within social arenas. Craftspeople can hear, smell, and see the actions of others enacting technical processes around them.[104] Willeke Wendrich describes the way these practices become learned as "body knowledge," or the kinesthetic skills that "build endurance, create habits, and engrain the movements, actions, and work

---

98 Dobres 2000, 97.

99 Conkey 1993; Hodder 1982a,b; Lemonnier 1990.

100 Dobres 2000, 100.

101 Mauss 2000, 79.

102 Dobres 2000, 99.

103 Graburn 1979, 21; Ingold 1993; Lave and Wenger 1991.

104 Dobres 2000, 160.

order in the body."[105] Wendrich stresses that skill acquisition and the creation of body knowledge was born out of "endless repetition."[106] Moreover, both Dobres and Wendrich underscore the "informal" aspects of knowledge transmission, a concept Wendrich asserts is a major aspect of apprenticeship and teaching in the ancient world. Because a craft is learned and practiced within this social environment, Wendrich argues that "enculturation and socialization are key factors and, in some instances, the main driving force for apprenticeship."[107] Consequently, the physical results of apprenticeship and learning, whether prescribed or informal, are only one element in the larger process of skill acquisition and apprenticeship. The study of production techniques that were applied to worked animal objects may elucidate some social aspects of the workshop environment, including relationships of apprenticeship and training.

2.3.1 Working Animal Materials as a Human-Animal Relationship

In the creation of worked animal materials, craftspeople mediate societal attitudes toward animals through technological practice. The technical acts performed by producers are negotiations; they can serve to reinforce societal ideas but also to undermine and subvert them.[108] Animal materials reached producers through several channels of social behaviors, representing different links among humans, animals, and their environments. For example, the relationships between agropastoralists and their flocks are inherently different from that of wild animals and hunters. The animal bodies that ultimately become worked objects may first be butchered and cooked, with some of their parts consumed. These animal materials may well have been part of social structures that dictate dietary practice, along with the stigmas, taboos, and customs associated with diet. The multiple meanings that underlie all

[105] Wendrich 2013, 13.

[106] Wendrich 2013, 13.

[107] Wendrich 2013, 13.

[108] Dobres 2000, 100.

the raw animal materials are further mediated by the producers themselves, who may be removed from some aspects of these relationships. After the objects leave producers' hands, they are deployed by different members of society for a variety of purposes. Understandings and beliefs about the objects and materials may be lost or changed by the individuals who use them. For all these reasons, there are a variety of possible interpretations of worked animal objects. However, perspectives drawn from theories of materiality and technology studies offer a means of understanding the relationships between craftsperson and material, as well as those between individual and object, as potentially active engagements between human and animal. These views are not fully formed ontological positions, but rather a de-emphasis of modern, Western ideas about bodies and materials. Such perspectives cannot capture all the complexity of human-animal relationships of the past, but instead offer alternatives to a tradition of human and animal bodies situated in modern ideas.

Dobres' approach, while sensitive to the inextricable nature of meaning and technical practice, is centered on the human. She stresses that her study of technology is "first and foremost [...] about people,"[109] which is an attempt to highlight the social aspects of technology and fight against portrayals of the past that are disembodied, and remove human agency.[110] However, her anthropocentric approach toward the study of technology may neglect the agency of animals and animal materials present within total social phenomena and technological practice.[111] The ideas of the total social fact and the natureculture are both worldviews in which the boundaries between social, symbolic, and natural are not easily separated. Dobres' emphasis on the socially constituted aspects of technology is important, but viewing society within various naturecultures helps to decentralize the human within technological practice. Shifting the focus from the human does not render technology any less social, rather it suggests a less-restricted idea of the social world; technological practice

[109] Dobres 2000, 1.

[110] Dobres 2000, 30.

[111] For a critique of Dobres' discussion of animal materials, see Conneller 2012, 50.

situated within a natureculture allows for the role of animal agency.

Human-animal relationships, such as those between hunter and prey or agropastoralist and flock, condition how animal materials are made, used, and understood. However, the craftsperson develops their relationship with the animals and the animal world through the technical acts themselves. Through repeated interaction with animal bodies, the craftsperson enters into their own "dance of relating" with animals. For the craftsperson, body knowledge is not just the deep understanding of the pliability of an animal material, but perhaps an extended relationship to the animal body itself. Although the animal is dead, and the craftsperson is only handling a part of the animal body, there is still a "dialogue" between human and animal. Animal materials have an odor, they may retain tendons, marrow, and other fleshy reminders of the animal body from which they originated. They exert agency on the producer who cannot fully dominate the organic aspects of the material, even in the animal's death. As in other human-animal encounters, the dynamic between human and animal material is not fully defined by human agency.

The role of animal materials within the act of production relates to larger perspectives on technology. In his discussion on acts of "making," Ingold argues against the hylomorphic model for production, in which humans impose a mental template on the material and produce the exact object they imagined.[112] Instead, Ingold advocates a "morphogenetic" view of technology which defines humans as participants in a larger dialogue between material and producer.[113] In this model, form is "ever emergent rather than given in advance," an idea that grants agency to materials.[114] In the morphogenetic model, the objects from any act of creation are the result of a conversation between material and maker; the producer and raw materials are both participants in the act of creation. The properties of the raw materials interact with the creator's actions: guiding, pushing, or pulling back against the act of

[112] Ingold 2013, 22.

[113] Ingold 2013, 22.

[114] Ingold 2013, 25.

creation. By acknowledging this dialogue between creator and material, the morphogenetic model highlights the inherent variabilities of raw material. Ingold cites Deleuze and Guattari who similarly reject hylomorphism, and highlight how the qualities unique to any material continuously shape the process of creation.[115] They give the example of how the "variable undulations and torsions of the fibers [guide] the operation of splitting wood."[116] Animal materials are no exception, their heterogeneous composition (i.e., cancellous and cortical bone, see § 5.2.1) is a constant reminder to producers that they are working with something organic and previously living. For the producer working animal materials, no two elements are the same. Even two humeri from the same species are slightly different in size, thickness, and tensile strength. As a primarily reductive craft, producers must constantly work around hidden weaknesses and idiosyncrasies within the internal structure of the animal material.

Animal materials are especially active participants in the interactions between human and substance described in the morphogenetic model. Like other materials, they have physical features which may impede or influence the intentions of the producer. Medieval ivory carvings of Mary and Jesus are some of the best illustrations of this compromise among material, craftsperson, and final product. These carvings show Mary arching backward in an unnatural curve (see fig. 2.2) as a result of craftspeople accommodating the scene within the full shape of an elephant's tusk. As a result, the shape and composition of the material dictated how a canonical scene was rendered.[117] Moreover, contemporary ideas about the qualities of the material similarly impacted how the images of Mary were both created and perceived. Sarah Guérin traces how notions of ivory and purity were negotiated through carving, arguing that there is a tradition of equating the "frigidity" of ivory as a material with the quality of chastity.[118] She cites Hugh of St. Cher's close paraphrase of Pseudo-

[115] Deleuze and Guattari 1987, 408.

[116] Deleuze and Guattari 1987, 408.

[117] Cutler 2011, 185.

[118] Guérin 2013, 62, see note 81.

Jerome, in which he says that "through cold ivory, we are to understand the chastity of the saints."[119] The tactile engagement between craftsperson and material, in which ivory is cold within the hands of the artist, resulted in an ideal medium for depicting the flesh of Mary and other holy figures. As Medieval worldviews helped to meld ideas of spiritual virtue with the technical and kinesthetic aspects of ivory carving, early Greek perspectives of the natural world have likely informed the practice of working animal materials as well. With their natural and somewhat unpredictable curves (Deleuze and Guattari's "undulations and torsions"), animal materials "talk back." Alternative ontologies of animal bodies may view this active participation within the production process as an extension of its life. Animal materials, although physically separated from the living being, may have retained a connection to their organic origin. As a result, the process of creating objects may have been perceived as a time in which producers were still interacting with animals. The creation of worked animal objects may have been a synthesis of the agency of materials with non-Western notions of partible or separable bodies, resulting in an entirely different form of human-animal relationship.

[119] Guérin 2013, 66; text: "quia per ebur frigidum, intelligitur castitas sanctorum"; (Hugh of St. Cher 1703, 118).

Figures

Figure 2.1: Hunter of the Torres Strait with dugong hunting charm. "Ned Waria of Mabuiag Island holding a harpoon (wap) and demonstrating the use of a dugong hunting platform (nat) to Alfred Haddon, Mabuiag, 1888. Note dugong hunting charm hanging from platform," description from McNiven and Feldman 2003, 176, fig. 3. The British Museum, museum number: Oc,B40.11 (© The Trustees of the British Museum).

Figure 2.2: Ivory images of Mary and Jesus: *a*, Virgin and Child, North French, ca. 1250-75 (the Metropolitan Museum of Art, accession number: 17.190.191a-e); *b*, Virgin and Child, North French, ca. 1375 (the Metropolitan Museum of Art, accession number: 17.190.170); *c*, Virgin and Child from the Sainte-Chapelle, before 1279 (The Louvre, image: © 2001 RMN / Jean-Gilles Berizzi).

(a) (b) (c)

CHAPTER 3

The Context of Ivory Production in the Iron Age Mediterranean

The impressive corpus of Levantine ivory carvings found at sites such as Nimrud, Arslan Tash, and Samaria remains a dominant point of comparison within the scholarship surrounding the use of the material throughout the Mediterranean. These ivories have been at the center of an ongoing debate concerning their place of origin, style, and intended audience.[1] The bulk of Levantine ivory production occurred between the 10th and 8th centuries BCE, the period in which ivory only begins to reappear in Greece. In addition to being produced earlier, Levantine ivories were also created and deployed in social contexts particular to the Iron Age Levant. Unlike Iron Age Greece, the Levant was composed of city-states that were ruled by hereditary monarchies centered upon distinct ethnic identities.[2] As a result, the Levantine political landscape created venues and social contexts in which elite individuals could deploy ivories, in a way that was distinct to the region. In Marian Feldman's research on Levantine ivories, she argues that they "were used in settings belonging to the highest elite Levantine groups. The objects appear in structures functionally understood to relate to reception halls, which likely hosted ceremonial banqueting."[3] While Feldman bases her understanding of ivory praxis on the few instances of objects that were actually found in

[1] See Winter 1973, 1976a,b, 1981, 2005; Wicke 2005; Herrmann 2000, 2005; Herrmann, Laidlaw, and Coffey 2009; Herrmann and Laidlaw 2013; Cecchini, Mazzoni, and Scigliuzzo 2009; Feldman 2014; Gansell, Meent, Zairis, and Wiggins 2014.

[2] Joffe 2002.

[3] Feldman 2014, 5.

Levantine contexts, the vast majority of these ivories come from Nimrud, where they had been brought as plunder or tribute.[4] The Nimrud ivories, preserved through being discarded during a late-7th century BCE destruction event, were still displayed centuries after they were originally produced.[5]

As in the Assyrian and Levantine contexts, early Greek ivories were also limited to elite individuals. Many of the earliest examples of post–Bronze Age Greek ivories appeared in rich funerary contexts (e.g., hilt plates at Lefkandi, seals from the "Tomb of the Rich Athenian Lady"), which were marked by conspicuous shows of wealth. However, by the 7th century BCE, ivory objects were primarily associated with votive contexts within sanctuaries. While elites were still exerting control over the creation and use of ivory objects, the dedication of these objects as part of a public, religious action is markedly different from the way that ivory objects were used in Levantine social practices, or their secondary role as captured Assyrian plunder.

Despite the differences between Levantine and Greek ivory production, many of the earliest examples of Greek ivories have strong stylistic connections to Near Eastern traditions. The Dipylon ivories (see § 4.2.2), for example, find strong parallels with ivories from Nimrud. In addition to ivories that draw on Near Eastern artistic traditions, there are also multiple examples of imported Near Eastern ivories dedicated in Greek sanctuaries alongside locally created ivory objects. Regardless of the different ways Levantine and Greek societies used ivory objects, early Greek ivory practice was enmeshed with Near Eastern ideas surrounding the material. The association between early Greek ivory practices and Near Eastern individuals, objects, and styles suggests that the end of the Levantine phenomenon and the re-emergence of Greek ivory carving were not unrelated events. Furthermore, historical and archaeological evidence suggests that Syrian elephant populations, the purported source of ivory for the Levantine craftspeople, were fluctuating between the 8th and 7th centuries BCE;

4 Herrmann, Laidlaw, and Coffey 2009, 5–26.

5 Mallowan 1966b, 387; Herrmann and Mallowan 1974, 3.

changes in raw material supply would have had ramifications for craftspeople across the entire eastern Mediterranean and Aegean. These changes across the Mediterranean require closer examination of the evidence for the sources of ivory in the Iron Age, as does the relationship between industries in Greece and the Near East.

3.1 Sources of Ivory in the 1st Millennium BCE

3.1.1 Hippopotamus

In the Bronze and Iron Age Mediterranean, Syro-Palestine and Egypt were the only sources for hippopotamus ivory.[6] During the Bronze Age, hippopotamus ivory (dentin from the canines and incisors) often rivaled elephant ivory as the dominant material in Egypt and the Aegean.[7] The Uluburun shipwreck, for example, contained six canines and seven incisors of hippopotami, as well as finished objects made from hippopotamus ivory.[8] Many notable objects from the Bronze Age were crafted from hippopotamus ivory, including nearly all of the duck pyxides found throughout Egypt and the Levant.[9] Furthermore, Egyptian craftspeople took advantage of the natural shape of hippopotamus canines to create "wands" or "clappers."[10] On Crete, stamp seals were made from hippopotamus ivory, which Krzyszkowska believes to have been sourced from Egypt.[11] In later works, the "Warrior Heads" from Mycenae were also made from the material.[12] Despite the abundance of hippopotamus ivory in the Bronze Age, there is little evidence for its use in the Iron Age. While records of the material in archaeological contexts are scant, Claude Rolley reports that some of the carv-

6 Krzyszkowska 1990, 20; Lafrenz 2003, 24.

7 Lafrenz 2003, 61–62; Caubet and Poplin 1992, 92; Krzyszkowska 1988.

8 Pulak 1998, 203; Lafrenz 2003, 1.

9 Caubet and Poplin 1987, 299; Krzyszkowska 1988, 233–34, 1990, 78.

10 Krzyszkowska and Morkot 2009, 320.

11 Krzyszkowska 1990, 41, 1984, 213, 2005, 59; Krzyszkowska and Morkot 2009, 320.

12 NM 2468 and NM 2469. Krzyszkowska 1984, 226.

ings in relief from the Halos deposit at Delphi (see § 4.3.11) were made from hippopotamus ivory.[13] Unworked hippopotamus teeth were also found at the Heraion at Samos (see § 4.3.7). Finally, analysis of the worked animal object assemblage from the Kamiros well showed that a small piece of the lower canine of a hippopotamus was cut at both ends and roughly pierced in the center; perhaps this piece was worn as a pendant (see fig. 3.1).[14] Despite a dearth of material evidence, Pausanias references hippopotamus ivory carving made by the 6th-century BCE sculptor Endoeus; he writes: "the people of Cyzicus, compelling the people of Proconnesus by war to live at Cyzicus, took away from Proconnesus an image of Mother Dindymene. The image is of gold, and its face is made of hippopotamus teeth instead of ivory (ἐλέφαντος)."[15] There are two objects from the Methone assemblage that appear to be made from hippopotamus ivory, although the small sizes of both prevent definitive classification.[16] It is possible, and perhaps likely, that other examples of hippopotamus ivory have been misidentified within Greek assemblages. Regardless, elephant ivory is the dominant form of the material in Iron Age and Archaic Greece.

3.1.2 African Elephant

The African continent is home to the bush elephant (*Loxodonta africana*, see fig. 3.2), and its smaller subspecies, the forest elephant (*Loxodonta cyclotis*, see fig. 3.3).[17] The bush and forest elephant are morphologically distinct in many ways, although their size is the most

---

13 It is unclear from where Rolley (1994, 75) gets this information.

14 British Museum accession number: 1864,1007.644.

15 Paus. 8.46.4.

16 ID 85 is a portion of a spectacle fibula, while ID 202 is a small rectangular piece that may be production waste.

17 There is considerable controversy over whether the forest elephant should be considered a separate species. Nancy Todd (2010, 70) argues that these two types of elephants should not be considered separate species, as they have overlapping territories, and may interbreed. However, DNA analysis shows significant genetic divergence, suggesting that they should be separated into two different species; see also Roca, Georgiadis, Pecon-Slattery, and O'Brien 2001.

apparent difference; the forest elephant is considerably smaller.[18] Today, the forest elephant is confined to only a few areas, including small regions of Ghana,[19] the Ivory Coast,[20] and Gabon.[21] In a 1948 article, William Gowers reports that the elephant inhabited the area between the Atlantic coast of Africa and the Nile Valley, suggesting that the geographic range of the forest elephant was much larger in the recent past.[22] Other evidence for the recent distribution of the forest elephant comes from a DNA and stable isotope analysis of tusks found on the *Bom Jesus*, a Portuguese trading ship that sunk in 1533 CE. The study of the *Bom Jesus* demonstrates that the tusks came from forest elephants living in West Africa, the same region in which Portuguese trading posts were located.[23] The scholarly understanding of forest elephant habitats from the recent past is still evolving, serving as a reminder that the subspecies should be considered as a possible source of ivory in the ancient world.

Fossil evidence suggests that the bush elephant was prevalent in the Sudano-Sahelian belt, and was also present in the Sahara and regions of Northern Africa throughout the Holocene.[24] The elephant has strong ecological tolerance, as evidenced by the permanent population of bush elephants living in the Namib desert.[25] This flexible behavior makes it difficult to rule out past elephant habitats in the ancient world where little or no paleontological evidence exists. Within the Sudano-Sahelian belt, Neolithic sites from modern Mali, Niger, Libya, Chad, and Sudan show skeletal evidence for elephant remains.[26] In Egypt, in-

[18] Todd 2010.

[19] Dudley, Mensah-Ntiamoah, and Kpelle 1992.

[20] Merz 1986.

[21] White, Tutin, and Fernandez 1993; Tangley 1997.

[22] Gowers 1948, 177.

[23] De Flamingh, Coutu, Sealy, Chirikure, Bastos, Libanda-Mubusisi, Malhi, and Roca 2020.

[24] Gautier, Schild, Wendorf, and Stafford Jr 1994.

[25] Ishida et al. 2016.

[26] Gautier, Schild, Wendorf, and Stafford Jr 1994, 17–19.

dividuals were exploiting ivory resources and depicting elephants in rock art as early as the 4th millennium BCE.[27] By the early 3rd millennium BCE, the species faced local extinction in the Nile valley.[28] Egyptians subsequently imported ivory from the south, and much of the Bronze Age ivory production relied on the hippopotamus.[29] The later historical record suggests that elephants occupied other parts of Northern Africa until the 1st century CE, as they appear in the writings of Juba II (30 BCE–25 CE) of Mauretania.[30]

Many of the historical accounts contain a persistent notion that the African elephant is smaller than the Asian species, despite the fact that the African bush elephant is clearly larger. However, this feature of the text may indicate that the forest elephant had a much wider geographic range in the ancient world. H.H. Scullard believes this idea may have originated with Polybius' description of the battle between the Hellenistic kingdoms of Ptolemy IV and Antiochus III at Raphia in 217 BCE.[31] Polybius writes that "most of Ptolemy's elephants, however, declined the combat, as is the habit of African elephants; for unable to stand the smell and the trumpeting of the Indian elephants, and terrified, I suppose, also by their great size and strength."[32] This view is echoed by Diodorus Siculus, who writes that "[India] also has an unbelievable multitude of elephants, which both in courage and in strength of body far surpass those of Libya."[33] Strabo, citing Onescritus, also says that Asian elephants are "larger and stronger than the Libyan elephants."[34] While initially believed to be a misunderstanding of the ancient sources, Gowers and Scullard argue instead

27 Lobban Jr. and Liedekerke 2000, 233.

28 Lobban Jr. and Liedekerke 2000, 233.

29 Gautier, Schild, Wendorf, and Stafford Jr 1994, 13; Lafrenz 2003, 31.

30 Mauretania corresponds to the modern-day western/central Maghreb. Gautier, Schild, Wendorf, and Stafford Jr 1994, 13; Casson 1993, 250.

31 Scullard 1974, 60. See also Kosmin 2014, 19–21.

32 Polyb. 5.84.

33 Diod. Sic. 2.16.4. Elephants from Libya (Λιβύη) should be understood as from Africa generally.

34 Strab. 15.1.43.

that Classical authors were discussing the smaller African forest elephant rather than the bush elephant.[35] However, Gowers' and Scullard's theory about the presence of forest elephants at the Battle of Raphia has come into question in light of recent DNA analysis of a population of elephants in Eritrea. The authors of the study found that an isolated population of Eritrean elephants exhibited "species-diagnostic nucleotide sites" specific to the bush elephant (*Loxodonta africana*), rather than the forest elephant (*Loxodonta cyclotis*). Adam Brandt and his collaborators argue that the lineage of these Eritrean elephants casts doubt on the claim that forest elephants were used at the battle of Raphia. However, the authors concede that their data "cannot completely rule out the possibility that forest elephants may have existed somewhere in Eritrea in the past."[36] The combined evidence from scientific analysis of modern elephant populations, historical accounts, and archaeological sources demonstrates that much is still unknown about the distribution of elephant species in the recent and distant past. However, the ivory of both African forest and bush elephants may have been available to individuals trading in the Mediterranean. While Levantine ivory carving is most often associated with the Syrian elephant, African sources cannot be dismissed for any Iron Age ivory carving industry.

3.2 The Syrian Elephant

After the Bronze Age, the reappearance of ivory in Greece is most often connected with the resumption of foreign trade connections and the expansion of Phoenician colonies throughout the Mediterranean. Yet the initial source of this ivory is in question, as the Syrian elephant was thought to have gone extinct in the 9th century BCE. The role played by Phoenicians and other Near Easterners would suggest a continuation of some aspects of the Levantine ivory carving tradition and its associated trade networks. Greek craftspeople began to produce objects that were heavily influenced by existing Near Eastern ivory

35 See Gowers 1948, 173–175; Scullard 1974, 60–63; Casson 1993, 248.

36 Brandt, Hagos, Yacob, David, Georgiadis, Shoshani, and Roca 2014, 88.

work, and some have speculated that non-Greeks were producing and dedicating ivories of a Levantine style at the Idaean cave on Crete (see § 4.3.10). However, by the time ivory production becomes more widespread in Greece (the 7th century BCE), those same practices appear to have ended in the Near East. Furthermore, some argue that the historical sources indicate that the Syrian elephant died out long before 7th-century BCE. As a result, the role of Greek ivory production within the Mediterranean requires a re-evaluation of the ivory sources for Levantine craftspeople, the origins of the Syrian elephant, as well the timing of its extinction.

The Syrian elephant is a contested and imprecise term in modern scholarship. It has been variously described as a form of the Asian elephant (*Elephas maximus*, see fig. 3.4), a subspecies of the Asian elephant known as *Elephas maximus asurus*, and an "Evolutionarily Significant Unit (ESU)." [37] Textual, artistic, and archaeological sources provide evidence for a close relative of the Asian elephant living in southwest Asia, beginning in the Bronze Age and continuing into the early Iron Age. The origins of the Syrian elephant are strongly debated, as some believe it is not native to the region (see below). Disagreements on the timing of the extinction place the event between the 9th–7th centuries BCE. However, the dominant argument is based upon references within the Assyrian annals to elephant hunting, which decrease throughout the 9th century and ultimately stop after Shalmaneser III (859–824 BCE).

3.2.1 Textual and Artistic Testimony

Repeated textual references to Egyptian and Assyrian rulers hunting elephants within the Syrian region offer robust evidence for a population of elephants living between the Bronze and Iron Ages (See Table 3.1). A fragmentary Egyptian source describes Thutmose I (1506–1493 BCE) hunting elephants in the land of Niy, which is thought to be located in the region of Qala^{c}at al-Mudiq in the Orontes valley, although its precise location has not

[37] Çakırlar and Ikram (2016, 180) define an ESU as "a geographically separated, genetically restricted and possibly phenotypically distinct population."

been confirmed.[38] Several more secure sources also describe Thutmose III (1479–1425 BC) hunting elephants. Both the stela of Jebel Barkal and the stela from the temple of Month at Armant describe the Pharaoh killing 200 elephants in the proximity of Niy.[39] Peter Pfälzner argues that the inscriptions imply that elephants were hunted at Niy in the proximity of a lake or other body of water, which may have been in the Ghab basin.[40]

The Assyrian annals provide a fuller picture of the elephant populations of southwest Asia, as they describe several rulers traveling to Syria throughout the end of the Bronze and Iron Ages. In the annals of Tiglath Pileser I (1114–1076 BCE), he writes that "I killed ten strong bull elephants in the land Ḫarrān and the region of the River Ḫabur (and) four live elephants I captured. I brought the hides and tusks (of the dead elephants) with the live elephants to my city Aššur."[41] Similarly, an inscription from the "Broken Obelisk" attributed to Aššur-bēl-kala (1074/3–1056 BCE) describes the ruler hunting elephants and bringing some back alive to Assur.[42] Aššur-dān II (934–912 BCE) also claims to have killed 56 elephants.[43] Between the 10th and 9th centuries, Adad-nārārī II (911–891 BCE) claims that he killed six elephants and writes that "I drove four elephants into an ambush and captured (them) alive. I captured five (elephants) by means of a snare."[44] Furthermore, he claims to have created herds of elephants at Assur.[45]

In the 9th century, Ashurnasirpal II (883–859 BCE) makes a similar claim about forming herds of elephants alongside other exotic animals at the city of Nimrud; he also describes

38 Sethe 1906, 103–4; Gardiner 1947, 158–59; Spalinger 1978, 38; Gabolde 2000, 133; Pfälzner 2016, 173–74; Röllig 1998.

39 Gabolde 2000, 132.

40 Pfälzner 2016, 173–74.

41 Grayson 1991, 26, A.0.87.1 vi 70–76.

42 Grayson 1991, 103, A.0.89.7 iv 5–10.

43 Grayson 1991, 135, A.0.98.1 68–72.

44 Grayson 1991, 154, A.0.99.2 122–127.

45 Grayson 1991, 154, A.0.99.2 122–127.

killing 30 elephants using an "ambush pit."[46] On another inscription found on a stone slab in the North West Palace at Nimrud, Ashurnasirpal II again describes himself killing 30 elephants in a drive; he also claims to have "received five live elephants as tribute from the governor of the land Suḫu and the governor of the land Lubdu."[47] Both Suḫu and Lubdu are slightly east of the region the Syrian elephant is believed to have lived, but could represent a larger habitat range in the past.[48] On the Rassam Obelisk, Ashurnasirpal II also mentions that he received "a herd of domesticated (lit. 'town-bred') elephants."[49]

While Shalmaneser III (859–824 BCE) is the last Assyrian ruler to mention live elephants, there are several notable references related to elephant tribute throughout his annals. These include Shalmaneser III's claims he "drove twenty-nine elephants into ambush."[50] Additionally, in an inscription on a stone statue found at Nimrud, he says he killed 40 elephants from his chariot.[51] Like other Assyrian rulers, Shalmaneser III also describes receiving ivory and elephant hides as tribute. Inscriptions on the Balawat Gates and Shalmaneser III's carved throne base both describe the same instances of tribute from Adini of Bit-Dakkuri and Mushallim-Marduk of Bit-A(m)ukani.[52] Additionally, the carved throne base also shows

---

[46] See Grayson 1991, 223 for details on the inscription and Grayson 1991, 226, A.0.101.2 31b–38a; 40–42 for the text.

[47] See Grayson 1991, 288 for details on the inscription and Grayson 1991, 291, A.0.101.30 90–95 for the text.

[48] Daisuke Shibata (2011, 97) argues that Suḫu was situated in the Lower-Middle Euphrates region. Lubdu is well attested in the Nuzi records, and J.J. Finkelstein (1955, 2) writes that its location is "near the modern town of Tauq, about twenty miles south of Kirkuk, on a tributary of the 'Adheim River. The references to Lubdi in the annals of the Assyrian kings make it clear that the city was situated in the frontier area between Assyria and Babylonia in the East Tigris area, south of the Lower Zab River."

[49] Grayson 1991, 344, A.0.101.75; Reade (1980, 19) speculates that these elephants could have come from Suḫu or Lubdu.

[50] Grayson 1996, 41, A.0.102.6 iv 40–44.

[51] See Grayson 1996, 72 for details on the inscription, and Grayson 1996, 84, A.0.102.16 341'b–347' for the text.

[52] For the carved throne base inscription, see Grayson 1996, 139, A.0.102.61. For the Balawat gates inscription, see Grayson 1996, 31–32, A.0.102.5 vi 5b–7. Bit-Dakkuri and Bit-A(m)ukani are names of Chaldean tribes, see Zadok 1985, 21; Yamada 2000, 261.

a procession from Unqi,[53] in which a man is shown bearing a tusk.[54]

In addition to these examples, one of the most notable references to an elephant during the Assyrian period comes from the Black Obelisk of Shalmaneser III. On the obelisk, an inscription describes a tribute of "female elephants" from Muṣri and is accompanied by a depiction;[55] the panel shows individuals leading an elephant and two apes (see fig. 3.5). The elephant on the obelisk has a small head and ears, with a high back. It strongly resembles the Asian species, although its tusks mean that the elephant could not be a female as the inscription says.[56] Canan Çakırlar and Salima Ikram suggest that the context and the depiction of the elephant eliminate the possibility that it is an African elephant.[57] However, there are some ambiguities between the text and the depiction. The inscription identifies the tributaries as being from Muṣri, which has been translated as Egypt.[58] Others have argued that the Muṣri of the Black Obelisk refers to an area closer to the Assyrian heartland.[59] T.C. Mitchell casts some doubts on this view by documenting the discrepancies between animal depictions and the text of the Black Obelisk, arguing that the portrayal of the Bactrian camels and Asian elephant both support a Muṣri closer to Assyria, while the images of apes are more likely to be associated with Egypt. He also suggests that the sculptor could have been working from a description, rather than having actually viewed the animals depicted on the obelisk.[60] The artist likely depicted an Asian elephant out of familiarity with the species, irrespective of which type of elephant was brought to Assyria. Regardless of the

53 A Syro-Hittite state located in the Amuq valley, also known as Patin, Yamada 2000, 96.

54 Yamada 2000, 257.

55 Grayson 1996, 150, A.0.102.89.

56 Female Asian elephants will occasionally grow small tusks known as tushes, see section 5.2.4.

57 Çakırlar and Ikram (2016, 169), Krzyszkowska (1990, 16), and Moorey (1999, 119) have all identified it as an Asian elephant.

58 Grayson 1996, 150; Tadmor 1961.

59 Moorey 1999, 119.

60 Mitchell 2000, 189.

location of Muṣri, the Black Obelisk provides evidence for an Assyrian cultural familiarity with the Asian elephant.

Furthermore, the idea that Egyptians brought an Asian elephant to the Assyrians cannot be discounted, as there was no longer an immediate supply of African elephants in the Nile Valley. If the individuals from Muṣri are Egyptians, they still could have been transporting an Asian elephant. Evidence for Asian elephants in Egypt comes from a Late Bronze Age painting from the Tomb of Rekhmire, in which a painting shows Syrian tribute bearers bringing a small elephant to Egypt (see fig. 3.6).[61] The elephant is depicted at waist-level height of the tribute bearers, but has large tusks that are incommensurate with its size.[62] In another instance of iconographic evidence from Egypt, an ostracon from the tomb of Ramses III depicts a rough drawing of an elephant, which does not resemble an actual species.[63]

Aside from the Egyptian and Assyrian examples, there are only a few other depictions that predate or are roughly concurrent with the presumed extinction of the Syrian elephant. While two amulets from Kish are described as portraying an elephant, the published photograph does not clearly show any representation of an animal;[64] Dominique Collon remarked that the amulets are "rather indistinct."[65] Barbra Parker identifies an elephant on a cylinder seal from Beth Shean dated to the Late Bronze Age (Level VII), and impressions from the seal appear to show a quadruped with a trunk and triangular ears.[66] However, the size and condition of the carving obscure some of its detail, allowing for the possibility that some-

---

61 Davies 1943, 29.

62 Bökönyi (1985, 161), Moorey (1999, 117), and Çakırlar and Ikram (2016, 170) have all argued that this elephant resembles an Asian species. Çakırlar and Ikram argue that "within the canon of Egyptian art, [the tusks] might have served to identify the animal, and explain its significance and inclusion in the tribute."

63 Erika Fischer (2007, 79–80) argues, contra Richard Barnett (1982, 6), that the features do not clearly show any specific species of elephant.

64 de Genouillac 1924, 25.

65 Collon 1977, 219.

66 Parker 1949, 10.

thing other than an elephant is depicted on the seal. In contrast to these more indistinct possibilities, a fragmentary terracotta statue found in the rubble of the Esarhaddon Palace at Sam'al/Zincirli clearly shows a rider (only the leg is preserved) on top of an elephant (see fig. 3.7). Felix von Luschan states that the statue depicts an Asian elephant, an assessment that appears accurate based on the statue's small ears.[67]

3.2.2 Archaeological and Paleontological Evidence

In addition to textual and artistic testimony, there is zooarchaeological and paleontological evidence for elephants living in southwest Asia during the Bronze Age and into the Iron Age (for a full list, see Table 3.2). The majority of the remains date to either the Middle or Late Bronze Age, although a single, burnt elephant bone from an Early Bronze Age context was also found at Tell Munbaqa. While Peter Pfälzner concedes that a single bone is a limiting piece of evidence, he also argues it "indicates that elephant hunting took place in the gallery forests of the Middle Euphrates Valley as early as the Early Bronze Age IV period (ca. 2400–2000 B.C.)."[68] An Early Bronze Age context from Ugarit may have also contained elephant bones. However, they were identified as either elephant or hippopotamus; these finds are potentially very interesting, but frustratingly unverified.[69]

By the Middle Bronze Age, evidence for post-cranial elephant remains is comparatively more common. At Babylon, a nearly complete tibia from the "Hammurabi stratum" was recovered (see fig. 3.8).[70] Pfälzner suggests that "the bone may have been brought to Babylon by long-distance trade. Deposited singly and in an undamaged state, it must have had a special meaning or function, which, however, remains obscure."[71] Similarly, an intact ulna or

---

67 von Luschan 1943, 68, figs. 80, 81, pl. 35.

68 Pfälzner 2013, 115.

69 Schaeffer 1962, 233.

70 Reuther 1926, 10.

71 Pfälzner 2013, 117.

radius was discovered at Nuzi in a context dating to the 14th century (see fig. 3.8),[72] which Pfälzner argues was imported from the Khabur or Euphrates Valley.[73] Çakırlar and Ikram also studied post-cranial remains from Alalakh (Middle Bronze Age and Late Bronze Age) and Kinet Höyük (Late Bronze Age–Early Iron Age). Based on these remains and others, the authors argue that "the borders of the distribution map of the Syrian elephant [...] include a large area that extends from the southern foothills of the eastern Taurus, the Levantine coastal plain, the Orontes Valley, the Beqaa Valley, the Euphrates Basin, and — perhaps — the Lower Mesopotamian Plain."[74] The majority of the post-cranial skeletal material comes from Late Bronze Age contexts; however, the latest examples comes from a 7th century BCE deposit at Tell Sheikh Hamad. If these remains represent an elephant killed in the 7th century BCE (rather than an older skeleton deposited later), then they postdate the end of Shalmaneser III's reign by over a century. The Tell Sheikh Hamad skeletal material suggests that the extinction date associated with the reign of Shalmaneser III is no longer tenable.

In addition to archaeological evidence, there are a variety of elephant remains (teeth, mandibles, maxillae, and skulls) from a paleontological context at the Gavur Lake Swamp, located near the city of Kahramanmaraş, Turkey.[75] The skeletal material has no cut marks and is thought to be natural.[76] The remains found in the Gavur Lake Swamp are morphologically consistent with contemporary Asian elephants and produced two radiocarbon dates: 1600–1450 BCE and 1570–1400 BCE.[77] These remains offer insight into the natural

---

72 Starr 1939, 199, pl. 28C; Reese 1985, 399.

73 Pfälzner 2013, 118.

74 Çakırlar and Ikram 2016, 174.

75 Albayrak 2012, 367.

76 Albayrak 2019, 197. Çakırlar and Ikram (2016, 175–76) present a potential alternative interpretation of the Gavur Lake Swamp; they suggest that the skeletal material may represent individuals which were killed by humans as part of drive, such as what is described in the Assyrian and Egyptian sources.

77 Albayrak (2012, 367–68) writes "radiocarbon analysis was made on fragments of roots from two *E. maximus* specimens [...] from this locality. The uncalibrated date is 3297 +/- 29 BP (OxA-20592) and calibrated median is 3521 +/- 39 cal BP, 95% confidence interval 3610–3449 for the specimen 2047. The uncalibrated date is 3267 +/- 31 BP (OxA-20593) and calibrated median is 3494 +/- 43 cal BP,

populations of Syrian elephants, which are roughly contemporary with some of the archaeological specimens found in settlements like Qatna.[78] The paleontological assemblage from the Gavur Lake Swamp is the strongest evidence that elephant remains in archaeological contexts represent an actual population living in southwest Asia.

The textual, artistic, and material records all present unequivocal evidence for a population of elephants living in southwest Asia during the Bronze and Iron ages. Moreover, these sources suggest that the Assyrians were attempting to manage and transport elephants. The repeated claims of rulers bringing living elephants back to Assur as well as references to forming herds are indications that Assyrians were attempting to tame or breed elephants in captivity. Additionally, both the reference to Assurnasirpal II receiving "a herd of domesticated (lit. 'town-bred') elephants," as well as the discovery of a depiction of an elephant rider at Sam'al/Zincirli, suggests that others in the Syrian region were attempting to breed or tame elephants as well.[79] As Sam'al/Zincirli is fewer than 70 km from the Gavur Lake Swamp, and only 50 km from the modern border of Syria, the site would have been adjacent to elephant habitats during the Bronze and Iron ages. Perhaps the Sam'al/Zincirli depicts an actual practice, or maybe it represents an idealized notion of elephant management. Regardless, the repeated references to tamed elephants within the Assyrian annals and this statue attest to a continuum of human-elephant relationships playing out in the region of Syria, and being negotiated in the wider Near East at the time.

3.2.3 The Origin of the Syrian Elephant

The proliferation of post-cranial remains in southwest Asia, along with the discovery of the Gavur Lake Swamp site, have further verified textual references to an elephant population living in the Syrian region. However, scholarly opinion on the origin of the Syrian

95% confidence interval 3570–3405 for the specimen 1639." The authors calibrate those date ranges as 1600–1450 BCE and 1570–1400 BCE. See also Albayrak and Lister 2012, 209.

[78] Pfälzner 2016, 168–69.

[79] J.E. Reade (1980, 19) makes this same suggestion based on the statue found at Sam'al/Zincirli.

elephant is still strongly divided between two opposing theories. Some have argued that the Syrian elephant represents an indigenous population left over from a period earlier in the Pleistocene.[80] The other theory is that the elephants were imported from southeast Asia at some point in the second millennium, which is the more dominant view.[81] Proponents of this theory cite the lack of artistic depiction of elephants in southwest Asia and the Mediterranean prior to the 3rd millennium BCE as evidence that "the Holocene elephants of Southwest Asia were not endemic to the region and that the Early Bronze Age peoples of the region knew about them only through their contact with India, or possibly Egypt."[82] However, artistic representations do not seem to be a very reliable proxy for the presence of elephants, as their depictions continue to be rare throughout the Bronze and Iron Ages. The scattered artistic depictions of elephants following the Bronze Age are probably not in response to a recent appearance of a new species. Rather, they are likely a side-effect of the increased movement and connectivity within the Mediterranean during this period.

Scientific research has not given any definitive evidence regarding the origins of the Syrian elephant. However, a series of studies offers some indications that the Syrian elephant population was isolated long enough to cause observable genetic and morphological differences between it and other Asian elephants. DNA analysis of the Gavur Lake Swamp skeletal material found that those specimens share a haplotype with living populations of Asian elephants, but it could not establish whether the genetic drift between the individuals from the Gavur Lake Swamp and modern Asian elephants significantly predated the Bronze Age.[83] The authors write:

> It leaves open the possibility that the Turkish population was established only shortly before its Bronze Age date. However, the estimated age of the common

80 Pfälzner 2016.

81 See Çakırlar and Ikram 2016; Caubet 2008; Caubet and Poplin 2010; Collon 1977; Gabolde 2000; Winter 1973.

82 Çakırlar and Ikram 2016, 169.

83 Girdland-Flink, Albayrak, and Lister 2018.

> ancestor of the Kahramanmaraş haplotype, extending to 58.7 kyr at its 95% lower bound, means that the Near Eastern populations could alternatively have been established, or at least separated from other populations in southern Asia, as long ago as MIS 3[84], assuming that the Turkish population and their direct ancestors were isolated without gene flow.[85]

The authors admit that this data does not settle the issue of whether the Syrian elephant was transported by humans, but they suggest that the elephants would have likely moved "during favourable climatic episode(s), i.e. with sufficient warmth and moisture to provide the required vegetation and drinking water to support the animals along the route."[86]

There are also morphological features of the Gavur Lake Swamp skeletal material that may indicate a degree of allopatric speciation (the creation of a new species as a result of geographic isolation) between Syrian and other Asian elephants. Ebru Albayrak notes a "dot-dash-dot" pattern of tooth wear on the occlusal surfaces of molars that are more common in the teeth of Syrian elephants than in other Asian elephants.[87] Nearly half [88] of Syrian elephant specimens feature the "dot-dash-dot" pattern, while only 4 of 27 (15%) modern Asian elephants show this pattern.[89] Albayrak concludes that "this feature might be attributable to the local or regional features of this extinct westernmost population of *E. maximus*."[90] She also notes some differences in cranial morphology, including a medial mental foramen which is rare in modern Asian elephants, but present in some of the Syrian elephant specimens.[91] While the data concerning morphological differences within Asian elephant species is limited and does not account for the chronological effects of genetic drift,

84 Marine Isotope Stage 3 ≈ 57kya.

85 Girdland-Flink, Albayrak, and Lister 2018, 6.

86 Girdland-Flink, Albayrak, and Lister 2018, 6.

87 Albayrak 2019.

88 Çakırlar and Ikram (2016) report 12 of 27 from the Gavur Lake Swamp and 2 of 2 from Kinet Höyük.

89 Albayrak 2019, 196–97, see table 6.

90 Albayrak 2019, 197.

91 Albayrak 2019, 197–98, see table 7.

this research provides some evidence that the Syrian elephant took on regional characteristics separating it from other Asian elephants.[92]

The genetic and morphological evidence for the Syrian elephant's origin is, at best, only suggestive of an indigenous population of Asian elephants left over from earlier Pleistocene relatives. However, the idea that Syrian elephants were all descended from a transported population represents a significantly more speculative claim. Although the notion of a transported population is more accepted within scholarship, it relies on a series of questionable assumptions about elephant breeding and genetic diversity. Most recently, Çakırlar and Ikram argue that the Syrian elephant was introduced "later in the mid-Holocene as an import from southeast Asia that took hold locally"[93] and also suggest that this process started some time after regular trade contact began between the Indus valley and southwest Asia in the 3rd millennium BCE. Using elephants from southeast Asia to establish a stable, breeding population in Syria would have been an enormous undertaking, as these two regions are nearly 3000 km apart. While this is a considerable distance, there is precedent for elephants making a similar journey. Before the Battle of Ipsus in 301 BCE, Seleucus I Nicator traveled from the Maurya empire (northern India) to Phrygia with 500 war elephants that later fought in battle.[94] Therefore a large number of elephants could traverse the same terrain over a long distance. That being said, Seleucus I Nicator's trip was likely difficult as the food and water requirements of elephants are high. Additionally, this example may not be wholly comparable to a hypothetical journey from southeast Asia to Syria in the Bronze Age. Pfälzner argues that Seleucus was only able to make the journey because he controlled all the territory, whereas "during the 2nd mill. BC this would have meant crossing boundaries

92 For a more robust test investigation of genetic differences between the Syrian elephant and other Asian elephants, these morphological differences should be tested against roughly contemporary (Bronze Age) examples of Asian elephants.

93 Çakırlar and Ikram 2016, 176.

94 Diod. Sic. 110–16; Strab. 15.2.9; Scharfe 1971, 216–17; Kosmin 2014, 18–24, 37.

of numerous independent states and innumerable tribal territories."[95]

While the journey from southeast Asia to northern Syria is technically possible, establishing a stable population of elephants in captivity would have been an arduous challenge in itself. Both elephant breeding behaviors and a lack of genetic diversity would have stood in the way of creating a self-sufficient population. A study of Asian elephants in zoos and sanctuaries found that "poor reproductive success compromises the long-term viability of captive Asian elephant populations," and the authors noted persistent problems with conceptions, stillbirths, and infant mortality.[96] Peter Armbruster and his collaborators attempted to model the long-term reproductive success of Asian elephant populations by performing a population viability analysis (PVA). The study determined that populations may be viable in the short term, but have a higher chance of extinction at larger time scales.[97] Their analysis found that:

> [O]ver a 1000 year time frame, even a population of 100 elephants would have a 6–-17% probability of extinction [...]. Increasing the population size from 100 to 120 elephants decreases the probability of extinction to 4–-7% over 1000 years [...]. These results probably underestimate true risks of extinction, since they assume a carrying capacity of 120% the initial population size, and no habitat loss over the 1000 year period we examined.[98]

Their research also shows that populations smaller than 100 have significantly higher chances of going extinct within 1000 years. According to Armbruster et al., an initial population of 40 elephants has an 80% chance of going extinct in 1000 years.[99] An application of a similar PVA for elephant populations within the Lao People's Democratic Republic shows how a significantly larger population, with less favorable growth rates, can be bound

---

95 Pfälzner 2016, 181.

96 Taylor and Poole 1998, 311.

97 Armbruster, Fernando, and Lande 1999.

98 Armbruster, Fernando, and Lande 1999, 71.

99 Armbruster, Fernando, and Lande 1999, 71, fig. 1.

for extinction in a little over a century. This research concluded that the 600–800 wild elephants and the 500 captive elephants would be extinct in 112 years.[100] These analyses show that only elephants in optimal conditions, with positive growth rates, can maintain a stable population over long timescales.

The Orontes Valley in northern Syria may have been one such perfect habitat for fostering population growth.[101] Yet a significant number of elephants would have been necessary to ensure enough genetic diversity for the species to last 1000 years. This would have required a major trade network for elephants, responsible for transporting hundreds throughout southeast and southwest Asia. If those elephants were transported as early as the third millennium, elephant populations would have had to persist for more than 1000 years. While still feasible in the framework of the PVA of Armbruster et al., such a model does not account for episodes of hunting and capture occurring in the Late Bronze and Iron Ages.[102] Furthermore, an Asian elephant population that was targeted for its ivory would have been exceptionally prone to low genetic diversity, as male elephants would be killed disproportionately. Skewing the sex ratio in elephant populations would have also had other negative effects, as elephants form complex kin groups and social networks.[103] Modern ivory poaching efforts have been shown to disrupt elephant social structures, leading to a series of adverse effects, including higher stress levels and lower reproductive output.[104] The combined requirements for a stable population of transported elephants that were regularly hunted for their ivory necessitates evidence that is currently lacking.

Many aspects of the non-indigenous origin hypothesis for the Syrian elephant are technically possible. Large numbers of elephants were taken on a nearly identical journey in

[100] Suter, Maurer, and Baxter 2014, 1.

[101] Pfälzner 2016, 178.

[102] Armbruster, Fernando, and Lande 1999.

[103] Sukumar 1989, 50–51.

[104] Gobush, Mutayoba, and Wasser 2008; Gobush and Wasser 2009; Archie and Chiyo 2012, 770.

the ancient world. Additionally, population viability analysis shows that 120 elephants have a greater than 90% chance of staving off extinction for 1000 years under ideal conditions. However, this hypothesis also assumes that a large number of elephants were brought to Syria during the 3rd or 2nd millennium BCE; that the elephants successfully adapted to the Orontes environment, and that they routinely mated within a new environment and/or their numbers were supplemented. Furthermore, this theory also presumes that the hunting that began as early as the 15th century BCE did not significantly stress the populations until the 8th century BCE or later.[105] The Syrian elephant would have faced many challenges, including adverse effects of poaching and competition with humans. Yet the combined archaeological, paleontological, and textual record testifies to a population living in Syria for at least a few centuries. These elephants must have been resilient and have had some degree of stability to withstand continuous hunting and capture. It seems unlikely that a group of elephants, transported from nearly 3000 km away, would have been able to establish such a robust community. While the populations could have been supplemented in the centuries leading up to extinction, there is no actual evidence for a significant elephant trade that begins in the third or second millennium and continues into the Iron Age. It seems much more likely that elephants able to stave off extinction for centuries would have had the benefit of significant genetic diversity, and a long period of adaptation to their environment.

The alternative idea that the Syrian elephant was descended from a late Pleistocene population is not without its problems. This theory posits a Pleistocene population in Syria survived the transition from the Pleistocene to the Holocene and existed into the Iron Age. The end of the Pleistocene brought periods of intense climatic shift, including a period of rapid cooling.[106] These changes resulted in significant alterations to the landscape and

[105] Pfälzner (2016, 180–82) expresses a series of similar concerns, and specifically argues against the idea of a managed elephant reserve. Perhaps a more realistic non-indigenous origin hypothesis would involve a second millennium ruler's attempt at creating a reserve, but the elephants rapidly adapted to the landscape and no longer required any management.

[106] Broecker, Denton, Edwards, Cheng, Alley, and Putnam 2010.

vegetation, which would have had profound impacts on a population of elephants living in Syria. A comparable example of a Pleistocene–Holocene survival was suggested for the proboscidean *Stegodon orientalis* in China. However, a re-evaluation of the evidence shows that the *Stegodon* remains were either misidentified or their chronological attribution was not derived from radiocarbon dating.[107] Proving such a survival requires a fossil record with examples dating to both epochs.

Yet there is a significant shortage of Asian elephant (*Elephas maximus*) remains from the earlier part of the Holocene. This is a major lacuna in the evidence and a shortcoming for the theory of a Pleistocene survival; yet it is not a problem specific to the region. *Elephas maximus* is "hardly represented at all in the fossil record"[108] and the "direct ancestors of *E. maximus* [are] virtually unknown beyond subfossil finds."[109] Additionally, *E. maximus* is a late species, whose earliest fossilized specimens only date to the Late Pleistocene.[110] Therefore, the fossil record for the Asian elephant does not have the benefit of a long evolutionary history. The "missing" fossil data for *E. maximus* is an issue for the species as a whole. As a result, gaps in the fossil record should not be a wholly disqualifying factor when considering the Syrian elephant as a survivor from the Pleistocene.

With such a sparse fossil record, there is still an incomplete understanding of the Asian elephant's evolutionary history, further complicating the relationship between *E. maximus* and its Pleistocene relatives. Fossil data for ancestors of the *E. maximus* in the Levant dating to the Early and Middle Pleistocene may indicate a long-lived lineage of Asian elephant species occupying the region. In the Early to Middle Pleistocene (ca. 1.0 Ma–0.78 Ma[111]), indications of several different species of proboscideans (a molar from *Elephas hysudricus*,

---

[107] Turvey, Tong, Stuart, and Lister 2013.

[108] Maglio 1973, 50.

[109] Tchernov, Horwitz, Ronen, and Lister 1994, 333.

[110] Vidya, Sukumar, and Melnick 2009, 898, see supplementary material 10.

[111] Ron, Porat, Ronen, Tchernov, and Horwitz 2003.

as well as a molar and molar fragments from *Stegodon* sp.) were found at the Evron Quarry in northern Israel.[112] Recent discoveries of *Elephas hysudricus* from Ma'ayan Baruch[113] and 'Ain Soda (500–220 ka), provide evidence for an ancestor of *Elephas maximus* living in the Levant for a large portion of the Pleistocene.[114] Adrian Lister et al. do not view the evidence from Ma'ayan Baruch and the Hule Valley as definitive evidence for an indigenous Syrian elephant, but do regard these specimens as examples of proboscidean species that were able to flourish in a Levantine environment comparable to that of the Syrian elephant in the Holocene. The authors write:

> [A]vailable data are too scanty to assess whether this represents continuity of occupation, independent westward expansions from further east, or importation of some or all of the Holocene material [...]. The Pleistocene records do, however, provide a precedent for the natural expansion of *Elephas* as far as the Near East. While not proving the existence of an indigenous Holocene population, it makes it at least ecologically plausible.[115]

Extinction of the Syrian Elephant

The uncertainty surrounding the origins of the Syrian elephant has ramifications for understanding its eventual extinction. If the Syrian elephant represents a Pleistocene holdover, it would have had a robust and established population that managed to survive the instability before the beginning of the Holocene. Whereas, if the Syrian elephant was introduced in the third or second millennium, its history and demise are wholly tied to the actions of humans. Much of the discussion surrounding the extinction of the Syrian elephant centers on

---

112 Tchernov, Horwitz, Ronen, and Lister 1994, 333.

113 Pfälzner (2016, 181) points out that Ma'ayan Baruch is located in the Hule Valley, a marshy area fed by the Jordan River, which is similar to the Beqaᶜa valley in the Orontes. He suggests that both areas would be ideal elephant environments.

114 Lister, Dirks, Assaf, Chazan, Goldberg, Applbaum, Greenbaum, and Horwitz 2013, 128.

115 Lister, Dirks, Assaf, Chazan, Goldberg, Applbaum, Greenbaum, and Horwitz 2013, 128.

the Assyrian textual record. Citing these annals and the relative paucity of elephant depictions in first-millennium art, Collon argues that an 8th century BCE date for the extinction of the Syrian elephant may be too late.[116] Similarly, Anne Caubet and Danielle Gaborit-Poplin favor a 9th century BCE extinction date based upon the Assyrian annals, arguing that ivory objects created after the 9th century BCE must be from African elephants.[117] However, based on the archaeological evidence from Tell Seh Hamad, Çakırlar and Ikram date the event in the 8th or 7th century BCE. Robert Miller also views the extinction of the Syrian elephant as an 8th-century BCE phenomenon, but looks to patterns of human-environment interaction as an explanation.[118] In Miller's model, Late Bronze Age and Early Iron Age settlement patterns in North Syria were favorable for elephant populations. He cites survey data showing small numbers of settlements during these periods, arguing that these depopulated areas provided "optimal conditions for elephants associated with forest regeneration" between 1650–900 BCE.[119] By the 9th century BCE, the Neo-Assyrian empire was gaining influence and resettling the Upper Euphrates. Miller argues that a combination of expanded settlements, increased agricultural activity, and a demand for charcoal driven by iron production would have made the woodlands vulnerable to deforestation and desertification. He also notes that Assyrian resettlement practices may have resulted in non-local individuals attempting agricultural practices in a marginal ecological zone without a long-term understanding of the local environment. According to Miller, all of these factors create unstable conditions for elephant populations and resulted in landscape transformation and extinction.

In light of more recent scholarship on settlement and environmental change in southwest Asia, Çakırlar and Ikram present a refined model for the extinction of the Syrian

---

116 Collon 1977.

117 Caubet and Gaborit-Chopin 2004, 29.

118 Miller 1986.

119 Miller 1986, 33.

elephant.[120] They argue that environmental studies have shown highly variable conditions across southwest Asia, finding Miller's idea of charcoal-driven deforestation unlikely to be a prime agent for environmental change. The authors also use recent survey data to show that many Bronze Age settlements continued to be occupied during the Iron Age, and that the number of settlements also increased. The authors conclude that these changes would have brought humans and elephants in contact more regularly during the Iron Age. The role of elephants as agents of their own extinction is one of the most innovative aspects of Çakırlar and Ikram's argument; the authors cite the stress on the landscape brought on by the elephants' large food and drink requirements.[121] The authors also assert that in addition to being significant factors in landscape alteration, elephants consume resources "that could easily be used to support cattle, sheep and goats, let alone people, thus bringing elephants into direct competition with humans."[122] Çakırlar and Ikram ultimately argue that in the 8$^{\text{th}}$ or 7$^{\text{th}}$ centuries BCE, a combination of factors negatively altered the habitats of Syrian elephants, leading to their demise.

As the demise of the Syrian elephant was a combination of environmental and anthropogenic aspects, direct archaeological and paleontological evidence should be the dominant means of assessing the factors and timing that led to extinction. While many arguments for a 9$^{\text{th}}$ century BCE extinction are based on the Assyrian annals, those arguments are seriously hampered by the nature of the sources. Following Shalmaneser III, there are no references to living elephants or elephant hunting in the Assyrian corpus. Instead, rulers continue to receive ivory and elephant hides. This has been taken, *ex-silentio*, to imply that the Syrian elephant went extinct sometime after the reign of Shalmaneser III; however, this assumption is predicated on limited textual evidence. During his reign, Shalmaneser III twice mentions

---

120 Çakırlar and Ikram 2016.

121 Çakırlar and Ikram (2016, 179) cite the daily diet of elephants as 90-272 kg of food and drink 200 ls of water a day.

122 Çakırlar and Ikram 2016, 179.

receiving ivory "without measure."[123] While these references may be embellishment, subsequent rulers such as Tiglath Pileser III (745–727 BCE), Sennacherib (705–681 BCE), and Esarhaddon (681–669 BCE) also continued to receive elephant hides and ivory.

The political climate of Assyria immediately following the reign of Shalmaneser III, as well as associated problems with the textual corpus may better account for a lack of references to elephants. After Shalmaneser III, Šamsī-Adad V assumed control of Assyria during a particularly turbulent period, which left less textual evidence compared to the previous rulers. Furthermore, the campaigns of Šamsī-Adad V took place in Nairi[124] and Babylonia, rather than the Levant.[125] While the subsequent ruler Adad-nārārī III had more stability and military success (including within the Levant) than Šamsī-Adad V, only a small portion of a single annalistic text from his reign is preserved.[126] Finally, the reigns of the next three rulers— Shalmaneser IV, Aššur-dān III, and Aššur-narari V— are all marked by both further political instability, limited military action, and fewer preserved texts [127] Albert Grayson suggests that a weak monarchy may have driven the scant textual record.[128] The weaknesses apparent in the rulers immediately following Shalmaneser III may have rendered them unable to conduct similar hunting excursions. Following Shalmaneser III, Sennacherib still describes receiving "ivory beds, armchairs of ivory, elephant hide(s), elephant ivory" from the Judean king Hezekiah,[129] and Esarhaddon describes taking ivory from the king of Sidon.[130] While these mentions of ivory may imply a finished or unfinished material,

123 Grayson 1996, 69, A.0.102.14, 155–56a, 1996, 82, A.0.102.16, 280'–85'.

124 Nairi refers to the upper Tigris Basin/the Armenian Highlands around Lake Van, Yamada 2000, 71.

125 Grayson 1996, 180–81, 1982, 268–70.

126 Grayson 1996, 200.

127 See Schramm 1973, 120–24 and Grayson 1982, 276–79 for an overview of this period, as well as Grayson 1996, 239–47 for the limited textual evidence for this period.

128 Grayson 1982, 271.

129 Grayson and Novotny 2012, 65–66, Sennacherib 4, ii 55–58.

130 Leichty 2011, 16, Esarhaddon 1, ii 65–82.

Sennacherib's annals appear to reference both. The absence of the Syrian elephant within the textual corpus following Shalmaneser III seems far more likely to be a result of Assyrian political instability and decline, as well as a paucity of records, rather than a total extinction of the elephant population.

These references to ivory in the later Assyrian annals also complicate the idea of extinction. Perhaps the lack of references to elephants in the later Assyrian annals represents a more nebulous end of the Syrian elephant, in which elephant populations are dwindling. Treating extinction as a singular moment that can be registered within the textual record is not commensurate with how animal populations actually die out. If the Syrian elephant was the result of a small, unstable population, its extinction would have been a foregone conclusion. It is more likely that the combined pressures of large-scale hunting episodes led by Egyptian and Assyrian rulers, anthropogenic landscape change, and the ivory demands of the Levantine industries would have rapidly decreased genetic diversity. These factors would further accelerate the elephants' local extinction, pushing the population to a point from which it cannot recover.[131] A robust population may have been able to weather these challenges for a longer time, which would be difficult to capture within the textual sources. Declining Assyrian political power may have meant fewer episodes of hunting, which could have had advantageous effects on elephant populations. The fact that the final mention of live elephants during Shalmaneser III's reign was followed by nearly two centuries of Assyrian rulers receiving hides and ivory as tribute may be more indicative of a fluctuating population.

3.3 Ivory Sources in Early Greece

With an ambiguous extinction date for the Syrian elephant, and as many as two types of African elephant accessible to traders in the Near East and the Aegean, there is not an

[131] When populations begin to decline, it can signal what Biere, Andel, and Koppel (2012) describe as "the start of a self-reinforced negative spiral towards extinction that is known as the extinction vortex."

obvious single candidate for the source of Greek ivory during the 10th–7th centuries BCE. Moreover, textual sources suggest that the Levantine city-states may have been receiving ivory from non-local sources, as the Hebrew Bible makes references to the ships of Tarshish bringing ivory to Hiram of Tyre.[132] What or where Tarshish represents within the Hebrew Bible is a contentious issue, although recent scholarship has linked it to the Iberian region called Tartessos by the Greeks.[133] If these passages are an accurate portrayal of Tyrian trade in the 10th century BCE, it raises the possibility that African elephant ivory was in use in the Levant throughout the entirety of the 1st millennium BCE. This would indicate that the Syrian elephant was not the sole source of ivory in the early Iron Age. With the resumption of foreign trade connections at places like Lefkandi, and the expansion of Phoenician colonization, it seems likely that the earliest instances of Greek ivory were the result of the same trading networks that furnished the Levantine city-states between the 10th and 8th centuries BCE. As a result, craftspeople in Greece may have been receiving African elephant ivory.

After the extinction of the Syrian elephant, African elephants were most likely the major source of ivory in the Aegean and Near East. Both male and female African elephants grow tusks, making African elephant populations an appealing and productive source of ivory.[134] Later textual evidence suggests that by the 6th century BCE, African elephants were major contributors to the ivory trade in the Aegean and Near East. Herodotus reports that Darius I (550–486 BCE) received a yearly tribute of ivory from Ethiopia, despite the fact that the Achaemenid empire controlled the Indus Valley at the time.[135] Additionally, the 4th-century BCE *Periplous of Pseudo-Skylax* mentions the island of Kerne as a location where Phoenicians would trade with Ethiopians who used ivory for drinking bowls, bracelets, and

[132] 1 Kings 10:22; 2 Chronicles 9:21–9:21.

[133] López-Ruiz 2009.

[134] It should be noted that African bush elephants may have been more difficult to hunt owing to their size.

[135] Hdt. 3.97.

horse decoration.[136] In addition to Ethiopia, North Africa was another likely location for Aegean merchants to acquire ivory. Textual evidence provides some support for this, as the 5th-century BCE Athenian comedian Hermippus cites Λιβύη[137] as a place where much ivory is for sale.[138] Via Naukratis and other Greek settlements on the North African coast (e.g., Tocra and Cyrene), African ivory would have been increasingly accessible to Greek craftspeople.

The Baja de la Campana shipwreck (off the coast of modern Cartagena, Spain) may attest to the dominance of African elephant ivory in the Iron Age. The shipwreck represents one of the most important discoveries for ivory trade of the period, as it contained at least 54 elephant tusks, some of which bear Phoenician inscriptions. The wreck dates to the late 7th to early 6th centuries BCE, and was carrying Phoenician pottery, along with lead ore, tin and copper ingots, and other objects.[139] While found off the coast of Spain, it is not hard to imagine a ship like this being integrated within Greek trade networks, or even those mentioned bringing ivory to Hiram of Tyre. Based on the inscriptions, Mark Polzer views the tusks as votive offerings; he describes some of the inscriptions, singling out five that all contain personal names with theophoric elements: *'štrt*, (possibly) *mlqrt*, *'šmn*, *ḥmn*, and *mlk*. Additionally, Some of the inscriptions contain "a request for blessing or a declaration of devotion."[140] Polzer also highlights the fact that "given that dedicatory objects were meant to remain in the sanctuary wherein they were deposited, how and why they came to be on board the ship remains unknown."[141] Based on the small size of the tusks, Polzer theorizes

---

136 Ps.-Scylax 1.112.9.

137 "Libya" meaning Africa generally.

138 Hermippus, *Comic Testimonia and Fragments* 63.

139 Polzer 2014, 232.

140 Polzer 2014, 232.

141 Polzer 2014, 234; the concept of tusks as votive offerings complicates the idea of raw material trade. It seems unlikely that these tusks would go unused, but perhaps they entered ritual economies as a votive object.

that they may have belonged to the African forest elephant; he also emphasizes that size estimates are not adequate to make a species determination, and that the tusks have yet to be scientifically analyzed.[142] His belief that they belong to an African forest elephant is reasonable, but the similarity in size between the Asian elephant and the African forest elephant leaves open the possibility that some of these tusks may be from the last era of the Syrian elephant ivory trade.

Some of the debate around Iron Age sourcing may be resolved using methods to determine elephant species based on ivory. DNA analysis is regularly performed on modern samples from ivory seizures to determine species, and similar analysis has been performed on Medieval ivories for the same purpose.[143] However, there are several problems with using this method for ancient ivories: these methods are destructive, and there is rarely an abundance of Iron Age ivory that could be used for such a purpose. Ancient ivory is also often strongly degraded, and may not preserve DNA in the same way as more modern specimens. Finally, current understandings of Asian elephant haplotypes are based on a limited number of samples from "far eastern sources."[144] As many aspects of the Syrian elephant (including genetic profile) are not fully understood, it may be difficult to associate genetic material with these populations. Likewise, Rina Rani Singh et al. have used multiple methods of elemental analysis[145] to varying degrees of success.[146] However, Singh et al. as well as Kittisak Buddhachat et al. have both used non-destructive XRF (Non-portable and portable respectively) to create elemental profiles as a means of distinguishing between species.[147] These elemental

142 The tusks were as large as 146 cm in length, Polzer 2014, 232.

143 Winters, Torkelson, Booth, Mailand, Hoareau, Tucker, and Wasser 2018; Ewart, Lightson, Sitam, Rovie-Ryan, Mather, and McEwing 2020; Cutler and Götherström 2008.

144 Cutler and Götherström 2008, 75, this was as of 2006, and more may have been added since.

145 Inductively coupled plasma-AES, Inductively coupled plasma-MS, and other forms of elemental analysis, many of which are destructive.

146 Singh, Goyal, Khanna, Mukherjee, and Sukumar 2006.

147 Both studies, Singh, Goyal, Khanna, Mukherjee, and Sukumar 2006; Buddhachat et al. 2016, had the advantage of using entire tusks.

analysis studies are strongly tied to diet, and may be inadequate for elephant species from ancient environments.

In addition to the methods outlined above, the Schreger pattern (see § 5.2.4) also offers a reliable, non-destructive means of determining elephant species using ivory. By measuring the angles of the Schreger pattern in ivory, researchers have been able to distinguish among proboscidean species.[148] Singh et al. found the greatest variation in Schreger angles between Asian and African elephants by using measurements taken from the outer region of the tusk; they report that the "mean Schreger angle value on the outer portion of ivory is more than 120° in African and less than 120° in Asian elephant."[149] While Singh et al. do not provide their raw data, a graph indicates no overlap between the Schreger angles taken at the outer zone, such that the smallest angles measured in African ivory samples were larger than the largest angles in Asian samples. The authors do not report an exact average outer Schreger angle for Asian elephants, although the graph shows a mean around 110°. Martina Ábelová's work on mammoth ivory showed variation of Schreger angles with respect to the distance from the pulp cavity (i.e., outer and inner angles), as well as changes in angle depending on whether measurements are made at the proximal or distal end.[150] As a result, Dinesh Kumar Jha et al.'s study of Asian elephant tusks provided a wider range of average Schreger angles because the authors took measurements at different places along both axes of the tusk.[151]

Despite this growing body of results, multiple factors complicate this analysis for sourcing ancient ivories. None of these studies differentiate between African forest and bush elephants, which could be problematic if the Schreger angle of African forest elephants were

---

[148] Espinoza and Mann 1993; Trapani and Fisher 2003; Singh, Goyal, Khanna, Mukherjee, and Sukumar 2006; Ábelová 2008.

[149] Schreger angles are smaller toward the interior of the tusk, and larger at the edge. Singh, Goyal, Khanna, Mukherjee, and Sukumar 2006, 150.

[150] Ábelová 2008.

[151] Jha, Kshetry, Pokharel, Lal, and Panday (2017) found an average of 95.60°, and 61.9% of measurements fell between 90° and 110°.

similar to that of Asian elephants. These studies also benefit from the researchers' ability to cut flat transverse surfaces into the ivory and standardize their measurements with respect to the location of the angle within the tusk (i.e., recording whether the angle is from a region closer to the outside, central axis, as well as the proximal or distal end). Finally, these measurements are also made using complete tusks that come from modern collections. This technique may be unavailable to many researchers studying ancient ivories, as they are often carved along curves, and their flat surfaces rarely align with the transverse axis.[152] Additionally, craftspeople nearly always remove the outer cementum layer, so it is often impossible to determine whether carved ivory comes from closer to the inside or the outside of the tusk.

While this method is complicated for ancient ivories, the Methone assemblage affords some opportunities for Schreger pattern analysis. As much of the Methone assemblage represents production waste, many pieces of ivory exhibit transverse cuts and preserve their cementum layer. Despite the quantity of ivory fragments from Methone, the evidence for the use of a specific elephant species at the site is lacking. Based on a small sample of measurements, there is some suggestion that the site was receiving ivory from both African and Asian elephants. One piece of ivory dating to the 7th century BCE (ID 188) is cut transversely and appears to come from a more distal part of the tusk (toward the tip). ID 188 is a transverse cross-section exhibiting both the center of the tusk and the outside border (the cementum-dentin junction); the piece is only around 3 cm in diameter. The visible Schreger lines are roughly equidistant from the center and outer edge of the tusk. As a result, it is difficult to assign the Schreger lines to either the inner or middle section of the tusk.[153] The angles of ID 188 average about 77°, which is smaller than most central

152 Some statues are an exception, as many follow the natural curve of the material and have a flat base created from a transverse cut across the tusk.

153 The middle is perhaps the more accurate characterization of these Schreger lines.

angles for both African and Asian elephants as recorded by Singh et al.[154] As an inner angle measurement, 77° is possible lower end value for African elephants, but slightly larger than the largest inner angle measurement for an Asian elephant.[155] In Jha et al.'s findings, 77° is smaller than the majority of observed angles (78.25% of Schreger angles were less than 80°) in Asian elephants.[156] While ID 188 does not provide unequivocal evidence for either species, it exhibits acute angles that are more associated with Asian elephant ivory. The West Hill also produced a piece of ivory that may provide better evidence for African elephant ivory at Methone. ID 89 was produced utilizing a transverse cut from the outer edge of the tusk, containing a thick layer of cementum. The Schreger lines are visible but diffuse; as a result, only an approximation of the angle is possible (between 120° and 140°). Of the measurements of the Schreger angles from tusks of Asian elephants by Jha et al., 24% were 110° or larger, but with only 3% larger than 120°.[157] Additionally, Singh et al. found no examples of Asian elephant Schreger angles at 120° or larger. In the case of ID 89, it seems more likely that this represents a piece of African elephant ivory.

The ivory found at Methone does not provide definitive evidence that it originated from either species of elephant. Instead, it leaves open the possibility that artisans at Methone handled ivory from both species over the course of the history of the site. Methone may have begun receiving Syrian elephant ivory shortly before its extinction. Afterward, African elephant ivory became the only source in the Aegean. It seems likely that both African and Syrian elephants were supplying ivory at the same time for a large part of the Iron Age. While the 7th century BCE brought a marked increase in the amount of ivory production both at Methone and across Greece, it is not necessarily related to the Syrian elephant's extinction.

154 Singh, Goyal, Khanna, Mukherjee, and Sukumar 2006, 147.

155 Singh, Goyal, Khanna, Mukherjee, and Sukumar 2006, 147.

156 Jha, Kshetry, Pokharel, Lal, and Panday 2017, 101.

157 Jha, Kshetry, Pokharel, Lal, and Panday 2017, 101.

3.4 General Patterns of Ivory Use in the Greek World

From the 11th century until the first half of the 8th century BCE, the corpus of ivory objects is limited in form, as well as in their depositional patterns. Following the disruption at the end of the Bronze Age, evidence for ivory production is sparse throughout the Submycenaean and Subminoan periods. Moreover, it is difficult to discern whether ivories dated to this transitional period represent heirlooms or were the products of trade with the East. Wealthy burials make up the vast majority of the contexts in which ivory was found. These burials, such as Tomb 219 at the Knossos North Cemetery; the cremation beneath the Toumba building at Lefkandi; the Tomb of the Rich Athenian Lady; and the Isis Grave at Eleusis, illustrate the extent to which ivory was limited to elite members of society. Additionally, the distribution of the material is not particularly widespread, as many of the sites (Homolion, Lefkandi, Tiryns, Eleusis, Argos, Corinth, and Athens) in which ivory was found are located near a coastline.[158] The use of ivory in this early period also takes on recognizable forms, some of which may be borrowed from previous periods. One of the most dominant uses of the material is in the practice of burying an individual with two iron pins topped with ivory, as seen in graves from Athens, Tiryns, Argos, and Homolion. Imma Kilian-Dirlmeier argues that the paired pins are seen in the Late Bronze Age, and that the Protogeometric practice developed as a result.[159] Furthermore, Irene Lemos sees the combination of iron with bone/ivory as an older practice, but suggests the ivory pins from the Protogeometric period could have been imported.[160] Sword pommels also represent a popular form of ivory burial good, and many of the pommels correspond to Bronze Age sword forms as well.[161]

158 This is also a function of which sites were occupied in the Protogeometric/Sub-Protogeometric periods. For Homolion, see Theocharis 1961/1962, 175. For the other sites, see § 4.2.

159 Kilian-Dirlmeier 1984, 80.

160 Lemos 2002, 108.

161 Many swords similar to the Naue II-type persist into the Archaic period in iron forms. Kilian-Dirlmeier 1993, 126.

The ivory assemblage from Lefkandi also exhibits commonalities and parallels with Bronze Age objects. Painted ivory fragments found in the Submycenaean S Tomb 38 may be evidence for the persistence of Bronze Age practices. Painted ivory has few comparanda in the Iron Age assemblage of Greece,[162] but some Mycenaean examples preserve traces of red staining; Jean-Claude Poursat cites several examples of colored ivory from Mycenaean contexts, and connects this practice to the Homeric metaphor of Carian or Maionian (Anatolian) women staining ivory with a red or purple (φοίνικι) dye.[163] However, Jane Carter sees this Homeric image as a reference to contemporary Levantine practices, rather than a preserved memory of the Late Bronze Age.[164] In addition to the colored ivory, the hilt plates found at Lefkandi are associated with the "Naue's Type" or "Type II" sword form, an object with its roots in the Late Bronze Age. While the examples of this sword from Lefkandi differ from their Bronze Age antecedents,[165] the ivory hilt plates (especially T 26,18) strongly parallel earlier examples made for Naue's/Type II swords found at Mycenae and other sites.[166]

The presence of ivory at Lefkandi is undoubtedly important for assessing the role of foreign trade and evaluating the degree to which Euboea may have played host to various non-Greek individuals, but many of the objects at Lefkandi do not represent a development in ivory production or a new idea adopted from the Near East. As objects, the ivories themselves are not *orientalia,* in the way of many of the other high value objects found at the site. Instead, they reflect indigenous ideas of ivory production; it is even possible that the hilt plates were reused from a Bronze Age weapon or that the fragments of ivory from the Submycenaean tomb were an heirloom. Lefkandi undoubtedly had a significant amount

---

[162] Red paint has been noted on ivory found at Lefkandi (see § 4.2.1), and examples of stained astragali were found at both the Corycian and Koroneia caves (see § 4.4).

[163] Poursat 1977, 48; Hom. *Il.* 4.127.

[164] Carter 1985, 11–13.

[165] The Lefkandi examples are made from iron rather than bronze, and similar versions in iron were made into the 8th century BCE. Catling and Catling 1980, 253.

[166] See Krzyszkowska 2007, 30–31, nos. I-20, I-21, pl. 6; for other examples, see Sandars 1963.

of ivory for the period, yet the Kerameikos assemblage is not wholly dissimilar. Based on the limited evidence at Lefkandi, it is difficult to evaluate whether the site reflects a true resurgence in the ivory trade. Moreover, the weight that Lefkandi carries within scholarship may be an aggrandizing factor in how its ivory assemblage is perceived.

3.4.1 Practices in 7th–6th Centuries BCE Greece

By the 7th century BCE, ivory was no longer a scarce material in Greece. While in the previous centuries ivory was most often deposited in funerary contexts, ivory found in contexts dating to the 7th and 6th centuries BCE was more often the result of a dedicatory practice. At sites such as the sanctuary of Hera Akraia at Perachora, the Artemision at Ephesus, the sanctuary of Artemis Orthia at Sparta, and the Artemision at Thasos, excavators found large numbers of ivory objects in diverse forms (see fig. 3.9).[167] The large assemblages of the 7th century BCE are evidence that ivory was more widely available during this period, and further illustrate the degree to which Greece had re-entered trade networks integrating the whole of the Mediterranean. Moreover, this increase in ivory availability during the 7th century BCE is visible within the Methone assemblage. The *Hypogeion*, a well-stratified deposit, shows limited amounts of ivory in the earliest levels (late 8th/early 7th century BCE), but larger amounts of ivory in the later levels. Evidence for the creation of ivory objects was also found in contexts dating to the 7th and 6th centuries BCE across multiple areas of the site, although there is some indication that the sudden increase in ivory availability was short-lived in some areas (see § 5.6). By the first quarter of the 6th century BCE, Sparta apparently lost its access to ivory resources; bone objects supplant ivory ones within the later strata at the sanctuary of Artemis Orthia.[168] Dawkins theorizes that Tyre's capitulation to

[167] The Artemision at Thasos had nearly 100 ivory objects, while the other sites all had over 100 objects. These numbers are based on a combination of published sources and research within different museums; the actual amount of recovered ivory at these sites may be much higher.

[168] Dawkins 1929a, 203; Barnett 1982, 60; Carter 1989, 365.

Nebuchadnezzar in 573 BCE affected the supply of ivory.[169] However, inferring changes in ivory supply from one assemblage relies on many assumptions. Based on other 6th-century BCE contexts, such as those at Methone and Delphi, ivory continued to be in use during this time. The apparent shortage at Sparta may reflect a change in specific trade relationships, rather than a more systemic cause such as Dawkins suggests.

The earliest ivory works of the 7th century BCE share several features, indicating that they were united by similar production practices. Many of the early ivory objects are fairly flat, such as in the case of the Spartan plaques, spectacle fibulae, and circular seals. The few early objects carved in the round (e.g., the Perachora Sphinx,[170] the statuettes from the sanctuary of Artemis Orthia,[171] and the recumbent animal figurines found across sanctuaries, see § 4.6.4) tend to be small and compact, with minimal negative space. The small size or constrained dimensions of these objects allowed craftspeople to maximize the material, potentially producing many smaller objects (e.g., circular seals) from a single tusk or portion of ivory; this approach to ivory manufacture might be a response to a limited supply or availability of the material. However, the evidence from Methone implies that craftspeople were processing significant portions of the tusk, suggesting that supply was not an issue. Moreover, the abundant waste (sometimes in large pieces) at Methone suggests that craftspeople were not overly concerned with using every available piece of ivory. While Methone is only a single site, this attitude toward the material permeates the earliest sanctuaries: Perachora and Artemis Orthia both have large assemblages of small ivory objects. The tendency to create smaller objects may have also been a combination of risk-management and unfamiliarity with the material. The 7th century BCE marks the first time that ivory was readily available in the Greek world since the Bronze Age, and the craftspeople responsible for the creation of these objects would not have had the benefit of generations of communal knowledge sur-

169 Dawkins 1929a, 203.

170 Dunbabin 1940, 403–4, no. A 1, pl. 171.

171 Dawkins 1929a, 219–22, pls. 121–125.

rounding the craft. Ivory carving was effectively "rediscovered" in 8th-century BCE Greece, and these objects represent the nascent stages of the craft. Finally, the ivory practices of the 7th century BCE may also have been a result of dedicatory practices, as craftspeople may have created multiple, smaller items if a large number of individuals wanted to dedicate ivory objects.

3.4.2 Imports

While many of the ivories of early Greece are thought to be made by Greek craftspeople, some of these objects also appear to be imported. The presence of imports within Greek sanctuaries is well documented in other materials, and it is thought to be the result of several factors. Imports may have been gifts from foreign rulers, such as in Herodotus' description of King Midas sending a throne to the Oracle of Delphi.[172] Philip Kaplan asserts that gifts from foreign rulers might have been dedicated for the purpose of gathering information, as sanctuaries like Delphi were centralized meeting places for the Greeks. Kaplan also cites foreign dedications as a means to cement alliances, and recruit Greek mercenaries.[173] Similarly, Sarah Morris argues that "such piety towards Greek gods by foreign rulers, at least in the Iron Age, allowed them to establish permanent relations of prestige not possible through political channels, given unstable regimes (tyrants) or rotating officials in democratic cities."[174] The dedication of foreign objects may have also been the result of a larger pattern of elite consumption of Eastern goods within Aegean sanctuaries.[175] A series of factors in the 8th century BCE (e.g., colonization, expanded Phoenician settlement and trade, use of Greek mercenaries) integrated Greeks within widespread trade networks, and exposed them to foreigners and their goods. These factors are aspects of an increasingly connected Iron Age

[172] Hdt. 1.14; for other textual references to foreign dedications, see Morris 2006, 72.

[173] Kaplan 2006, 142–52.

[174] Morris 2006, 72; see also S. P. Morris 1997, 65–66.

[175] Crielaard 2012.

Mediterranean, which allowed for foreign objects to be dedicated in Greek religious contexts.

Imports (ivory or otherwise) were never fully absent from the Greek world following the Bronze Age, and ivory imports represent early dedications at places like the Idaean Cave. As an inherently foreign material, nearly any ivory object within the Greek assemblage represents participation in a long-distance trade network. As a result, imported ivory objects appear in larger numbers around the same time that Greeks were making more objects in the material. The Idaean Cave appears to be one of the earliest centers for these imports, as many of the objects date to the 8th century BCE.[176] However, the date when these objects were created (based on stylistic features) should not be assumed to equate to the time of their deposition. Levantine ivory goods may have been displaced by the political forces of Assyrian expansion for quite some time before merchants brought them to Greek shores. The assemblage from Samos speaks to this chronological lag between creation and deposition with items such as the 9th century BCE bronze horse blinker found in a 6th century BCE context.[177] Ivory objects from Samos also can be shown to have a large gap between creation and deposition: a Bronze Age, Rammeside-period lion from Egypt was found in a late-7th/early-6th century BCE deposit at the Heraion.[178] For this reason, imports are not a reliable proxy for the existence of a specific foreign group at a site or the presence of non-indigenous craftspeople (as has been argued for the Idaean Cave). These objects remain as captivating today as they were when they were produced in the 2nd millennium; their appeal would not have been lost to merchants or other individuals wishing to profit off of them. As a result, an appealing ivory object might circulate for a long time before it was dedicated within a Greek sanctuary.

Several scholars have attempted to identify which objects represent imports within sanc-

---

176 Sakellarakis 1993, 348.

177 Eph'al and Naveh 1989.

178 Andreas Furtwängler (1981, 126–28) argues that it may have been stolen from a royal grave, before being brought to Samos.

tuary assemblages, most notably Emil Kunze, R.D. Barnett, Brigitte Freyer-Schauenburg, and Irene Winter.[179] Many of the scholars' observations are well supported, and likely reflect the reality of imports among the dedications. However, as in the debate surrounding the North Syrian and Phoenician carving styles, some objects do not clearly fit into either Greek or non-Greek styles. Feldman's model for ivory practices in the Near East offers a somewhat comparable situation for the relationship between Greek sanctuaries, imports, and ivory carving practices. Feldman envisions "the greater Levant to have been crisscrossed by multiple intersecting and overlapping (but not necessarily homogenous or monolithic) networks of skilled practices."[180] As these networks did not cleanly align with political or national boundaries, practices (i.e., habitus) of ivory carving were ways to negotiate and "engender collective identity."[181] In the process, "regional styles" become blurred and intermixed, effectively de-regionalized.

Greek sanctuaries may have provided a similarly networked infrastructure that crosscut political boundaries, but were still held together by religious practices. At their start, sanctuaries acted as nodes that "connected major centers to key points in community territory (villages, border locations, roads and passes)."[182] These sites acted as loci for local and non-local Greeks, as well as foreigners, to perform rituals or attend festivals, make offerings, and see the dedications of others.[183] The network of Greek sanctuaries may have been similarly "crisscrossed" by a community of ivory craftspeople (some non-Greek), which led to the creation of objects that did not conform to any specific style, or appeared to emulate non-Greek designs. Ivories found at sanctuaries in East Greece like Ephesus and Samos best exemplify these blended styles. Regardless of the complications of interpretation, the

179 Kunze 1936; Barnett 1948; Freyer-Schauenburg 1966a; Winter 1976b.

180 Feldman 2014, 40.

181 Feldman 2014, 57.

182 Morgan 2009, 61.

183 Malkin 2011, 20–21.

non-mainland assemblages stand out as containing more examples of unambiguous imports, with the Heraion of Samos (see § 4.3.7) and the Idaean Cave (see § 4.3.10) having the most numerous examples of these objects. The sanctuaries at Ialysos and Lindos also contain several imports and objects with Near Eastern influences (see § 4.5). Finally, Thasos shows some objects which have been identified as both imports and Greek adaptations of Near Eastern models (see § 4.3.9).

3.4.3 Changes in Ivory Carving at the end of the 7th Century BCE

By the last quarter of the 7th century BCE, craftspeople were creating different types of ivory objects and approaching the material in new ways. Much of the ivory carving from this period no longer reflects attempts to maximize the creation of smaller or flatter objects. Instead, objects like the chryselephantine statues and cut-out reliefs from Delphi relied on large amounts of ivory to create singular objects. In the case of the Delphi statuary, craftspeople used considerable sections of ivory to create components of the work, resulting in a statue composed of multiple tusks. By the end of the 7th century BCE, craftspeople understood how to assemble ivory on a scale larger than life-size. This approach to the material suggests the craftspeople were unafraid to risk a substantial portion of ivory within their work. Furthermore, they were skilled at incorporating or working around the natural features of the ivory, such as the pulp cavity, a technique which can be seen on the back of one of the heads from Delphi. Not only does the evidence from the end of the 7th century suggest that more complex techniques were becoming increasingly widespread, but also larger and fully three-dimensional ivory carvings were more likely to be used to render images of humans and deities.

At the end of the 7th century BCE, there is an increase in figural representations in the round, many of which were part of composite objects. While some of the earliest post–Bronze Age ivories were figural representations of a female figure in the round (the Dipylon statuettes), these objects remained mostly anomalous until the end of the 7th century BCE.

There are some earlier examples of ivory depictions carved in the round, such as the Daedalic statue from the Idaean cave and a carving of a rider atop a horse found on Chios. The rider carving was found in an early level of a clearly stratified deposit, leading John Boardman to date it to the mid-7th century BCE at the latest (see § 4.3.8). Additionally, other earlier representations of deities exist, including large numbers of goddess figurines found at the sanctuary of Artemis Orthia.[184] However, not all of those goddess figurines were carved in the round, and all were made from bone rather than ivory. It is not until the end of the 7th century BCE that ivory objects rendering humans in the round (or mostly in the round) become more commonplace, and these often served as components of larger items. The Halos deposit exemplifies this trend: the chryselephantine group incorporates multiple sections of ivory and an array of other materials. The lion tamer statue also has a large rectangular mortise at its back, indicating it was an attachment to something else.[185] Moreover, the cut-out reliefs found within the deposit are also thought to be an element of a chest or some other, larger item (see § 4.3.11).[186]

Objects from other assemblages also show this emphasis on creating more complex statuary, many of which were composite works. One of the most notable pieces of ivory work, the kneeling youth found on Samos, has been reconstructed as a component of a kithara.[187] Like many of these more advanced works, the kneeling youth has been dated between the last quarter and the end of the 7th century BCE.[188] Its curved pose indicates that the craftspeople understood how to create objects carved from large, singular portions of the tusk. The hollow cavity at the head of the object may even be the remnant of the pulp cavity, cleverly repurposed as part of its use as a kithara. This method of ivory carving

[184] See section 4.3.1. Additionally, a single example of a similar object was found at Perachora. Stubbings 1940, 406, no. A6, pl. 172.

[185] Amandry 1944, 151.

[186] Carter 1989.

[187] See Ohly 1959.

[188] Carter 1985, 208.

is markedly different from objects like the Dipylon ivories, which do not incorporate the pulp cavity at all. On Crete, the ivory heads found at Eleutherna are another instance of complex, figural ivory work dating to the end of the 7th century (620–580 BCE). Like the other examples, these faces were thought to have been a component of a larger couch.[189] Further evidence for composite statuary comes from the sanctuary to Korkyrean Apollo at Mon Repos on Corcyra, where an ivory face was found that was intended to be inserted into a larger object using a mortise. The sanctuary bears a mid-5th century BCE destruction date, and Kenneth Lapatin dates the head to the first half of the 6th century BCE.[190]

The choice to use ivory in larger designs that incorporate the natural shape of the material is likely the result of several interconnected factors. Changes in the availability of ivory may have led craftspeople to experiment with the material. As Greek colonization on the African coast increased toward the end of the 7th century BCE, the supply of African ivory likely expanded within Greek trading networks. Hermippus' mention of Λιβύη as a source for ivory in the 5th century BCE may have been reflective of trade that began in the previous century. With more ivory, craftspeople would have had greater ability to practice creating complex works of composite sculpture. The shift toward larger ivory objects may also be the result of changing political and social circumstances; such objects required a substantial investment of wealth and meant that larger amounts of ivory were dedicated by fewer individuals. As a result, certain smaller types of ivory objects may have become unfashionable, while others increased in popularity. The start of the 6th century BCE represents a crucial period for the growth of the polis, the actions of elites, and the development of coinage. The role of elites within society may have helped guide both the popularity of certain types of objects, as well as the funding for their creation. The degree to which elitist competition and exclusion of so-called middle classes shaped the social and political order of this period is debated, and earlier models of the 7th and 6th centuries BCE positing opposing elitist and

189 Stampolidis 1992, 145.

190 Lapatin 2001, 54.

middling ideologies[191] have come under scrutiny.[192] However, more nuanced ideas about the role of elites may help explain why certain types of ivory work became increasingly popular at the end of the 7th century BCE. Drawing on Alain Duplouy's ideas of dynamic elite performance, in which elites adopt a variety of different strategies to assert their prestige, John Ma argues that political "play-acting" complicated the relationship between the actions of elites and the apparent elitist or "middling"[193] ideologies. While Ma does not see the contours of early Greek society as fundamentally elite-driven, he lays out a complex model of elite actions within Archaic communities:

> [E]galitarianism and restraint were alibis or acts put on by small ruling elites, whereas display and luxury characterized complex claims about community, staked out within inclusive polities. Paradoxically, inclusive gestures could serve to exclude and dominate, whereas the exclusive implications of prestige-laden gestures, supposedly reserved for a narrow elite, could in fact reflect, or even contribute to the construction of, broad-based, inclusive communities. All these situations are much more complicated and dialectic than the simple homologous model (elitist community = elitist style) developed by Morris and Kurke within the old master narrative. The combination of play-acting and dynamic possibilities explains the complexity and apparent opacity of cultural politics during the Archaic period, as well as the difficulty of formulating one-to-one explanatory hypotheses or schemas.[194]

One such instance of gesture and "play-acting" using ivory can be seen in an inlaid Ionian couch dating to the third quarter of the 6th century BCE found in the *Südhügel* of the Kerameikos (see § 4.2).[195] While the couch is not the same kind of complex sculpture seen at places like Samos, Delphi, and Ephesus, it contained considerable amounts of ivory, underscoring its value and opulence. The creation of the couch did not necessarily require complex carving techniques witnessed in sculpture (most of the inlays were flat), although

191 I. Morris 1997, 1998, 2009; Kurke 1999.

192 Duplouy 2006; Ma 2016.

193 A dichotomy that Ma (2016, 404) problematizes.

194 Ma 2016, 413.

195 Knigge 1976, 83.

producers were still expending large amounts of the material for a single object. Elizabeth Baughan argues that these funeral *klinai* may have been understood as having multiple meanings, including references to the idea of banqueting (perhaps the notion of *Totenmahl*), but also ideas of "*prothesis* or nuptial symbolism."[196] Luxurious *klinai* have often been seen as markers of the "elite class." Sanne Houby-Nielsen views the couch found in the Kerameikos as part of an opulent burial language rooted in the ideas of the symposium, one which connected elite groups responsible for the burials within the *Südhügel* and *Grabhügel* G.[197] Moreover, she argues that *klinai* reflect a particular symposiac association with a "luxurious Lydian lifestyle known to the Greeks as *truphé*."[198] As Duplouy highlights,[199] Houby-Nielsen's views of the *Südhügel* burials are only hypothetical; regardless, the Kerameikos couch represents a distinct use of ivory, reflecting ostentatious wealth. The burned ivory heads from Eleutherna, thought to be remnants of a *kline* or bier, represent another instance of a performative funerary act using ivory.[200] In a reversal from the earlier part of the 7th century BCE, these objects are indications of a re-emergence of ivory as a grave good. As components of funerary couches, ivory was used to signal wealth in a visible, public manner.

Cult statues and ornate funeral *klinai* represent two different uses of ivory, with separate religious, funerary, and social connotations. Yet the creation and use of both types of objects can be seen as part of different socio-political strategies that aim to project, wealth, status, or both. The dedication of statuary might act as an inclusive gesture, allowing the dedicant to be seen benefiting a community of worshipers.[201] As Houby-Nielsen proposes, the use of an ornate couch in a funerary context may also be an attempt to self-identify as part of

---

196 Baughan 2016, 211.

197 Houby-Nielsen 1995, 159–62.

198 Houby-Nielsen 1995, 142.

199 Duplouy 2006, 144.

200 Stampolidis 2004, 295, 1992, 146.

201 Ma 2016, 409.

an elite class, simultaneously excluding others. In both cases, individuals are incorporating ivory within a social language. As in any act of dedication, previous uses of ivory (e.g., small seals and recumbent animal statuettes) also reflected the willingness of the dedicant to be seen in a certain way or to belong in a community. However, the ivory objects of the end of the 7th/start of the 6th century BCE are more conspicuous and required larger amounts of material. It suggests that ivory production may have become tailored to elite needs, potentially restricting access from certain groups of the population. The extent to which the shift toward large-scale ivory sculpture (and away from smaller objects) can be attributed to an elite strategy of conspicuous dedication is unclear. However, objects like the statuary from the Halos Deposit at Delphi are radically different from the votive offerings making up sanctuary assemblages of previous decades. This focus on larger objects also suggests that the social contexts of production (i.e., types of workshops, apprenticeship and knowledge transmission) may have been different for objects like the statues from Delphi; complex statuary and large furniture likely required new types of workshops and craftspeople.

3.4.4 Ivory Carving "Schools" and Communities of Practice

The social context surrounding ivory carving at the end of the 7th century BCE may have been significantly different from that of previous periods and other kinds of crafts. As a result, the idea of ivory carving "schools" may vastly misrepresent the craft as it was practiced. The role of regional styles and the ill-defined idea of "schools" of carving dominate the scholarship surrounding the major works of Greek ivory in the 7th and 6th centuries BCE. However, these debates may actually be unsuited to a craft as particular as ivory carving. Rather than framing ivory work as the result of schools of carving, Greek ivory carvers should instead be seen as members of a community of practice. This perspective may better explain many of the disagreements about the regional identity of ivory artists. The few examples of ivory sculpture from this period have been variously assigned to Laconian, Corinthian, or Ionian schools of carving.[202] The raised relief fragments from Delphi are some of the most contested examples, beginning with Pierre Amandry's initial report suggesting these carvings may have been created by an Ionian artist.[203] Lila Marangou proposes that the body structures and articulation of traits of the individuals within the carvings may evoke an idea of the Laconian school, but thinks a Corinthian or Attic-Ionic artist may be a more fitting attribution. She ultimately concluded that no proper comparison can be made until the material is fully published.[204] An alternative idea by Carter positions the openwork reliefs within the tradition of Laconian carvers, who began creating *à jour* bone objects at the start of the 6th century BCE. She theorizes that the Laconian school of carving moved to Delphi after losing access to ivory.[205] Francis Croissant, following Klaus Wallenstein's identification of some Corinthian elements in the relief, unequivocally attributes the piece to Corinthian artists.[206]

A similar debate surrounds the kneeling youth from Samos, which was first given a tentative attribution to Corinthian artists by Freyer-Schauenburg.[207] Others, including Hans Walter, have argued that the statuette is Ionic.[208] Croissant more forcefully attributes the work to Corinthian artists; he provides multiple comparanda, including convincing parallels in the form of figures on the Chigi Olpe.[209] Marangou, following Hans-Volkmar Herrman, argues that the work could be Laconian.[210] Furthermore, Marangou views a carving of an

---

202 Debate especially surrounds the kneeling youth of Samos, the chryselephantine trio at Delphi, and the raised relief fragments at Delphi.

203 Amandry 1939, 106.

204 Marangou 1969, 192.

205 Carter 1989, 1985, 166–73.

206 Croissant 1988, 141–43; Wallenstein 1971, 64.

207 Freyer-Schauenburg 1966a, 25–26.

208 Walter 1959, 44–45.

209 For an overview of its many attributions, see Croissant 1988, 92.

210 Marangou 1969, 42, 139; Herrmann 1966, 86, note 37.

ivory head (NM 15366) found at the sanctuary of Artemis Orthia as part of a series of Laconian carvings that share the same “innere, stilistische Wesensverwandtschaft” with the kneeling youth from Samos.[211] Carter similarly views NM 15366 as “one of the finest carvings from the Orthia sanctuary” and “characteristically Spartan in its rounded eye with a raised outline, herringbone hair, and fine incisions in the beard.”[212] Yet Croissant believes that the head from Artemis Orthia is atypical of Laconian work, well situated within the sphere of Corinthian art.[213] Croissant and Marangou draw similar stylistic connections between the ivory head at Artemis Orthia and the youth from Samos, yet come to completely different conclusions.[214]

These wide-ranging disagreements on ivory manufacture are the result of several issues of interpretation. One of the most fundamental barriers for understanding complex works of ivory sculpture is a lack of evidence for their production. Unlike the Mycenaean workshop contexts (“House of Shields” and “House of Sphinxes”), in which nearly 19,000 pieces of ivory were discovered, no such archaeological contexts for dedicated ivory production exist for this period.[215] This is partially a result of a vastly different political system of the Bronze Age, which allowed palatial administrations to exert some degree of control over ivory manufacture;[216] more importantly, Mycenae’s integration within Bronze Age trade networks assured a regular supply of ivory. These factors encouraged large-scale ivory production on the periphery of sites like Mycenae, but there was no such form of ivory production before the 8th century BCE. After the 8th century BCE, it is assumed that most ivory manufacture

211 Marangou 1969, 42.

212 Carter 1989, 365.

213 A Corinthian attribution of this head is a minority view, others accept it as Laconian. Croissant 1988, 101; cf. Dörig 1962, 83; Marangou 1969; Carter 1989.

214 In an addendum to her article, Carter (1989, 376–78) sharply critiques Croissant’s methodology for attribution.

215 Tournavitou 1995, 2020, 631.

216 For a discussion of these buildings and their status as “private” or “palatial,” see Burns 2007.

occurred in conjunction with sanctuaries.[217] Even if the stylistic and formal unity within the ivory assemblage at the sanctuary of Artemis Orthia suggests a permanent school, there is no known workshop associated with the site.

With evidence for production waste found across the site, especially in contexts associated with other industries, the Methone assemblage is the best evidence for ivory production in the time between the Bronze Age and the 5th century BCE workshop of Pheidias at Olympia.[218] Yet the Methone assemblage is found in secondary deposits, thought to be the result of the waste disposal of workshops, leaving a great deal about the production process unknown. The sheer quantity and dispersal of ivory across the site suggests that this craft was not limited or restricted. However, it may also imply that ivory production had no fixed location at Methone, and that the material was worked by various craftspeople, depending on its availability. This image of ivory production is at odds with the idea of workshops at Ephesus and Sparta, which produced a series of objects so similar that they appear to be by the same hand. The Methone assemblage, while extensive, illustrates how little is known about the organization of ivory production during this period. There may have been significant differences between ivory production at a site like Methone, and the workshops which provided votives for sanctuaries. Methone may have been producing more minor works of ivory, as only a few workshops had the knowledge to create more advanced works of sculpture.

Another problem in ivory attribution and scholarship is the limited body of comparanda. With so few examples of complex ivory sculpture, all the objects seem to evince some degree of idiosyncrasy. Limited comparanda have also led scholars like Marangou and Croissant to build their arguments around other media.[219] While these comparisons are not inherently

217 One caveat is that sanctuaries undeniably bias the archaeological record. By excavating locations which attract deliberately deposited luxury goods, the material record might overemphasize the importance of ivory in sanctuary contexts.

218 Schiering 1991.

219 Carter is careful to build stylistic arguments based mainly on works of ivory, rather than other media.

inappropriate, the nature of ivory may dictate certain shapes and forms (e.g., the pose and proportions of the naked youth from Samos) that are required by the material. Furthermore, wooden sculpture is a body of material culture that would provide valuable comparisons to ivory, but is almost entirely absent from the archaeological record. The extant statuettes from Samos exhibit strong similarities to works of Greek ivory carving, a striking reminder of the objects missing from the archaeological record.[220] While the relationship between wood and ivory carving is poorly understood, the toolkits employed were likely similar, and there may have been an element of knowledge transfer between the two crafts.

Perhaps the largest issue with the analysis of early Greek ivory is the interpretive frameworks of past scholarship. There is a tendency to approach ivory carving as though it has the same stark regional differences seen in ceramics and other media. However, ivory carving is different from other crafts for several reasons. One factor separating ivory carving from other industries is that knowledge transfer surrounding the craft was severely fractured by the disruption in the Aegean at the end of the Bronze Age. While ceramic production was altered to an extent during this period, it remained a vital part of life and continued throughout the Submycenaean and Protogeometric periods. As Bronze Age ivory practices were lost, the works of sculpture that began in the 7th century BCE were the culmination of recent advances in the development of the craft. There are many particularities to ivory as a material that have no parallels in wood or stone carving. These practices specific to ivory, such as removing the outer layer of cementum, and carving around the hollow pulp cavity, would have necessitated the creation of new forms of knowledge, potentially limited to smaller communities. Moreover, ivory carving was an inherently limited practice during this period. While crafts like ceramics are only dependent on abundant resources like clay, ivory is an import whose availability may have been impeded by a suite of factors connected to long-distance trade. Furthermore, the value of the material also would have restricted ivory carving (especially for the creation of large objects) to a small number of individuals. These

[220] Ohly 1956, 1967; Kopcke 1967.

conditions are not conducive to the creation of "schools," with strong stylistic boundaries.

Approaching ivory production as if it were akin to regional ceramic styles is part of a larger assumption about how ivory workshops, and the communities that worked within them, functioned. In discussing these communities, Marangou opts for a relatively nonconnotative term, considering the Laconian ivories as part of a "geschlossener Fundkomplex."[221] Similarly, Croissant restricts his discussion of Corinthian works (ivory and other media) to "ateliers."[222] Yet some scholars have used the term "school" for ivory carving in the Archaic period, most often in reference to the examples from the sanctuary of Artemis Orthia.[223] In the absence of more evidence for how ivory production was structured, the term "school" seems particularly inappropriate. Feldman's critique of the use of connoisseurship in the study of Levantine ivories highlights how the notion of the "school" is derived in part from 19$^{\text{th}}$-century CE individuals like Giovanni Morelli. Feldman writes that Morelli organized art into regional schools out of a motivation by "a nationalist desire to define and reify 'Italian' art for the newly unified nation-state."[224] There is no evidence that a "Laconian School" existed in the same way as the Venetian School of Titian and Tintoretto. A school implies some sort of formalized knowledge transfer, apprenticeship, and hierarchical relationships between master and student. While scholars use that term to mean a regional style in the ancient world, its implications hinder the discourse around ivory work in early Greece.

Approaching the more technically impressive ivory works (especially those of the later 7$^{\text{th}}$ century BCE) through the lens of "communities of practice" may better explain the seemingly polyvalent style within these objects. As Feldman suggests for the Levantine assemblages, ivory carvers may have been linked by a network of highly skilled practices

---

221 Marangou 1969, VII.

222 Croissant 1988.

223 Carter 1989, 364; Barnett 1982, 60.

224 Feldman 2014, 18. The notion of the "school" has even deeper roots, notably within the 17$^{\text{th}}$-century CE writings of Giulio Mancini, see: Frigo 2012, 419.

that transcended formal borders. This community does not fully align with the notion of a "Corinthian" or "Laconian" school. Perhaps fewer, more mobile individuals were responsible for the knowledge transmission surrounding complex works of ivory craving. The introduction of more large-scale ivory sculpture at the end of the 7th century BCE may have also represented a wholly new approach to the "workshop." The relationship between craftspeople and elites may have compelled individuals to remain mobile to create objects when there was a demand. Carter's suggestion of the movement of Laconian individuals to Delphi, while speculative and entrenched in a diffusionist idea of the "school," may capture some elements of the process of knowledge transmission surrounding this elite craft. Instead of the wholesale movement of the "Laconian school," there may have been some Laconian artists responsible for sharing their techniques outside the region.

This is not to say that permanent or semi-permanent ivory carving workshops, bound by regional convention, did not exist. The strong stylistic and formal coherence seen among the assemblages of the sanctuaries of Artemis Orthia at Sparta and Athena Alea at Tegea strongly argues for workshops in the vicinity that served both sanctuaries (see § 4.3.2). The recumbent animal figurines and circular seals of the earlier 7th century BCE may have been created at specific workshop sites attached to sanctuaries, which produced many smaller ivory objects. But viewing these communities as "schools" imposes a rigid idea of how workshops may have functioned, especially in light of so little evidence. Moreover, the stylistic fluidity seen at Ephesus, as well as in many of the technically complex works like the kneeling youth at Samos, is more fully explained in the context of communities that are bound primarily by the practices they enact, rather than a geographical or regional kinship.

The end of the 7th century BCE ushered in a new approach to ivory carving that appears to be marked by elite investment in larger objects, as well as a de-coupling from more stationary workshops. As a result, larger objects exhibiting blended, multi-regional styles became more common throughout Greece. While the effects of these changes can be seen across Greece, the regions of Ionia, the east Aegean, and Western Anatolia appear to be the epicenter of this phenomenon. As early as the Bronze Age, Ionia offered a highly permeable and connected environment that was marked by persistent intercultural interaction among Anatolians, Greeks, and others.[225] In the Iron Age and Archaic periods, individuals dedicated ivories at Ephesus exhibiting strong connections to the material culture of Lydia and Phrygia. Many of the carvings, especially the *Megabyzos* statuette of the late 7th century BCE, demonstrate a mixture of Ionian, Neo-Hittite, and Phrygian elements.[226] Their connections to other parts of western Anatolia are most evident in their similarity to the ivory figurines found in a tumulus near Elmalı. Dating and assigning these figurines to a given workshop or school has been controversial, and Tuna Şare sees them as emblematic of hybridization and a "blurring of ethnic boundaries in western Anatolia in the 7th century."[227] Fahri Işık's interpretation of these figures is perhaps more radical, as he asserts that the Elmalı and Ephesus figurines were all made at Ephesus by the same hand and in a "pure Anatolian formal language."[228] Işık regards these statuettes as evidence that Ionic sculpture "can only have been developed out of Anatolian syntheses."[229] Regardless of whether Işık's assertion—that all these statues were made by the same hand—is true, Ionian craftspeople seem to have created deliberately polysemic objects, reflective of the diverse region in which they were living.

The objects found within the Halos Deposit at Delphi are another indication that Ionia seemed to be a nexus for more complex works of ivory sculpture toward the start of the 6th century BCE. There is general consensus that the chryselephantine statues are East Greek (see § 4.3.11), while the debate around the lion tamer statue remains heated.[230] Aside

[225] Mokrišová 2017, 5.

[226] Carter 1985; Şare 2010, 62–63.

[227] Şare 2010, 75.

[228] Işık 2001, 99.

[229] Işık 2001, 99.

[230] The debate around this statue was so fierce that when it was displayed at the exhibit "The Golden Age of King Midas" at the Penn Museum, the Huffington Post dedicated an article to the differences in

from the fanciful suggestion by Keith DeVries and C. Brian Rose that the piece belonged to the throne of Midas (see § 4.3.11), there also have been several attributions made to East Greece (see above). The lion tamer statue undoubtedly stands out in the corpus of Greek ivory carving as something different from other objects. As Amandry points out,[231] the pose and positioning of the lion have definite Assyrian connections; a similar scene was portrayed in a relief from Dur-Sharrukin (see fig. 3.10). Boardman's description of the object also highlights its hybrid nature; he writes: "[T]he flabby oriental is being pared to near-Daedalic alertness."[232] The lion tamer statue, with all its seemingly alien features, is the type of object which could have been made by a decentralized community of ivory producers in Ionia. Rather than viewing this object as piece of Midas' throne originating from Phrygia, it appears born out of the east Aegean milieu; the result of a network of producers connected by their craft rather than their place of origin or the language they spoke. The fact that such different ivory objects could all end up in the same deposit suggests that by the end of the 7th century, the nature of production was changing.

By the end of the 7th century BCE, attitudes toward ivory were changing. The popularity of small dedications found across sanctuaries in the Greek world was waning, while larger, more complex ivory objects were becoming more common than ever before. Items such as the couch from the *Südhügel* were likely created at the behest of wealthy individuals; these ivory objects also seem to be larger and more ostentatious. Moreover, there is increasing stylistic evidence that these objects were created in East Greece, Ionia, and Western Anatolia. Ivory carvers from these regions were able to meet the demands of wealthy individuals, perhaps leading to a new mode of production more focused on providing objects for specific individuals. Ionia and its environs also provided an arena for ivory carvers to experience strong multicultural interaction and produce objects exhibiting stylistic blending, such as

opinion surrounding the piece, Mazur 2016.

231 Amandry 1944, 161.

232 Boardman 1978, 16.

the Delphi lion tamer. Both changes to the fabric of Greek society (e.g., a movement toward more conspicuous burial practices, new elite social strategies) as well as the movement of individuals in the east Aegean, provided an impetus to restructure ivory production and consumption practices at the start of the 6^{th} century BCE.

Tables

Table 3.1: Elephant references in Egyptian and Assyrian sources

	Hunted Elephants	**Captured or Transported Elephants**	**Created Herds at Assur or Nimrud**	**Received Elephants as Tribute**
Egyptian Rulers				
Thutmose I (1506–1493 BCE)	•			
Thutmose III (1479–1425 BC)	•			
Assyrian Rulers				
Tiglath Pileser I (1114–1076 BCE)	•	•		
Aššur-bēl-kala (1074/3–1056 BCE)	•	•		
Aššur-dān II (934–912 BCE)	•			
Adad-nārārī II (911–891 BCE)	•	•	•	
Ashurnasirpal II (883–859 BCE)	•		•	•
Shalmaneser III (859–824 BCE)	•			•

Table 3.2: Postcranial elephant remains in southwest Asia, adapted from Fischer 2007, 75–78, table 5 a.

Site	**Bone**	**Chronology**	**Source**
Syria			
Emar	Two mandible fragments	MBA – LBA (15^{th}-14^{th} Centuries BCE)	Gündem and Uerpmann 2003, 120–124
Emar	Long bone fragment	UNK	Gündem and Uerpmann 2003, 120
Tell Sabi Abyad	Femur fragment with cut marks	LBA	Akkermans and Rossmeisl 1990, 20
El Qitar	Femur	Late Bronze Age	McClellan 1986, 435; Becker 1994, 173
Tell Sheikh Hamad / Dūr-Katlimmu	Tibia Fragment	13^{th} Century BCE	Becker 1994, 2005, 447, 2008, 106-107
Tell Sheikh Hamad / Dūr-Katlimmu	Post Cranial Bone	9^{th} - 6^{th} Centuries BCE	Becker 1994, 2005, 447, 2008, 106–107
Qatna	Post Cranial Bone	LBA	Pfälzner 2013, 2016
Qatna	Post Cranial Bone	MBA	Pfälzner 2016
Munbaqa	Post Cranial Bone	2200 – 1900 BCE	Boessneck and Peters 1988, 53
Munbaqa	Post Cranial Bone	Mid 2^{nd} Millennium	Boessneck and von den Driesch 1986, 147-150
Turkey			
Alalakh	Limb bones and vertebrae	LBA	Çakırlar and Ikram 2016, 173–174
Alalakh	Post Cranial Bone	MBA	Caubet and Poplin 1987; Woolley 1955, 288, footnote 3, see also Çakırlar and Ikram 2016 supplementary material.
Çatalhöyük	Humerus Fragment	15^{th} Century BCE	Gündem and Uerpmann 2003, 123; Moorey 1999, 118
Kinet Höyük	Tibia fragment, rib fragment, 1st phalanx, carpal	LBA – Early Iron Age	Çakırlar and Ikram 2016, 172
Sirkeli Tepe	Femur fragment	8^{th} Century BCE	Vogler 1997, 18, 171–173; von den Driesch 1996
Arslantepe	Pelvis fragments	LBA	Bökönyi 1986, 187–189
Iraq			
Babylon	Femur	1900 BCE	Reuther 1926, 10
Assur	Toe bones	Neo-Assyrian?	Unpublished, see Fischer 2007, 77
Nimrud	Long bones	9^{th} – 8^{th} Century BCE	Mallowan 1966b, 451; Reese 1985, 399

Nuzi	Ulna	14th Century BCE	Starr 1939, 199, pl. 28C; Reese 1985, 399
Iran			
Haft Tepe	Unspecified, photo appears to show mandible fragment and rib	14th Century BCE	Negahban 1991, 18
Lebanon			
Kamid el-Loz	Post Cranial Bone	MBA	Bökönyi 1990, 71, 1986, 187–189

Figures

Figure 3.1: Pierced hippopotamus tooth found in the Kamiros well, accession number: 1864,1007.644 (© The Trustees of the British Museum).

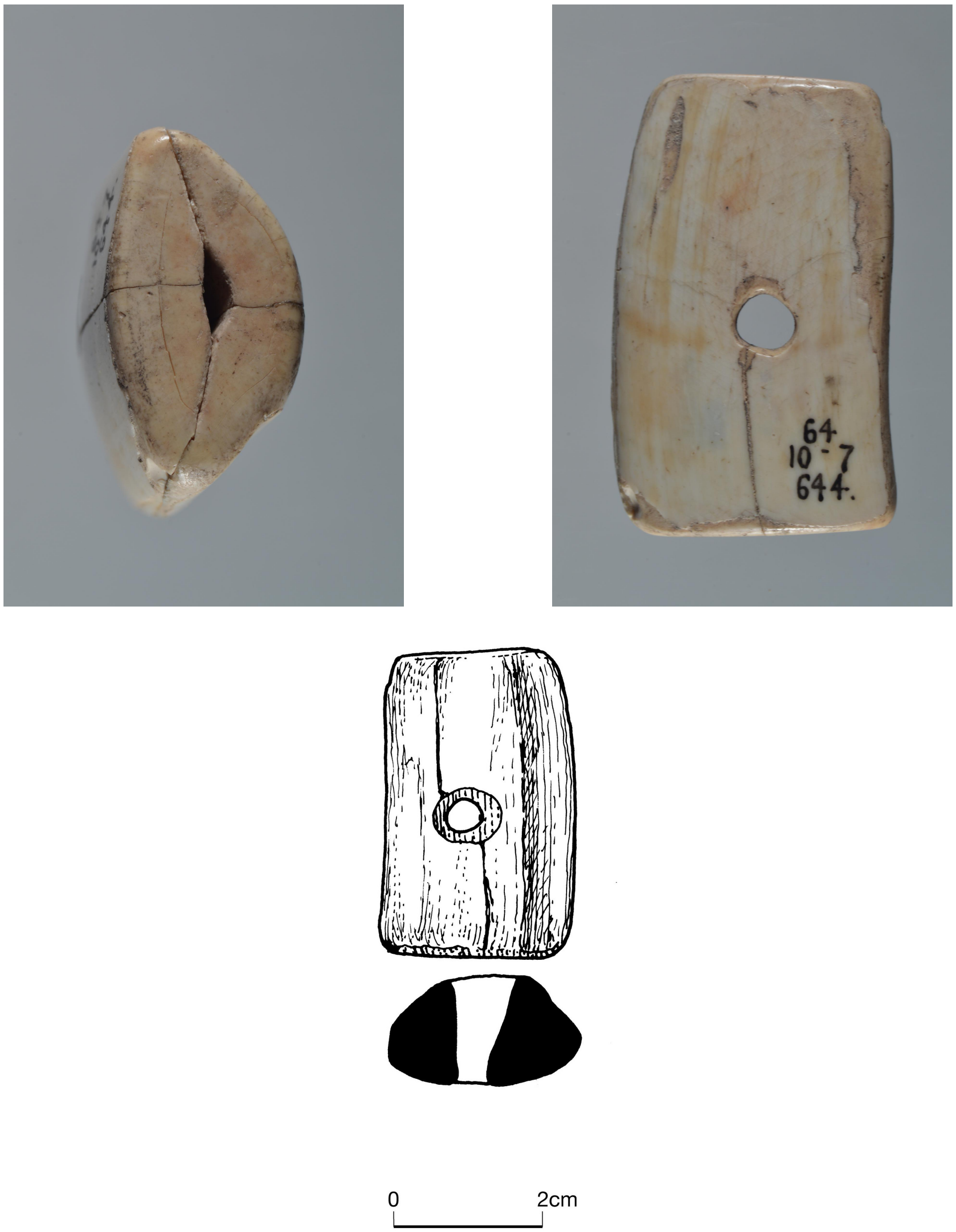


Figure 3.2: African bush elephant (*Loxodonta africana*), Kruger National Park, South Africa. Image by Andrew Shiva

Figure 3.3: Forest elephants (*Loxodonta cyclotis*) in the swamp Mbeli Bai, Nouabalé-Ndoki National Park, Congo. Image by Thomas Breuer.

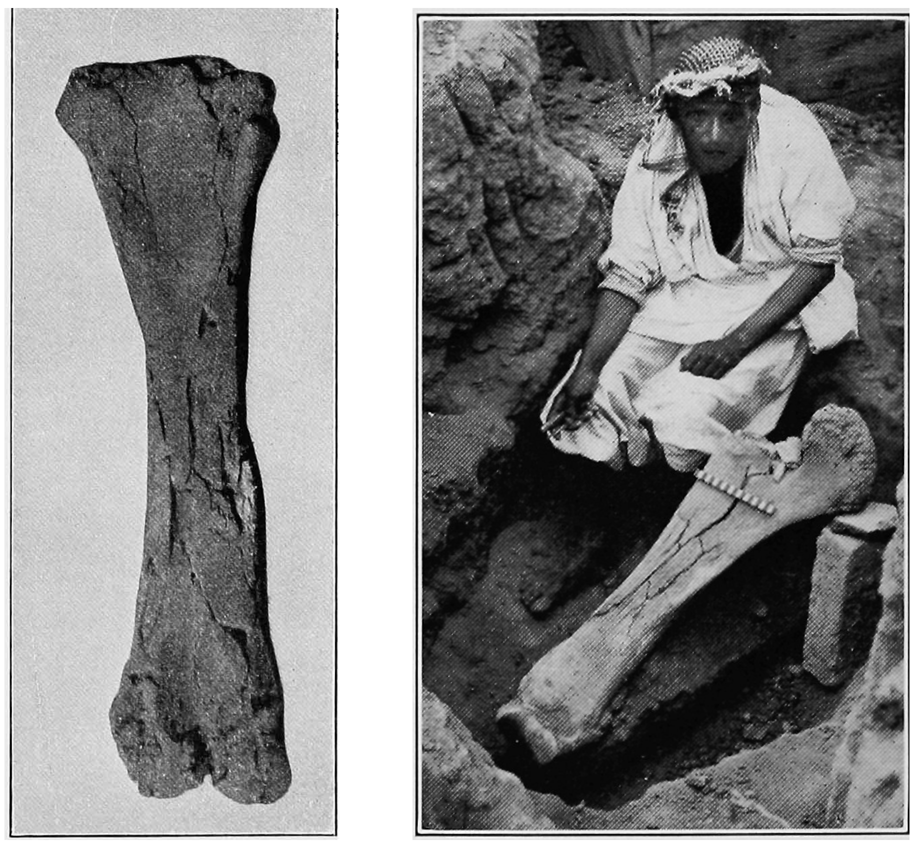
Figure 3.4: Asian elephant (*Elephas maximus*) at the Elephant Jungle Sanctuary in Chiang Mai, Thailand. Image by James B. Cutchin

Figure 3.5: The Black Obelisk of Shalmaneser III. The British Museum, museum number: 118885 (© The Trustees of the British Museum).

Figure 3.6: Facsimile painting of a scene from the Tomb of Rekhmire (TT 100) by Nina de Garis Davies.

Figure 3.7: Statue fragment of an elephant and rider from Sam'al/Zincirli. After von Luschan 1943, 68, figs. 80, 81, pl. 35. Image by Leah Olson.

Figure 3.8: Elephant bones recovered from excavations: *a*, tibia from the “Hammurabi stratum” at Babylon (from Reuther 1926, 10. fig. 6); *b*, ulna or radius found in situ at Nuzi (from Starr 1939, 199, pl. 28C).



(a) (b)

Figure 3.9: Distribution of ivory in the Greek world.

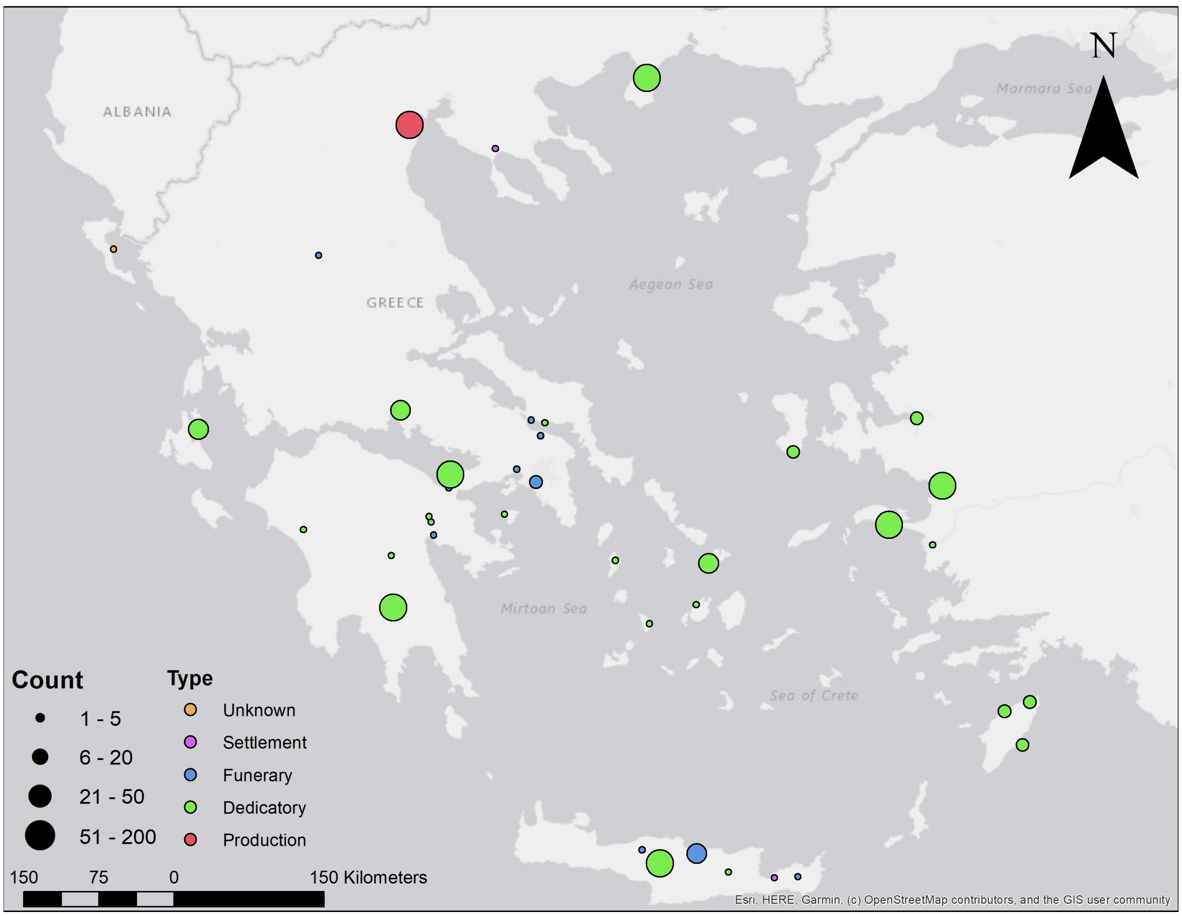


Figure 3.10: Statue of an Assyrian lion-tamer from Khorsabad.

CHAPTER 4

Worked Animal Materials in the Wider Greek World

4.1 The Uses and Values of Worked Animal Materials

Objects made from worked animal materials took on a variety of forms in the Greek world, and they likely would not have been recognized as a single category of objects by individuals in the past. Grouping these objects risks comparing things that were perceived as unrelated in their original cultural contexts. While worked animal materials found in production contexts have been discovered (see Chapter 5), the majority of worked animal objects entered the archaeological record as the result of a deliberate deposition: either as a grave good or a votive offering at a sanctuary. Items like spectacle fibulae, seals, and flute pieces may differ from one another, but they all represent a deliberate choice to use a worked animal object in a meaningful social practice. The variation among worked animal objects, rather than being a barrier to interpretation, allows for a variety of understandings for how these materials were employed within religious or burial practices. Despite the differences among these items, there are strong deposition patterns that resulted in only a limited range of grave goods made from worked animal materials, especially in the period following the 8th century BCE. During the 7th century BCE, distinct deposition patterns are also evident among the worked animal objects most frequently dedicated at sanctuaries (see § 4.6). Comparing the use of these materials in dedicatory and burial contexts is an attempt to articulate how Greek society created specific practices around worked animal objects.

Worked animal materials were never foreign to Greece (nor any other society), but they experienced a sudden rise in popularity coinciding with many of the other social changes permeating the Greek world in the Early Iron Age. Starting at the end of the 9th century BCE, the number of cult sites increased from around a dozen to over 70 by 700 BCE.[1] One of the most visible aspects of this change within the archaeological record is the increase in the number of votives in places where there had not been earlier traces of any sort of offering.[2] In examining the many social changes of the 8th century, Anthony Snodgrass notes that the rise of metal offerings roughly coincided with burial practices resulting in the deposition of fewer grave goods than in previous centuries.[3] François de Polignac articulates the negative relationship between dedicatory behavior and burial practices, writing:

> One fact in particular proves that the proliferation of traces of religious life in the eighth century also resulted from a new attitude toward the sacred, which had the effect of converting religious practices into a more autonomous and specific component of social life: most of the kinds of offerings that make their appearance on religious sites in the Geometric period were also deposited in graves. Now in the course of the eighth century, many of these progressively disappear from the tombs, in particular the bronze objects that thereafter increasingly came to occupy a larger place in the sanctuaries.[4]

The worked animal objects generally follow this pattern, as they seem to decline as a grave good in the 8th and 7th centuries BCE,[5] while their use as dedications dramatically increases. However, these objects take on a variety of new forms in sanctuaries. The sudden increase in dedications made from animal materials, combined with their decrease in graves, conforms to a general cultural shift that took place in the 8th and 7th centuries BCE. Other materials, such as metals, were also being deposited in sanctuaries while declining as grave goods. However, the specific forms that were restricted to sanctuaries, and shared throughout

---

[1] Coldstream 1977, 300; De Polignac 1995, 12.

[2] De Polignac 1995, 13.

[3] Snodgrass 1971, 277–81, 1980a, 52–54.

[4] De Polignac 1995, 14.

[5] There are not enough graves with worked animal materials to demonstrate a definitive decline, but the evidence is at least suggestive of this pattern.

the Greek world, suggest that animal materials were thought of as particularly apt as a gift to the Gods.

The use of animal materials within sanctuaries may have indicated that dedicants expressed separate conceptions of value simultaneously. A sanctuary acts as a locus or arena for the presentation of value in multiple forms, allowing dedications of animal materials to achieve their own particular popularity. Within the early Greek world, value was structured through the use of metals, most often iron.[6] However, there are differences in opinion about what social and economic ideas governed the use of iron as a standard for value in the Greek world. These separate perspectives also offer ways to understand how the value of other objects, such as those made from animal materials, were understood. In past scholarship, two dominant models for the rise of iron use were proposed: circulation and deposition. The circulation model "explains the spread of iron in Syria, Palestine, Cyprus and Greece as a functional response to problems in obtaining copper and tin after the fall of many palaces around 1200 B.C."[7] However, Ian Morris advocates for a "deposition model," which regards the rise of iron as an element of emergent social structures rather than a decline in trade.[8] In line with Morris' view of the emergence of Archaic Greece as the struggle between elite and non-elite ideologies, he views the control of iron as strongly monopolized by elites within the deposition model.[9] In response to these perspectives, Papadopoulos argues that neither model fully explains the role of iron in Greek society. While the deposition model highlights the role of non-economic social forces and pays greater attention to the agency of individuals in society, it relies on the ability of elites to control iron. Highlighting the abundance of iron deposits, as well as the role of ironworking in Hesiod, Papadopoulos demonstrates that elites

---

[6] Papadopoulos (2014, 188) also argues for the importance of silver as a metal that structured value in the Early Iron Age.

[7] Morris 1989, 503; see also Snodgrass 1980b, 2006a.

[8] Morris 1989, 513.

[9] For more on Morris' view of elite ideologies, see I. Morris 1997, 1998, 2009; for a critique, see Duplouy 2006.

were unable to monopolize the metal.[10] Rather than viewing iron as a strictly economic commodity, or an item whose value is rooted in social or symbolic power, Papadopoulos prefers a combination of these two models. He writes that "circulation and deposition of critical commodities are processes that are complementary and interdependent."[11] In this third model, Papadopoulos recognizes the clear symbolic and ritualistic importance of the use of iron burial goods (e.g., the collection of weaponry within the "warrior grave" in the Athenian Agora [Tomb 13]). However, he also argues that the value of iron was structured due to its functional uses (especially within weaponry), evidence for which can be seen in the "apparent intensity of the drive to improve the hardness of iron."[12] Alterations in the economic structures of the Early Iron Age were part of a larger suite of social changes, joining functional, economic, social, and religious ideas together.

These different perspectives surrounding iron, and value more generally, provide a means of understanding the worth of animal materials. Like iron, animal materials were also structured through economic and symbolic ideas. A strictly economic perspective on worked animal objects within sanctuaries would view the utilization of bone and other non-ivory materials as the choice of a practical, abundant medium for creating objects. In this perspective, certain non-ivory animal materials might represent a more egalitarian or "democratized" material. Furthermore, viewing worked animal objects as rooted in symbolic value renders their worth as a dedication wholly divorced from their low economic value. This perspective might interpret the value of animal materials as contextually specific to the act of dedication; as a result, worked animal materials would not possess the same value outside their dedication to a god or goddess. This could explain, in part, why they were not popular as grave goods. Other religious practices in Greece suggest that animal materials possessed a different set of values when they were put in contact with the divine. In *thysia* sacrifice,

---

10 Papadopoulos 2014, 181; Papadopoulos and Smithson 2017, 976.

11 Papadopoulos 2014, 182, see also Papadopoulos and Smithson 2017, 976–78.

12 Papadopoulos and Smithson 2017, 976.

"the animal victim was divided between gods and men; the deities received the thighbones and the tail section burnt on the altar, while the meat was consumed by the worshippers."[13] Handling the bones was an essential form of this act, as they "constituted the gods' part of the sacrifice and the divinities were imagined as enjoying their share by inhaling the thick, fatty smoke, *knise*, rising from the burning bones."[14] Within the *thysia* sacrifice, there is a conceptual bifurcation of the bones and flesh of the animal. Gods appreciate the sacrifice differently than humans through a process that transforms part of the body of the animal into something "transient and elusive."[15] This separation also divides systems of value: edible meat has a different economic value than the leftover bones. Yet the idea of the *knise* suggests that Greek religious thought accorded the bones a sacred value in the context of an offering to a deity (see § 4.3.1).

The effect of the context on the value of bone also mirrors Igor Kopytoff's idea of a spectrum between "singularization" and "commoditization." Kopytoff defines commodities as things that have "use value and that can be exchanged in a discrete transaction for a counterpart."[16] On the other end of the spectrum are items that are kept from commoditization, objects Kopytoff calls singularized. He writes that "culture ensures that some things remain unambiguously singular, it resists the commoditization of others; and it sometimes resingularizes what has been commoditized."[17] By Kopytoff's own admission, these are idealized poles of a spectrum to which "no real economic system could conform."[18] In Morris' deposition model of iron, elites go to great lengths to keep iron singular, and outside of the commodity sphere. Such societal controls likely did not exist for animal materials, as there

---

13 Ekroth 2017a, 19; see also: Le Guen 1991; Peirce 1993; Van Straten 1995; Ekroth 2007.

14 Ekroth 2007, 250, 2017b, 33.

15 Ekroth 2017b, 33.

16 Kopytoff 1986, 68.

17 Kopytoff 1986, 73. Resingularization is the idea that objects societies can transform objects from a commodity into a different state, one which might be removed from economic behaviors.

18 Kopytoff 1986, 69–70.

was no incentive to preserve objects made from a material like bone for elite or religious contexts. Rather, the animal aspects of the material may have allowed such objects to transcend their commodity value. Like iron, animal materials similarly exist in multiple spheres of value, and their organic histories help explain their prevalence and value within dedicatory contexts.

Sanctuaries were venues in which craftspeople and dedicants publicly negotiated and structured the values of animal materials. The practice of dedication and the cultural understanding of the value of animal materials informed one another, and was ultimately responsible for the large number of worked animal object dedications during the 7th century BCE. Snodgrass interprets dedications at Greek sanctuaries in a framework separate from Kopytoff, but one which relates to these dichotomies of singular-commodity and circulation-deposition. Snodgrass approaches votives as either "raw" or "converted," writing that a raw dedication is "something like a weapon of war, a brooch, an ear-ring, a shield or a jumping-weight, which is an unmodified object of real, secular use."[19] Alternatively, converted objects are things that, as a result of exchange, have been "produced for the specific purpose of dedication."[20] Snodgrass's framework for dedications implies that converted objects are the result of inherently economic and fungible exchange, before being rendered, to use Kopytoff's term, singularized. Their value extends beyond whatever the dedicant exchanged for it, as they have been converted into a gift for a god or goddess. Snodgrass' converted goods are the transformation of the mundane (including both the material transformation, as well as whatever was exchanged for the materials and service) into something the value of which is specific to the context of the sanctuary. Raw objects, in contrast, are seen by Snodgrass as having a "secular use," and are the result of a "surrender."[21] An implicit difference between raw and converted objects is that raw objects would still have the same value if they were

[19] Snodgrass 2006b, 263.

[20] Snodgrass 2006b, 264.

[21] Snodgrass 2006b, 263. See also Burkert 1987.

taken outside of a sanctuary context. They are inherently less singularized than a converted object because converted objects do not generally have what Snodgrass calls "secular" value, and some of their value as a dedicatory object comes from the act of dedication.

Snodgrass' ideas of raw and converted dedications provide a helpful framework for thinking about why objects in a seemingly mundane material like bone may have special value within a sanctuary. He specifically highlights zoomorphic figurines as converted objects meant to stand in for actual animals like cows, pig, sheep, and other species.[22] However, this dichotomy between raw and converted is too strictly economic to explain all aspects of dedicatory behavior, and animal materials rarely fit neatly under the heading of either term. Snodgrass' conception of the trends of raw and converted dedications at sanctuaries also appears at odds with the pattern of worked animal material dedication. He views raw dedications as more emblematic of the Archaic period, with a shift in preference to converted objects in the 5th century BCE.[23] Yet many of the hundreds of animal material objects occurring within the early sanctuaries represent converted objects in Snodgrass' model, and they mostly date to the 7th century BCE. Furthermore, objects made from animal materials that are seemingly "raw" (inherent secular value, i.e., previously a commodity) have already undergone a significant transformation from living organism to object. Snodgrass also indicates that raw objects were used before being dedicated, although he cites certain cauldrons as occupying a middle ground between raw and converted. He writes that the cauldrons "simulate, in a grandiose way, a functional object of everyday life, yet we know them to have been in some cases produced on the actual sanctuary-site, for expressly religious purposes."[24] Many of the worked animal objects that seemingly have a "secular use" (e.g., spectacle fibulae, pendants) may have also been produced specifically for dedication.[25] Additionally, other

[22] Snodgrass 2006b, 264.

[23] Snodgrass 2006b, 264.

[24] Snodgrass 2006b, 264.

[25] Only some of the worked animal objects show signs of use wear, so it is not always evident that objects like pendants were actually worn before being dedicated.

animal materials at sanctuaries, such as the exotic faunal remains at the Samian Heraion, were not converted in any way; these remains have both economic and symbolic values (see § 4.3.7).

However, animal materials also were not fully separate from some of the more overt economic considerations of dedication. Ideas of exchange value were clearly a motivating factor in the case of some of the dedicated worked animal objects. Ivory objects undoubtedly involved an exchange of wealth for both the material and the expertise of the producer, and the final products were clear signs of the economic status of the dedicant. Moreover, certain types of objects were created in bone and ivory, suggesting that producers were using the less valuable (in the strictly economic and fungible sense) versions in bone to imitate their ivory counterparts. Dedications of worked animal objects in Greek sanctuaries show an intersection of two types of value whose constructions were not wholly independent of one another. As in Papadopoulos' view of the metals, the two systems of value inform and depend on one another. The use of animal materials as a symbolically charged medium for dedication was likely buoyed by their accessibility and low exchange value. Simultaneously, ivory objects that seemingly imitate bone (see § 4.3.6) and the reservation of ivory for specific purposes (e.g., recumbent animals) demonstrate that the material was thought of in a way that partially transcends its considerable economic value. As an animal material, it was inculcated with a similar cultural understanding that gave a material like bone extra significance in the dedicatory sphere.

Animal materials took on a variety of forms when they were used as dedications in sanctuaries. These objects were often less beautiful or useful, and some had less recognizable "secular use" (e.g., undecorated sections of shaft bone, see § 4.5.4). Some of these objects would have required a transformation of wealth, as they evince considerable skill on the part of the craftsperson. Others, like a minimally altered pig canine from the Kamiros well,[26] worked astragali, or many of the miniature double axes found in a variety of sanctuaries,

[26] British Museum, accession number: 1864,1007.659.

may have even been made by the dedicant. The widespread use of a series of objects that lack "secular use" (recumbent animals, miniature double axes, circular seals) indicates a convergence of cultural ideas about what specific production practices constitute a proper dedication. As a result, sanctuary assemblages from the 7$^{\text{th}}$ century BCE reveal a suite of worked animal objects designed for dedication. These objects are almost never found in graves, suggesting that they were reserved for use as an offering and that their value was specific to that context. The strictly economic value of these objects may be scant, and their creation may not even have required the services of a craftsperson. These objects fall outside any singular framework of value, as they were neither obvious commodities, nor singularized. They are converted objects, but their transformation is an invocation of the power and underlying value of animal materials. Regardless of the shortcomings of Snodgrass' model for worked animal materials, it attempts to address the conflict between systems of value within the context of sanctuary dedications. It also highlights the importance of transformation, even if it is framed in an overtly economic manner (i.e., wealth is transformed into a gift to the god). As they were once living, animal materials are emblematic of the power of conversion and transformation. They become a suitable gift for the gods because of reasons outside of strictly rational, economic behavior.

4.1.1 The Display and Distribution of Worked Animal Dedications

Like other types of votive offerings, objects made from worked animal materials were likely on view in sanctuaries after they were dedicated. More conspicuous objects like the composite statues of Delphi were undoubtedly focal points of wherever they were displayed (perhaps the sanctuary of Apollo). Likewise, it is not difficult to imagine how the larger statuettes of Ephesus or the Samian Heraion may have been laid out in a way that ensured they were seen. However, there are a variety of smaller animal objects that were found in large numbers and whose display is not as easy to envision, including circular seals, double axes, smaller plaques, and recumbent animal figurines. Based on an inscription on a bronze object with drill holes found at the Athena temple at Old Smyrna, Ekrem Akurgal proposes that the object may have been used to hold smaller votives. He reconstructs the usage of the bronze object by hanging several ivory votives from its openings.[27] Akurgal and Sencer Şahin (the translator of the inscription) believe that its text refers to literal votive objects, leading to Akurgal's idea that it was designed to hold offerings.[28] Akurgal compares this practice to the hanging of pinakes in sacred trees around a sanctuary and suggests that a plaque found at the Athena temple may have been originally hung similarly.[29] Votive plaques or pinakes are thought to have been suspended and displayed across multiple locations, including "from trees or attached to the walls of stoas, temples, heroa, and nymphea."[30] Akurgal's reconstruction, while speculative, suggests that individuals would have been concerned with ensuring that their offerings were seen. As many dedications were small, they may have been hung up to be viewed.

Some worked animal dedications may also have been displayed in other ways. The distribution of many objects of adornment from the sanctuary at Kythnos provides some insight into their display at the sanctuary. Alexander Mazarakis Ainian and Despoina Varvarinou-Vai note that a large number of the fibulae (bow and spectacle) were found in association with a cylindrical clay feature, which they suggest was the base for a wooden *xoanon*.[31] Mazarakis Ainian further theorizes that these fibulae may have been originally attached to

---

27 Akurgal 1983, 111–12, pl. 124a–c.

28 Şahin's transliteration: ἀρὴν τήνδ' ἀνέθηχεν τε 'Αθηναέηι Οἰνότιμος Πρωτάρχο. Şahin's translation: "Diesen Gegenstand des Gelübdes hat Oinotimos, der Sohn des Protarchos der (Göttin) Athena geweiht" (English Translation: This object of prayer/vow was dedicated to Athena by Oinotimos, the son of Protarchos). Şahin (1983, 129–30) sees a shift from a figurative to a literal use of ἀρή, he writes: "Das in der Inschrift als Dedikationsformel verwendete Wort ἀρή (ionisch für ἀρά) '*Gebet, Bitte, Flehen, Verwünschung*' bedeutet im übertragenen Sinn in einigen Weihinschriften '*ex-voto, Gelübde, Gegenstand des Gelübdes, Weihgeschenk* etc.' Diese Begriffsentwicklung vom Abstrakten zum Konkreten dürfte schon in der ältesten Zeit geschehen sein." (Translation: That word ἀρή used in the inscription as a dedication formula (Ionic for ἀρά) "*prayer, thanks, entreaty, spell*" means in a figurative sense in some dedicatory inscriptions "ex-voto, vow, subject of the vow, offering etc." The evolution of the concept from abstract to concrete must have happened in the earliest times.). Akurgal 1983, 111–12.

29 Akurgal 1983, 112.

30 Karoglou 2010, 14; see also Salapata 2002, 26.

31 Varvarinou-Vai 2017, 193; Mazarakis Ainian 2005, 93.

the cult image, perhaps as a means of fastening offerings of textiles.[32] Whether this reflects a widespread practice is unclear, although it may help explain the popularity of spectacle fibulae across sanctuaries. Regardless of whether worked animal materials were affixed to a cult image or displayed elsewhere, the prevalence of objects with drill holes suggests a concern for a means to display objects. Many of the circular seals, recumbent animals, and double axes, as well as types of objects specific to individual sanctuaries, like the possible weaving tools and cut shafts from the sanctuary of Artemis Orthia (see § 4.3.1), also exhibit drill holes. Few of these drill holes have overt evidence for wear resulting from use (abrasion around the edge or at the top of the drill hole), suggesting that craftspeople drilled holes in these items because dedicants would expect (or hope) that their objects would be displayed within the sanctuary. The objects likely lack use wear because they were displayed for a short period or were rarely moved, resulting in little abrasion. However, metal staining is exceedingly rare on these dedicated objects, which would be expected if they were affixed with a nail or wire (such as in Akurgal's reconstruction).

While the dedications may have been hung at some point, they were likely removed during a sanctuary cleaning and deposited elsewhere. In the case of assemblages of worked animal objects published with more precise information about the location of their findspots, some general deposition patterns are evident. Many objects were found in contexts associated with the interior of temples, including the material from the Athena Alea temple at Tegea, as well as certain important objects (e.g., the ship plaque) from the sanctuary of Artemis Orthia. The sanctuary at Kythnos offers one of the best examples of worked animal objects found within a temple, as the majority of that assemblage came from within the adyton itself. In addition to the interior of the temple, worked animal objects were often found in association with altars. The sanctuary of Artemis Orthia, the Archaic Artemision at Ephesus, the Samian Heraion, and the sanctuary at Kythnos all had objects found near

[32] Mazarakis Ainian 2005, 93.

an altar.[33] Many objects from the Artemision at Thasos were also found near an altar, but their deposition appears to predate its construction. Additionally, the so-called "Cult Base D" (thought to be an altar) at Ephesus provides some of the best evidence for this practice, as six ivories, along with gold objects, were found clustered around it. Ivories were also found in the vicinity of a monumental altar and another altar or cult base outside the temple (see § 4.3.6). The objects found within temples suggest that they were saved and perhaps displayed for an extended period before the sanctuary was cleaned. As altars were the location for sacrifices and the focal point of Greek religious practice, the prevalence of objects found nearby suggests that these objects may have been brought to an altar before ultimately being discarded in its vicinity.

4.2 Funerary Contexts

Evidence for worked animal materials in non-dedicatory settings, such as in domestic or funerary contexts, remains a major lacuna in the archaeological record; worked animal objects are represented primarily in sanctuary contexts, and only rarely outside them (see fig. 4.1). This absence is a result of both the contexts excavated, as well as cultural practices which reserved animal materials for sanctuaries. Worked animal objects are present in some Early Iron Age burials, although they never represent an overly common grave good. Between the start of the Early Iron Age (ca. 1100 BCE) and the 9$^{\text{th}}$ century, worked animal objects take on a limited number of forms in graves. A number of the worked animal objects from this period are made from ivory (e.g., paired pins and components of weaponry, see § 3.4), although access to the material was likely restricted to a limited number of sites.

By the 9$^{\text{th}}$ century BCE, grave goods made from worked animal materials became more variable, suggesting that the cultural ideas governing the use of worked animal objects were changing. However, the evidence for all of these practices is based on only small numbers of

33 While precise findspots have not been provided in the case of Kythnos, Varvarinou-Vai (2017, 193) mentions that objects were found in association with altars.

worked animal objects. Cemeteries like the Kerameikos, in which over 100 graves predating the 7th century BCE have been excavated, perhaps contains fewer than 10 burials with grave goods made from animal materials. This pattern is also evident at other major early cemeteries such as those at Lefkandi, Corinth, Argos, and Eretria, although the Knossos North Cemetery is a notable exception with certain graves containing large numbers of worked animal objects. Overall, the evidence from pre-Archaic periods shows that worked animal objects were only a small aspect of burial practice, and were neither overly common nor particularly rare grave goods. By the 7th century BCE, fewer numbers of worked animal objects were found in graves across Greece. A drop in the number of grave goods during the 7th century BCE has been noted in other materials as well,[34] but worked animal objects continue to remain rare in the 6th century BCE as well. Many scholars connect the decline of grave goods with the growth of sanctuary dedications (see § 4.1), suggesting that society rewarded the investment of wealth in the public religious sphere, rather than in a private grave. With the exception of worked astragali and spectacle fibulae, the most common forms of worked animal materials found in sanctuaries were absent in cemeteries. There are also several distinct classes of worked animal objects that occur in multiple sanctuaries, and which have never been found in a burial context. The stark divide between dedications and grave goods demonstrates specific ideas may have governed the practice of dedication in burials and dedicatory contexts.

4.2.1 Euboea

Lefkandi shows consistent evidence for the use of animal materials (including ivory) throughout its occupation, with most objects found in burial contexts dating to between the Submycenaean and Subprotogeometric periods (approximately 1100–750 BCE).[35] While most objects found at the site have been assigned a general date, objects found in association

---

34 Morris 1987, 141.

35 Popham, Sackett, and Themelis 1980; Popham and Lemos 1996, Table 2–3.

with some graves lack chronological information, including two antler objects from T Pyre 1.[36] One of the objects (T Pyre 1, 5) exhibits wavy incised lines and a drill hole near the tip, while the other (T Pyre 1, 6) appears to show a modified surface and a drill hole near its base. L.H. Sackett offers several possible interpretations of these objects including, "the tip of a musical instrument such as a horned cithara," "the tip of a composite bow," and "a fragment of jointed furniture."[37] However, Sackett also mentions that "a number of other, non-joining fragments of antler or horn were found with the bones gathered from this pyre."[38] The other pieces raise the possibility that rather than acting as a component of some other object, the animal materials themselves were the grave goods. However, these objects may have also functioned as elements of a horse-bridle piece. Antler tines have been used in this way throughout Eurasia,[39] and such an antler object was found in a Late Helladic I context at Mitrou.[40] While the design of the Mitrou bridle piece is fairly different from the antler object found at Lefkandi, the remains of the object from Lefkandi suggest that it had the same basic form.[41]

The earliest worked animal objects from Lefkandi date to the Submycenaean period (1100-1050 BCE); a burial from this period (S Tomb 38) contained fragmentary ivories that preserve traces of red paint.[42] Following the Submycenaean burials, worked animal objects were also found in association with the Toumba building. M.R. Popham fixes the date of the building between 1000-950, dating the burials beneath to 950 BCE at the latest.[43] An

36 Sackett 1980, 226, nos. T Pyre 1, 5–6, pl. 236.

37 Sackett 1980, 226.

38 Sackett 1980, 226.

39 Medvedskaya 2017; Chechushkov, Epimakhov, and Bersenev 2018.

40 Maran and Van de Moortel 2014, fig. 6.

41 For more on antler bridle pieces, see ID 1 in Appendix A.

42 Popham, Sackett, and Themelis 1980, 123, no. S 38,14.

43 Popham 1993, 22. The original excavators hypothesize that the building was erected as a funerary structure, post-dating the burials. It should be noted that this sequence has been challenged, with

iron knife with ivory pommel, as well as two iron pins with bone heads were found in the burial of the woman beneath the building.[44] Additionally, two bone objects were found in association with the building, including a "dress or hair pin of good quality, with decorated head and finial" found in the fill of the central room, as well as an object with a series of holes found in the fill of the Eastern Room.[45] L.H. Sackett proposes that the piece is a "chanter of a bagpipe or bag-hornpipe," citing similar "traditional Cretan" examples as comparanda.[46] However, the piece with drill holes may also have functioned as a spacer for weaving (a tool used to keep threads separate). Outside of Greece, examples in bone have been found in Iron Age contexts throughout Italy. Evidence for the use of spacers within Greece is less secure, but bone examples have been identified in Dipylon/Odos Peiraios Grave 13 (see § 4.2.2), and two other objects from the sanctuary of Artemis Orthia also may have functioned as spacers (see § 4.3.1).

By the Late Protogeometric (950 BCE), evidence for animal materials (especially ivory) at Lefkandi is more prevalent. For example, Lemos lists two pin heads from a Middle Protogeometric/Late Protogeometric (1000-900 BCE) grave from the Toumba Cemetery (T.49) as either bone or ivory.[47] While the graves from the Late Protogeometric/Sub-Protogeometric periods contain more ivory than graves in other periods, not all of it is substantial or can be associated with a specific object: a large, flat piece was found in a burial dating to Late Protogeometric.[48] Additionally, many of the ivory objects from this period were fashioned into hilt plates for knives and swords: Traces of such a hilt plate were found in association

Driessen and Crielaard (1994) arguing in favor of the building inhabited prior to the burials.

44 Popham 1993, 21.

45 Sackett 1993, 72.

46 Sackett (1993, 72) also suggests that it may be a marker for a game.

47 Lemos 2002, 107; Popham and Lemos 1996, pl. 56.8–9.

48 Popham, Sackett, and Themelis 1980, 152, no. P 23,18.

with a sword in a Late Protogeometric burial (950–900 BCE),[49] and there may be another example of a Late Protogeometric ivory hilt attached to an iron knife in Tomb P.31, although it is ambiguously described as bone, ivory, or wood.[50] Furthermore, another ivory hilt plate was found in a tomb dating to the Sub-Protogeometric II (875–850 BCE) period (T 3),[51] as well as a possible ivory hilt from a tomb dating to the Sub-Protogeometric I–II period.[52] In addition to the hilt plates, a later tomb from the Sub-Protogeometric II–III period (875–750 BCE) also contained a thick ivory pin/spindle, as well as ivory pieces from an unknown object.[53] Lefkandi was abandoned by the end of the Late Geometric period (750–700 BCE), and only two graves from the period were excavated; one of those graves produced a "Little Lion Seal."[54] The limited funerary evidence from this period cannot demonstrate whether such objects were becoming more common within graves at Lefkandi by the Late Geometric period.

The nearby site of Eretria is thought to have been resettled by individuals from Lefkandi,[55] and burials at the site are roughly contemporary with the later phases of Lefkandi, although worked animal objects were more rarely used as grave goods. There were several phases of burials, primarily dating between the 9th and end of the 8th centuries BCE, beginning with pit-cremation graves in the 9th century (875–850 BCE).[56] Later, both secondary cremations

49 Sackett 1980, 225–26, no. T 26,18, pl. 246.

50 Catling and Catling 1980, 257.

51 Sackett 1980, 226, no. T 3,12, pl. 246.

52 Popham, Sackett, and Themelis 1980, 161, no. P 47,18.

53 Sackett 1980, 226, nos. T 36,30, T 36,31, pl. 228.

54 Lemos 2012, 159, 163, pl. 19: 3.

55 Keith Walker (2004, 45) accepts the theory that Lefkandi represents Old Eretria, but is careful to distinguish it from the "Old Eretria" as described by Strabo; he writes: "This is not to say that the abandoned settlement at Lefkandi was in fact what Strabo saw (or thought he saw), for his distances make that unlikely, but merely that, in the ninth century, a substantial body of refugees from Lefkandi migrated to the site of the later *polis* of Eretria and expanded the already existing small settlement there."

56 Blandin (2007a, 43) describes the pit-cremations as "à incinération en fosse."

and inhumation burials date from the end of the 8th to the start of the 7th century BCE.[57] Finally, *enchytrismos* burials date to sometime between the Geometric II (760–735 BCE) and recent Geometric (750–700 BCE).[58] Only one burial (T. 10), dating to 750–700, contained a bone object.[59] The purpose of this object is unknown, as it has an irregular shape and appears to be decorated on both sides. The published image suggests that it may be a decorated scapula of a medium-sized animal, although it is unclear. The site of Eretria illustrates the discrepancy between burial and dedicatory contexts, as both graves and areas related to the sanctuary of Apollo were excavated. Despite the many rich graves at Eretria, worked animal objects remained scarce within burials. Yet roughly contemporaneous deposits from north of the sanctuary of Apollo contained several "Little Lion Seals" (see § 4.6.1), an ivory comb, and other objects.[60] The assemblage at Eretria demonstrates that individuals were deliberately burying their dead with objects made from materials other than bone or ivory, while saving worked animal objects for dedication.

4.2.2 Athens

Between the start of the Iron Age (ca. 1100) and the 6th century, graves in Athenian cemeteries produced several unique worked animal objects. Many of these objects come from the Kerameikos cemetery, a site with a considerable period of occupation. Like at Lefkandi, excavations of the Kerameikos cemetery revealed Submycenaean graves containing worked animal objects. An ivory object found in Middle Submycenaean Grave 47 appears to be an attachment of some sort,[61] while an ivory head of an iron pin was found in a tomb dating to

---

[57] Blandin 2007a, 52–57.

[58] Blandin 2007a, 63.

[59] Blandin 2007b, 48, pl. 91, 2007a, 122.

[60] Verdan 2013, 26, no. 453; Huber 2003, 87, no. O 156; 93–96, nos. O 196–201; 100, no. O 228; Huber and Poplin 2009.

[61] Kraiker and Kübler 1939, 25, 88.

the Late Submycenaean period (Grave 113).[62] The finds from the burials of the Protogeometric period also parallel those at Lefkandi, as two graves from the Kerameikos dating to the Early Protogeometric (1050–1000 BCE) period produced daggers with complete pommels and hilts.[63] Paired iron pins with ivory heads were also found in an Early Protogeometric grave from the Eridanos cemetery of the Kerameikos (Tomb hS 92a).[64]

Compared to the previous periods, evidence from Athens beginning in the 9th century BCE (roughly equivalent to Early Geometric I) indicates a slightly more diverse collection of worked animal objects, and these objects diverge from the more widespread pattern of paired pinheads or pommels and hilts made from bone or ivory. A single bone bead was found in the Early Geometric I (900–875 BCE) "Boot" or "Booties Grave" (so named for the terracotta boots found there).[65] This bone bead has few parallels, including one identified by Papadopoulos from the Early Iron Age cemetery at Torone.[66] A bone bead from Assiros (dating to ca. 800-750 BCE) is also somewhat similar in form (tapered in the center through incision), although it is decorated with incised circles.[67]

One of the best examples of a grave containing more unique forms of worked animal objects is the Early Geometric II (875–850 BCE) "Tomb of the Rich Athenian Lady" (Tomb 15) found within the cemetery on the north slopes of the Areiopagos. It is an extraordinary burial, with a rich and diverse assemblage of grave goods; Papadopoulos and Smithson write that it is "the richest of post-Mycenaean times in the Agora area and perhaps the richest

62 Smithson 1961, 175.

63 Kraiker and Kübler 1939, 101–4, pl. 32. It is unclear whether they are made from bone or ivory. The original publication refers to them as bone, although Lemos (2002, 120) claims that they are ivory. The photographs may show cone-within-cone splitting characteristic of ivory, although this is unclear.

64 Vierneisel-Schlörb 1966, 7.

65 Papadopoulos and Smithson 2017, 100, no. T11-30.

66 Papadopoulos 2005, 89, no. T10-7.

67 Wardle 1989, 449, pl. 68c.

of its period in Athens."[68] The filigreed gold jewelry, fine pottery, and model granaries all differentiate the grave as a markedly unique archaeological assemblage. Non-Greek influences were identified by Evelyn Lord Smithson in her initial publication, in which she suggested Eastern merchants responsible for the "thorough familiarity with oriental motives" seen within the grave goods.[69] In addition to the exceptional nature of the grave goods within Tomb 15, subsequent re-analysis of the skeletal material showed that the grave contained a fetus, indicating that the woman "was pregnant or had recently given birth when she died."[70] The worked animal objects found within Tomb 15 are further instances of unique elements of material culture found within this assemblage. Within the grave, two fragmentary, pyramidal stamp seals in ivory were discovered, which are wholly different from the multiple forms of bone and ivory seals of the 7th century BCE. Instead, the best parallel for the form of these objects is a faïence object found on Rhodes dating to the 9th century.[71]

Tomb 15 also contained a bone or ivory object with a carving of an eye.[72] Papadopoulos and Smithson highlight the anomalous nature of this piece, remarking that it precedes other attempts to integrate human figures into decoration, and suggest that it may have an "Eastern origin."[73] Light incision visible on the back of the object may indicate an attempt to score the surface, perhaps to affix it to another object using glue, a practice commonly employed in Near Eastern ivory work and later used as a production technique by Greek craftspeople (see fig. 4.2). Like the stamp seals, this object has no later comparanda in bone or ivory. In just a single, extraordinary burial, two anomalous forms of worked animal objects (perhaps both ivory) were deposited as grave goods and which have few parallels. The worked animal

68 Papadopoulos and Smithson 2017, 124.

69 Smithson 1968, 83; Papadopoulos and Smithson 2017, 132.

70 Liston and Papadopoulos 2004, 15; Liston 2017, 534–36.

71 Papadopoulos and Smithson 2017, 175; Laurenzi 1936, 164, fig. 151.

72 The object has been referred to as ivory, but photos of the object suggest that it could be bone. Smithson 1968, 116, no. 81, pl. 32; Papadopoulos and Smithson 2017, 175–76, no. T15-81, fig.2.100.

73 Papadopoulos and Smithson 2017, 176.

objects found within Tomb 15 should be seen as another unique attribute that differentiates this burial from others in the Kerameikos. These grave goods suggest a more conspicuous attempt at mobilizing ivory as a demarcation of status, through the use of forms that were perhaps experimental or short lived.

While the worked animal objects from Tomb 15 do not have precise parallels, somewhat similar grave goods were found in other burials in the Kerameikos. One such grave, G 41, dates to between the 10th and 8th centuries BCE, but was disturbed in the Late Geometric period (760–700 BCE). G 41 contained a triangular ivory object in the shape of a duck's head,[74] which is reminiscent of the seals from Tomb 15. Each of the objects is triangular and exhibits incised zig-zag patterns around their borders. Papadopoulos draws stylistic comparisons between this object and the triangular seals from Tomb 15,[75] and these similarities may suggest that this object dates to the initial period of deposition in G 41, and should be considered one of the earlier examples of Greek ivory carving. Another example of a worked animal object that potentially dates to before the 7th century is a seal from the Odos Kavalotti cemetery. Boardman and John Nicholas Coldstream refer to this seal as ivory,[76] but Phoivos Stauropoullos referred to it as bone in the original publication, and based on the photographs this appears more likely.[77] The rectangular seal features an atypical "peg handle surmounted by a bird," as well as other impressions that may have been for additional pegs.[78] Coldstream describes the intaglio as "two men exercising a horse," a theme he says appears on a mug dating to the Middle Geometric II (800–760 BCE) period.[79] The date of this seal is not fully understood, and it lacks parallels in the sanctuary assemblages of the

74 Kübler 1954, 235, no. 5289, pl. 161.

75 Papadopoulos and Smithson 2017, 175.

76 Boardman 1970, 108; Coldstream 1977, 108.

77 Stauropoullos 1965, 79. Carter (1985, 39, note 2) lists the seal among other ivory objects, but references the classification as bone as well.

78 Coldstream 1977, 108.

79 Coldstream 1977, 108.

7th century. As a result, this seal could have been created prior to the 7th century, but it cannot be dated with precision.

The triangular seals from Tomb 15, the ivory object in the shape of a duck's head from Kerameikos G 41, and the seal from Odos Kavalotti all represent worked animal objects that were unparalleled within the later corpus of Greek objects. These works suggest a period of inventiveness between the 9th and 8th centuries BCE, in which craftspeople created small numbers of relatively unique objects.[80] These objects appear primarily in wealthy graves, which helps to explain their scarcity and lack of contemporary parallels. Perhaps the relatively limited environment for production is the reason that these objects do not appear to have been an influence on future craft production. In the case of the ivory items, craftspeople may have been unable to create lasting practices because they lacked regular access to the materials.

The Dipylon Ivories and Related Finds

The ivory statuettes found in Dipylon/Odos Peiraios Grave 13 best exemplify this period of experimentation with new forms of worked animal objects before the 7th century. The five[81] ivory statuettes found in an 8th-century (ca. 730 BCE) grave in the Dipylon/Odos Peireos cemetery represent a genuinely remarkable archaeological discovery (figs. 4.3 and 4.4).[82] Each of the preserved statuettes depicts a naked woman wearing a *polos*, with her hands at her sides. When the Dipylon ivories were found, some believed them to be Near Eastern objects, and Barnett argued that the smallest statuette was original to Syria, while the others were modeled after it.[83] The ivories have parallels in ivory figurines from the Loftus

[80] The nearby site of Eleusis also shows evidence for wealthy individuals using ivory grave goods during this period. Ivory pins were found within two burials dating to "either side of 800 B.C.," one of which was the notably rich "Isis Grave" (Coldstream 1977, 56).

[81] Four of the statuettes are fairly complete: NM 776, NM 777, NM 778, NM 779 (with restored fragment NM 2602). The fifth is highly fragmentary, with only a left arm and leg: NM 2603.

[82] Coldstream 1977, 110.

[83] Homolle 1891, 442; Barnett 1939, 5, note 3.

group of the South-East Palace,[84] and another group discovered in the Burnt Palace by Max Mallowan;[85]the statuettes likely formed components of handles of fly-whisks or fans. Nude goddess figurines such as these are thought to represent either Inanna/Ishtar or Astarte, although there are several other Near Eastern goddesses who may be represented this way.[86] While Stephanie Böhm and Carter acknowledge a basic similarity between the examples from Nimrud and the Dipylon ivories, both scholars see a greater fundamental difference separating the two groups of statuettes;[87] Böhm writes that the Dipylon ivories possess "ein prinzipiell andersartiges Gestaltungsprinzip"[88] Today, it is agreed that the statuettes conform to conventions of Geometric art seen in other media, and are distinctly Greek.[89] Regardless, they have an aspect of otherness, and are so unprecedented that they represent a true experiment in ivory carving. Carter writes of them: "The ivory ladies have only remote relations among contemporary works in bronze and terracotta, and, as they seem to have no direct precursors, they likewise have no successors. They are, from our perspective, sui generis."[90]

Based on the decreasing size of the statuettes, Thomas Dunbabin has suggested that the ivories were carved from a single tusk.[91] This idea would imply that the statuettes were created simultaneously by the same artist or artists, which is difficult to prove or disprove, as many different factors might explain the sizes of the statuettes. Had the carvers of these

---

84 Barnett 1935, 192–94, pl. 27, nos. 2, 4.

85 Mallowan 1966a, 208–17, nos. 146, 147.

86 Böhm 1990, 127–28. In his survey of Syro-Palestinian goddess imagery, Isak Cornelius (2004, 21) identifies the naked goddess holding objects as the Egyptian Qedeshet, images of which make up roughly half of his catalog.

87 Carter 1985, 3.

88 Böhm 1990, 25.

89 Kunze 1930, 151; Marangou 1969, 186; Carter 1985, 4; Böhm 1990, 26; Lapatin 2001, 45.

90 Carter 1985, 2–3.

91 Others have repeated this idea, including Coldstream (1977, 108) and Lapatin (2001, 45).

statuettes had access to an entire tusk, procuring five equal-sized blocks of ivory would not have proved difficult. Carvers could have extracted some material from around the pulp cavity, leaving most of the desirable ivory available. It is more likely that the carvers of the Dipylon ivories were attempting to maximize their material. There is some evidence for such practices; Lapatin points to the separately carved ears attached to two of the statuettes' heads with dowels as evidence for material conservation.[92] The carvers may have also been relatively inexperienced working with larger portions of ivory, and found it difficult to navigate the shape of the tusk and create equal portions. Regardless of the reason for the unequal sizes, none of these explanations are incompatible with the idea that the statuettes were carved at the same time.

The Dipylon statuettes are not the only example of skillfully carved ivory sculpture following the Bronze Age, but they are the earliest. Additionally, nearly all the subsequent examples of sculpture appear in votive contexts, rather than in a burial. The deposition of five similar ivory statuettes within a grave represents a highly atypical practice. From a formal and stylistic standpoint, these statuettes seem to show Greek experimentation, adoption, and transformation of Near Eastern Ivory motifs. Moreover, their use in a funerary context also seems to demonstrate the exercise of a novel funerary practice. Lapatin speculates that the ivories would have been laid out during the *ekphora* or the *prothesis*.[93] Coldstream notes how seemingly out of place these figures are within funerary practice; he calls attention to nudity present in the figures, and notes that it is "alien to Aegean tradition."[94] It is unknown whether the Dipylon ivories carried with them more than a superficial connection to Near Eastern ideas about what these figures meant or how they functioned. Undoubtedly they would been striking, even arresting objects within the context of a funeral at the end of the 8th century BCE.

---

92 Lapatin 2001, 45.

93 Lapatin 2001, 45.

94 Coldstream 1977, 110.

In addition to the ivories, several other unique worked animal objects were found in Grave 13, including two bone bands showing incised zig-zags,[95] as well as "other bone fragments decorated with rosettes, leaves, lozenges, and a possible dolphin."[96] Sanne Houby-Nielsen argues that these objects are weaving tools, writing that the incised bone strips from Grave 13 are a depiction of "pin-beaters shaped as tablet woven bands," and the "dolphin-shaped" object "resembles a sophisticated version of the 'sword-like' bone beaters."[97] She compares the finds from Grave 13 to other worked animal objects found in Grave 11, which also contained "at least fifteen 'bands' (between 7 and 9 cm long and 1.5–1.7 cm wide) some of which were decorated with a running spiral."[98] Additionally, Grave 11 also contained bone objects with decorations and drill holes,[99] which Houby-Nielsen suggests are a type of tool used with weaving known as a spacer (see § 4.3.1).[100] Houby-Nielsen's identification of these objects is a reminder that weaving tools made from worked animal objects have gone unrecognized within both dedicatory and funerary assemblages.

Later Graves from Athens and Nearby Sites

There are some other examples of worked animal objects from Athenian graves in the later part of the 8th century, including a square ivory seal dating to roughly 740 BCE, which was found in a grave in the Kerameikos (gr. VD Ak 1).[101] Yet By the 7th century BCE and later, objects made from all worked animal materials were comparatively rarer than in the previous periods. One ivory object in the form of a recumbent bull may postdate the

---

95 Brückner and Pernice 1893, 120, fig, 13; Perrot 1895, 282–83; Zosi 2012, 148.

96 Zosi 2012, 148.

97 Houby-Nielsen 2017, 257.

98 Houby-Nielsen 2017, 257.

99 Brückner and Pernice 1893, 121–22, figs. 14–16; Houby-Nielsen 2017, 256–57, fig 10.

100 Houby-Nielsen 2017, 256, fig. 10.

101 Coldstream 1977, 108.

8th century BCE;[102] it was found in a pithos burial that was dated to between the 8th–6th centuries BCE.[103] Following the 8th century BCE, worked animal materials were only rarely used as grave goods. One notable exception to this pattern is an Ionian couch inlaid with large amounts of ivory found in the *Südhügel* of the Kerameikos; the burial is significantly later than the other materials from the cemetery, as it dates to the third quarter of the 6th century BCE (see § 3.4.3).[104]

4.2.3 Corinth, Argos, Tiryns, and Other Nearby Sites

While the Corinth North Cemetery has a similarly long-lived series of burials spanning the Geometric–Classical periods, excavations have not produced as many examples of worked animal objects as in the Athenian cemeteries. Objects made from animal materials were found in only three graves prior to the Classical period: A Protocorinthian (720–625 BCE) grave produced an ivory brooch (fig. 4.5),[105] a grave from the "middle of the first quarter of the sixth century" contained a bone spectacle fibula,[106] and a Middle Corinthian (580–555 BCE) grave contained fragments of bone associated with an iron pin (presumably a pinhead).[107] Additionally, an ivory pinhead came from the 8th-century BCE Grave C of the Agora at Corinth.[108]

The nearby site of Argos exhibited several graves that attest to a higher prevalence of

[102] The form of this item is different than the recumbent animals found across sanctuaries in Greece (see § 4.6.4); it may have served as a handle.

[103] Kübler 1970, 75, no. 2, pl. 128.

[104] Knigge 1976, 83.

[105] Blegen, Palmer, and Young 1964, Grave 113, 62, no. 113-1, pl. 13.

[106] Blegen, Palmer, and Young 1964, 185, Grave 159, no. 159-3, pl. 79.

[107] Blegen, Palmer, and Young 1964, Grave 154, 178, no. 154-1.

[108] The pin head is listed as ivory in the original publication, while Kilian-Dirlmeier (1984, 74, nos. 285, 286, pl. 11) calls it bone. The illustrations in both *Corinth XII* and *Nadeln der frühhelladischen bis archaischen Zeit von der Peloponnes* strongly suggest it is ivory (Morgan 1937, 544; Davidson 1952, 281, nos. 2264 (6534) and 2265 (6535), pl. 117).

worked animal objects in burials dating to the Protogeometric and Geometric periods. Pins or pairs of pins were found in several graves, primarily dating to the Protogeometric period, including Tomb 37,[109] Phlessas Tomb V,[110] Extension Grave III,[111] and Perrouka St., Grave II.[112] In addition to the pins, a point or dagger in Tomb 179 preserves traces of an ivory hilt and pommel.[113] In another Geometric tomb (Tomb 190), a plaque was found with several circle-and-dot motifs on one side, and an array of incised lines forming a rectangular grid on the other. Paul Courbin claims that another comparable plaque was found in Argos in 1966.[114] While the circle-and-dot motifs are relatively common among worked animal objects following the Geometric period, the incised grid does not have any obvious parallels. Argos represents another example of sites with higher concentrations of worked animal objects in graves from earlier periods, similar to the cemeteries of Lefkandi and Athens. Burials with bone or ivory pin heads (either a single object or in a pair) were found at other nearby sites, including Tiryns,[115] and Nauplion.[116]

4.2.4 Crete, Rhodes, and the Dodecanese

The Knossos North Cemetery

In areas of Greece farther from the mainland, worked animal objects appear somewhat more frequently in cemeteries. At the Knossos North Cemetery, worked animal objects were

[109] Courbin 1974, 39, no. B. 36, pl. 29; Kilian-Dirlmeier 1984, 73, no. 273.

[110] Alexandri 1960, 93; Kilian-Dirlmeier 1984, 74, nos. 277,278, pl. 11.

[111] Charitonidis 1966, 126; Kilian-Dirlmeier 1984, 74, nos. 283,284.

[112] Kokkou-Vyridē 1979, 176–77, pl. 55e; Kilian-Dirlmeier 1984, 74, nos. 285,286, pl. 11.

[113] Courbin 1974, 85, no. F. 75.

[114] Courbin 1974, 93, no. Os 106, pl. 52.

[115] Grave 9/1972 produced pins with bone heads and does not have a clear chronological determination; Grave 11/1974 contained pins with ivory heads and is dated to the Protogeometric period. Grave 12/1974 (also dated to the Protogeometric period) featured pins with bone heads. Kilian-Dirlmeier 1984, 74, nos. 275, 276, 279, 280, 281, 282, pl. 11. Additionally, a single iron pin with an ivory head was found in a grave dating to the Sub-Protogeometric I period. Walter Müller 1912, 128.

[116] Nauplion produced a single grave with a pin. Kilian-Dirlmeier 1984, 74, no. 289, pl. 12.

found in several tombs that date to between the Subminoan and Late Orientalizing periods (11^{th}–late 7^{th} centuries BCE). The number and variety of finds from the cemetery suggest that individuals on Crete made these objects a consistent and varied aspect of burial practice throughout the use of the Knossos North Cemetery (see table 4.1). Moreover, the objects were not just created from ivory and mammalian bone, but also horncore, animal tooth, and the vertebrae of cartilaginous fish. Such animal materials were viewed as apt additions to a burial, and were deposited alongside metals, glass, faïence, and other valuable materials.

The cemetery also contained a group of objects with clear Near Eastern influences in two of the richer graves: Tombs 219 and 292.[117] Tomb 219 produced a fragmentary janiform figure in ivory, as well as a series of sleeves and pommel-like objects, thought to be components of a fly whisk.[118] The condition of the janiform figure hinders precise stylistic analysis, and the disturbed nature of the tomb does not allow for any chronological certainty. However, Böhm argues that the object is non-Greek, but also writes that Greek manufacture cannot be ruled out.[119] Like Tomb 219, Tomb 292 also contained sleeves or staves thought to be part of a fly whisk. In addition to the foreign or foreign-influenced objects, Tomb 292 also produced an ivory object imported from the Near East or created in imitation of Near Eastern models. While this object (292.f49) is described as a hilt, it instead appears to be an ivory vessel. A similar example was found at the Heraion at Samos,[120] for which Brigitte Freyer-Schauenburg provides comparanda from Nimrud[121] and Carthage.[122] The examples from Carthage, Nimrud, Samos, and Knossos all exhibit traces of a single handle and a

117 Tomb 219 is dated to the Early Protogeometric, but with another interment thought to be from between the Late Protogeometric and the Protogeometric B periods. Tomb 292 dates between the Protogeometric B and Late Orientalizing periods (Coldstream and Catling 1997, 210, 257).

118 Hoffman 1997, 54–55. Comparable examples of fly whisks were also found in the Idaean cave.(Sakellarakis 2013, 175–79, pls. 95–97).

119 Böhm 1990, 42.

120 Freyer-Schauenburg 1966a, 10, no. 24, pl. 27.

121 Barnett 1935, 188, pl. 24.

122 Vives 1917, 80, no. 449, fig. 70.

flaring base.

Only a few other ivory objects were found at the cemetery, including a comb, pieces of a "mounting," as well as some assorted fragments, all found in graves dating to the Subminoan period. Tomb 219 (see above) produced a roundel that once held inlaid paste or blue frit, as well as some other ivory fragments. An ivory spectacle fibula was also found in Tomb 285, which dates to between the Early Protogeometric and Late Orientalizing periods, although the fibula itself was found in a vessel that postdates the Protogeometric period. While ivory appears fairly abundant at the cemetery, much of it dates to the Subminoan period or shows evidence that it could have been imported. As a result, it is not clear to what extent the ivory assemblage at the cemetery is a function of availability and increased production of the material within Greece, rather than a result of importing finished objects.

Objects made from other materials were also found at the cemetery, including items said to be made from boar tusk; however, images of these objects suggest that they were mischaracterized. The "boar tusk" pendant (292.f35), an animal tooth mounted in silver with a suspension hole, shows none of the characteristic triangular or trapezoidal shape of the canine tooth belonging to a wild boar or pig. Instead, it looks similar to the canine of a predator, perhaps a bear or canid. Similarly, a series of objects thought to be elements of a boar tusk helmet (201.f13) also do not appear to be made from the material. Instead, the images suggest that all are objects made from bone rather than tooth. While there may not be evidence for the use of boar tooth, the Knossos North Cemetery exhibits a variety of other worked animal materials. The frequency with which such objects were dedicated suggests that animal materials were an accepted part of burial practice.

The variation among animal materials may suggest that the objects did not all serve the same purpose. The fish vertebrae, for example, may have been seen as strongly tied to the ocean, invoking the landscape itself.[123] In the case of the animal-tooth pendant, the

[123] Perhaps comparable to Jones' ideas about Neolithic Orkney (see § 2.1.2).

relationship between the human and the animal (perhaps the non-human world more generally) is interred with, and bound to, the individual or individuals within the grave. These objects suggest that the community viewed the relationships between humans and animals as a significant part of a life, one which is worthy of inclusion in a burial. The willingness of individuals to bury their dead with animal materials, to extend ideas of value onto these objects, suggests a suite of practices comparable to those associated with sanctuaries elsewhere in the Greek world.

Other nearby cemeteries showed further evidence for the use of worked animal materials in burial contexts. Multiple graves from the Fortetsa cemetery contained worked animal objects, including a bone bead from Tomb VIII (dated to the Early Protogeometric period)[124] and a bone pin in a Tomb VI (dated to the Protogeometric period).[125] Tomb XI, dated to the Protogeometric period, contained an ivory carving of a bull and another fragmentary ivory piece.[126] Elsewhere on Crete, an ivory pendant was also found in Tomb 31 at Praisos.[127] In addition to these finds, the site of Eleutherna also produced one of the most notable funerary assemblages to integrate worked animal objects: the carved ivory faces thought to belong to a *kline* or bier. These carvings from Eleutherna, along with the Ionian couch found in the Kerameikos, suggest that different funerary practices (perhaps imported from the regions of East Greece or Western Anatolia) at the end of the 7$^{\text{th}}$ century BCE found new purposes for ivory (see § 3.4.3).

As on Crete, funerary contexts in the Dodecanese also show slightly different patterns in the use of worked animal objects. Two burials in the Seraglio cemetery on Kos and a burial from Ialysos on Rhodes all exhibit somewhat comparable bone pendants, and similar pendants were also found in sanctuary contexts on Rhodes (see § 4.5). Unlike elsewhere in

[124] Brock 1957, 59, no. 637.

[125] Brock 1957, 11, no. 111.

[126] Brock 1957, 22, no. 195 and 199, pl. 13.

[127] Marshall 1905, 64.

the Greek world, individuals seem to be depositing similar types of worked animal objects in both sanctuaries and graves. Subtly different uses of worked animal objects within funerary contexts in Crete and the Dodecanese suggest that cultural ideas about worked animal objects were not homogeneous across the Greek world. Individuals in Crete, Rhodes, and the Dodecanese appear to have been slightly more likely to inter their dead with worked animal objects, a practice that is testified in contexts dating from the Subminoan period until the start of the Archaic period.

4.3 Major Dedicatory Assemblages of Worked Animal Materials

The following sites possess the most significant dedicatory assemblages of worked animal objects; these assemblages are some of the largest and most varied collections across the Greek world. Within these assemblages are evidence for both a more general approach to dedication shared between sanctuaries, as well as regional practices indicating specific ideas about the materials.

4.3.1 The Sanctuary of Artemis Orthia at Sparta (650+ Objects)

Excavations at the sanctuary unearthed the largest assemblage of worked animal objects from the period, a considerable number of which were made from ivory. In addition to its breadth, the collection is strongly varied and contains many types of objects commonly found at other sanctuaries: a sizable set of circular seals, the largest collection of recumbent animals in any sanctuary, and many worked astragali. Additionally, it produced types of objects which were unique to the sanctuary, the most notable group being a series of plaques carved in relief showing mythological scenes and depictions of the winged Orthia. Plaques showing reliefs are found only in small numbers in other sanctuaries, making them a distinct feature of this assemblage. Other unique finds include a series of carved female figures in bone (see below), small statuettes of seated figures in bone and ivory, a series of seals with carved faces in ivory, as well combs in ivory featuring scenes in relief. The stylistic aspects of these more distinct finds have been extensively covered by Marangou, Carter, and others.[128] However, there are also bone dedications from the sanctuary that have few precedents at other sites; these include hundreds of undecorated cut sections of bone, as well as objects which may be weaving tools (both discussed below).

The sanctuary of Artemis Orthia had a long history of occupation, with the first traces of the cult potentially dating to as early as the 10th century BCE.[129] The earliest altar at the site is not associated with any temple architecture, and Dawkins suspects that "some kind of primitive temple stood in the western part of the sanctuary, and that the temple and altar already stood facing one another."[130] The stones making up this "earliest altar" underlie the foundations of the later Archaic altar. This later Archaic altar was associated with an early temple, of which some part of the foundation remains (see fig. 4.6). Dawkins suggests that the temple was long and thin, perhaps divided into two naves, and constructed with a mixture of brick and wood on a stone foundation.[131] A rich deposit found outside the south-east corner of the later temple is thought to be associated with the earlier temple; Dawkins theorizes that the objects found there were "stored in the western part of the [earlier temple]."[132] This deposit contained the ship plaque,[133] as well as one of the most impressive "beast of prey" recumbent animal scenes, both in ivory. Additionally, other recumbent animals were also found in this area. As these pieces are some of the most impressive from the sanctuary, Dawkins suggests that they were kept as objects of "especial importance."[134]

Since the original publication of the sanctuary, J. P. Droop's chronological sequence

---

128 Marangou 1969; Carter 1985; Poulsen 1912, 112–15; Barnett 1982.

129 Dawkins 1929b, 1.

130 Dawkins 1929b, 8.

131 Dawkins 1929b, 12.

132 Dawkins 1929b, 12.

133 Dawkins 1929a, 214, pls. 109, 110.

134 Dawkins 1929b, 14.

based on Laconian pottery was revised by both E. A. Lane,[135] and Boardman (see table 4.2).[136] With Boardman's revised chronology, the majority of the worked animal objects were dated to the middle and second half of the 7th century BCE (later than originally thought).[137] Boardman, Marangou, and Carter have all attempted to fix the dates of some of the more notable finds (e.g., plaques, recumbent animals, goddess figurines) by reinterpreting Dawkins' description of the stratigraphic associations of the objects and making stylistic comparisons to objects in other media. Purely based on the stratigraphy (rather than stylistic analysis), Dawkins states that most of the ivory comes from deposits dating to the Laconian I or II periods (650–570/560 in Boardman's updated chronology, see table 4.2). Marangou's chronological assessment, while drawn from both stratigraphic association and stylistic analysis, does not greatly differ from Boardman's chronology. Most recently Konstantinos Kopanias has attempted to revise the Artemis Orthia chronology and the dates of the ivories through a detailed study of Dawkins' excavation notes, as well as a comparative study of new materials.[138] Kopanias presents preliminary findings of his studies, in which he argues that the winged Orthia plaques should be dated to "the end of the eighth or the beginning of the seventh century" based on similarities between the plaques and ivories from the Idaean cave, along with other Cretan objects.[139] Kopanias proposes the following scenario to explain the connection between Crete and Artemis Orthia:

> [C]raftsmen trained in an Oriental or Orientalising workshop worked as ivory carvers at the Idaean Cave at some time during the third quarter of the eighth century BC. Some of the apprentices from this workshop continued working at the cave least up to the first half of the seventh century, while others moved to Sparta and worked at the Orthia sanctuary at the end of the eighth or the beginning of the seventh century and produced [the plaques showing the Winged

[135] Lane 1933.

[136] Boardman 1963.

[137] Boardman 1963, 5.

[138] Kopanias 2009.

[139] Kopanias 2009, 128.

> Orthia]; this ivory workshop was active in Sparta at least up to the sixth century BC.[140]

From a chronological standpoint, Kopanias suggests only that the plaques are between 25–50 years older than Marangou's chronological assessment.[141] Moreover, he presents compelling similarities between the designs of Orthia's dress and those found on multiple objects from the Idaean cave, including the Daedalic statuette, the janiform heads, and the unique rectangular seals (see § 4.3.10). Kopanias also provides parallels for the winged Orthia from Crete; one such example, housed at the University of Missouri at Columbia, is a Potnia figure on a lekanis.[142] He also references the Fortetsa belt as a stylistic precursor to the ivories, although he does not mention the ivory plaque from the sanctuary of Artemis Orthia that closely mirrors the central triad scene found on the belt.[143] Kopanias' work offers strong support for Cretan influence on the Artemis Orthia assemblage; however, his proposed change to the chronology of the Spartan ivories relies on a diffusionist theory that assumes some craftspeople from Crete left for Sparta and made the Orthia plaques at the end of the 8th century BCE, after which some of the original Cretan craftspeople made the Daedalic statue in the 7th century BCE. Without subscribing to a very particular narrative about the craftspeople at the Idaean cave, it is difficult to understand how a 7th-century Daedalic statue at the cave can be used to support an 8th-century BCE date for the Orthia plaques simply because they share similarities. While the specific details are speculative, Kopanias draws attention to the fact that the Orthia plaques may have had early Cretan influences, perhaps signaling that the Orthia plaques should be dated earlier. The similarities among the Cretan and Spartan materials might also speak to the presence and activities of more mobile craftspeople, perhaps even non-Greek individuals. Such possibilities complicate any

140 Kopanias 2009, 129–30.

141 Marangou 1969, 13, 22.

142 Kopanias 2009, 128, fig. 12.9.

143 Böhm (1990, 96–97, fig. 17) identifies the similarity between these scenes.

chronological assessment based on a limited body of work at only two sites. Regardless, the updated chronological assessments show that the worked animal assemblage at the sanctuary of Artemis Orthia follows a similar (if slightly earlier) pattern as many other sites: limited evidence for objects dating to the first quarter of the 7$^{\text{th}}$ century BCE, and a majority of objects dating to around the middle of the century and later.

Bone Shafts and Carvings of Female Figures

Shaft portions from a long bone of a large mammal served as the medium for two distinct types of offerings at the sanctuary: modified bone shafts and carved depictions of female figures.[144] It is unclear how many examples of these shafts were recovered from the sanctuary; Dawkins publishes a photo of only one shaft, but writes that "they were found by the hundred."[145] Without a more accurate account, it is difficult to determine if these "hundreds" of objects all represent the same type of worked bone shaft or whether they were more varied. However, the objects from the Ashmolean Museum are very similar to both the published example and a single shaft from the sanctuary on display at the Metropolitan Museum of Art in New York.[146] In these examples, the bone was cut transversely and longitudinally to create a semi-cylindrical section. Craftspeople also drilled a hole through the center of the bone, and some of the shafts exhibit a degree of polish (see figs. 4.7a, 4.7b, and 4.7c). As the craftspeople removed the most diagnostic features of the bone, it is difficult to characterize precisely the source of this material. However, based on a close study of three examples from the Ashmolean Museum, these objects appear to be created from the femur of a cow. The shafts show no sign of the *linea aspera* or other attributes of the posterior surface of the femur, suggesting that producers were targeting the more regular anterior surface.

144 Described by Dawkins (1929a, 218, pls. 117–20) as "Bone *Xoanon*-like figures, probably of Orthia." Marangou (1969, 151–58, nos. 88–104, figs. 115–34) divides these carvings into two separate classifications: "Weibliche Protome" and "Weibliche Statuetten", each with their own subgroups.

145 Dawkins 1929a, 238.

146 Accession number: 24.195.181, erroneously described as ivory.

Dawkins describes the shafts as "commonest in the seventh century, but there were also a considerable number in the Laconian III and IV deposits of the sixth century."[147] Presumably, he is suggesting that the bulk fell in the Laconian I and II layers (subsequently redated to 650–620 and 620–580 respectively, see table 4.2) and some in the III and IV layers. With the adjustments to the chronology of the site, these objects were more heavily concentrated in layers dating to the second half of the 7th century and early 6th century BCE. The carved figures follow a similar distribution, as they are split almost evenly among "Geometric"–Laconian II and Laconian III–IV layers (see table 4.3) Using both contextual information and stylistic traits, Marangou regrouped and redated these figures. Her analysis of the figures places them primarily in the mid-7th century BCE (see table 4.4). As a result, the carvings and bone shafts would have been deposited at roughly the same time.[148] The bone shafts and carvings of female figures are roughly contemporary with one another, but it is unclear if they were recovered in the same contexts.

Like the shafts, the carvings of female figures were also created from a portion of a long bone. These carvings were created from either a section that was cut longitudinally (i.e., the same as the shafts) or an entire section of the bone that was not split lengthwise (fig. 4.8).[149] Again, craftspeople took advantage of the anterior surface to carve the features of the figure. There are several styles of female figure, some with little more than a head, and others which are nearly carved in the round.[150] In differentiating these carvings as statuettes and protomes, Marangou argues that it cannot be assumed that the protomes were used as independent objects. Her criteria for what constitutes a protome or statuette is not entirely clear: at least two of the protomes were created from an entire section of bone,[151] while some

147 Dawkins 1929a, 238.

148 It should be noted that the mid-7th century BCE covers most of the other worked animal object dedications as well.

149 Dawkins 1929a, 217.

150 Marangou 1969.

151 Marangou 1969, 151, nos. 88, 94, figs. 115–16.

of the statuettes were created from a semi-cylindrical portion (i.e., cut longitudinally like the worked shafts).[152] Marangou tentatively suggests the protomes could have been mirror handles, but emphasizes that there is no evidence for such a use.[153] Within the larger context of the hundreds of worked animal object offerings at the sanctuary of Artemis Orthia, it seems likely that the "protomes" and "statuettes" were similar categories of objects, both intended as independent offerings.

Both the shafts and the goddess figurines share a common material: bone corresponding to a meat-bearing section of a large animal, likely the femur or thigh of cattle. The dedication of bone shafts from Artemis Orthia may be unrelated to *thysia* sacrifice, but the offerings are conceptually similar: a specific unit of the animal (part of the limb) was repeatedly given as an offering. Both practices appear to be governed by the same cultural ideas about the relationship among animals, their bodies, and offerings to deities; part of the value of these worked objects is connected to their potential as a meat source. While there are advantages in selecting such a bone for the goddess carvings,[154] there is not any practical reason for using a long bone to create a minimally worked shaft. Craftspeople could have created a generalized object using a bone from a non-meaty portion (e.g., a metapodial), such as was used in Rhodian sanctuaries (see § 4.5.4). Instead, the repeated use of a long bone (likely femur) suggests that craftspeople were deliberately choosing a valuable and significant material.

The thighbones (femora) held clear importance in Greek sacrificial practices. Folkert Van Straten identifies multiple literary sources in which thighbones constitute one part of the god's portion of a sacrifice,[155] including the Homeric poems,[156] Aristophanes' *Peace*,[157]

[152] Marangou 1969, 160, no. 105, fig. 126.

[153] Marangou 1969, 156.

[154] By using a thick and even bone like the femur, craftspeople would have sufficient material to carve away.

[155] Van Straten 1995, 115–28.

[156] Hom. *Il.* 1, 460–63 (μηρούς); *Od.* 3, 456–59 (μηρία).

[157] Aristophanes, *Peace* 1019-20 (μηρῐ́).

and Sophocles' *Antigone*.[158] Van Straten also identifies more general references to bones within sacrifice, including Hesiod's description of Prometheus' uneven distribution of sacrificial meat, in which he portions out ὀστέα λευκὰ covered in fat for Zeus.[159] Similarly, in Aeschylus' *Prometheus Bound,* Prometheus describes the gods' portion as comprising the osphys along with limbs covered in fat.[160] Archaeological evidence also suggests that the bones from sacrifice continued to have religious value after the act was completed. Gunnel Ekroth demonstrates the extent to which the leftover bones were handled with care following a *thysia* sacrifice, showing that they were taken away from the altar, left on the altar, disposed of within the altar, or they became components of the altar itself. She concludes that bones may have served a ritual purpose, and asks "whether anything could or should be labeled as garbage if it belonged to the God."[161] Moreover, the practice of displaying the skulls of sacrificed animals (bucrania) represents a use of animal materials that attempts to commemorate an inherently ephemeral act. Van Straten writes that "it probably was a common practice to accompany the sacrifice of an animal by the dedication of a more durable votive offering, be it a humble wooden panel or a large marble relief, which in its shape or decoration contained a reference to that sacrifice."[162] These practices leave open the possibility that worked bone objects could have been used to create an association with sacrifice.

Whether the worked shafts originated from a sacrificed animal is unclear, but the condition of the objects offers some indications about their transformation from living animal to worked offering. Bones that had been cooked in some way may show signs of burning, and one example from the Ashmolean Museum appears blackened (see fig. 4.7b). However,

---

158 Soph. *Ant.* 1005–11 (μηρίων and μηροὶ).

159 Hes. *Theog.* 540–41.

160 Aesch. *PV* 496–499. In reference to this section, Van Straten (1995, 124) writes that "the word κώλα is less precise than thighbones, but less vague than Hesiod's white bones."

161 Ekroth 2017b, 49.

162 Van Straten 1995, 159.

based on close study, it is not wholly clear if its color resulted from burning or some other taphonomic effect. Bones processed for dietary purposes should also exhibit butchery and defleshing marks, but microscopic study of the shafts from the Ashmolean Museum revealed no signs of these practices. It remains possible that these objects were carefully defleshed and craftspeople cut away the butcher marks to create even sections. If the bones were cooked, they may have been covered by meat and been protected from being blackened. As these worked shafts from the Ashmolean Museum suggest that craftspeople were only targeting a specific portion of the bone (the anterior half), perhaps the rest of the limb was used for either dietary or sacrificial purposes.[163]

Even if these worked bone objects were not involved in sacrifices at the sanctuary, limb bones may still have been understood as related to the religious practice. Victoria Tsoukala documents depictions of leg joints in Athenian black- and red-figure vases from the late 6th and 5th centuries BCE; she demonstrates that many of these scenes did not necessarily depict sacrificial butchering, but argues that depictions of the limbs "nonetheless allude to the process of animal sacrifice, and that these leg joints were perceived as sacrificial meat."[164] Tsoukala finds that many of these scenes with leg joints show individuals gifting them within social contexts, and she suggests that they represent "a reward for participating in a sacrifice or in the life of the polis more generally."[165] The Athenian depictions of gift-giving represent ideas and practices that were undoubtedly different from those deposition rituals at the sanctuary of Artemis Orthia, but leg joints acted metonymically for a larger cultural idea in both instances. The worked bone shafts from the sanctuary attest to the power of animal bone within Greek religious contexts. This assemblage shows a prevalent

---

[163] The longitudinal cut seen among the worked shaft bones and some of the carved goddesses parallels the modern butchery practice of preparing marrow bones in the "canoe-cut" style (Rombauer, Becker, Becker, Becker, and Scott 1931, 520). However, the worked portions could not have been used in this way without being significantly burned.

[164] Tsoukala 2009, 2.

[165] Tsoukala 2009, 34.

and repeated practice, in which a specific portion of animal bone was altered in preparation for dedication.

The suitability, or even desirability, of such an object for a religious dedication may also be drawn from a different conception of animal bodies and animality. Instead of acting as a direct reference to sacrifice, these objects may have been viewed as a partible component of the animal (see § 2.1.2). This alternate ontological perspective may have seen these portions of bone as active components of an animal body. Dedication of such an object brings with it an aspect of the animal's life; as a result, the shafts are not "standing in for" anything as symbols or referents. Instead, these objects maintain an ongoing link to the animal from which they originate, allowing dedicants to gift the animal to the gods. The dedication of these objects may attest to the ability for individuals to separate components of the animal body when making an offering to the gods. As in the separation of the *knise* from the meat during the *thysia*, what is "given" to the gods may be understood as something more consequential than it appears.

Possible Weaving Tools at the Sanctuary of Artemis Orthia

Some scholars have suggested that certain items among the worked animal objects at the sanctuary of Artemis Orthia might relate to weaving. Sarah Pomeroy highlights an ivory object (possibly a bobbin) as a usable implement,[166] and Nigel Kennell and Nino Luraghi identify an ivory object as a weaving comb.[167] Analysis of the worked animal object assemblage from the sanctuary suggests that a number of other objects were also related to weaving. The sanctuary produced several types of objects (strips with pointed ends, rectangular strips, and forked strips) made from a rectangular strip of bone which might have been used in weaving, or were deposited as votive representations of such tools. In addition to the tools made from rectangular strips of bone, other forms of worked animal

---

[166] Pomeroy 2002, 30, note. no. 119; Dawkins 1929a, 242, pl. 174, no. 2.

[167] Dawkins 1929a, 242, pl. 173, 6; Kennell and Luraghi 2009, 242, fig. 12.2.

objects may have also been dedicated for their association or use with card or tablet weaving.

Bone Strips with Pointed Ends (figs. 4.9 and 4.10): The most numerous of the rectangular objects are a series of flat bone strips of varying sizes (between 6 and 12 cm), all of which have a triangular point at their ends. Nearly all of these flat objects also have a drill hole opposite the pointed end, yet none of them show obvious wear.[168] The majority of these items also exhibit series of incised circles separated by incised lines spanning the width of the object, although undecorated examples were also found (fig. 4.10). Dawkins claims that similar objects came from the Argive Heraion, but there are no obvious parallels among the published examples.[169] There is a vaguely similar bone object from a Submycenaean tomb in the Athenian Agora, which Papadopoulos and Smithson identify as an "implement used for weaving, probably as weft beater."[170] As has been proposed for the example in the Submycenaean tomb, the pointed objects from the sanctuary of Artemis Orthia may have functioned as pin beaters. The drill holes opposite the point show that these objects could have been affixed to thread, which might imply they were used to pass through the warp as a needle. It is also possible that these objects are only representations, acting as miniaturized (non-functional) versions of a weaving sword.

Rectangular Strips (fig. 4.11): Dawkins grouped the pointed strips with similar rectangular objects, but which lack a pointed end and have drill holes in their centers. While a decorated rectangular strip might not have any obvious connections to weaving, the decorative scheme of incised circles separated by incised lines is nearly identical to many of the

168 I directly observed eleven examples at the Ashmolean, Fitzwilliam, and British Museums using low-level microscopy.

169 A single object has a superficial resemblance and Richard Norton (1905, 354, no. 86) describes it as only "use uncertain."

170 In their discussion of these objects, Papadopoulos and Smithson (2017, 427, no. T63-18, fig. 2.308; 948–52) also mention three examples (two undecorated, one decorated) of bone implements from a Mycenaean context dating to the second half of the 12th–first half of the 11th century BCE at Portes in Achaia. These examples are unpublished, but are described as having "a series of small incised circles, each with a small dot at center." The description of the examples from Portes closely follows the examples from the sanctuary of Artemis Orthia.

pointed strips. These similarities in decoration, as well as material (they are also made from a strip of a long bone), suggest that the rectangular strips and the pointed strips represent similar types of objects. There are also some rectangular strips with more complicated design schemes, but these are likely variations of the same object.[171] Dawkins describes both the rectangular and pointed strips as "extremely common in the seventh-century deposits; later than this they were comparatively rare."[172] It is unclear whether or not the rectangular and pointed objects were found in similar deposits; although Dawkins does not separate them and they seem to have the same chronological patterning. Without a pointed end, these objects likely did not function as pin beater or representation of an object like a weaving sword. Rather, these strips may have been used to separate threads during the weaving process.

Forked Strips (fig. 4.12): Another object made from a section of long bone appears to have had some sort of specific, functional use connected to weaving. These objects were made from a flat section of bone cut into multiple sections or prongs separated by narrow channels. They were also found in earlier deposits; Dawkins writes that "only one was found earlier than Laconian I; perhaps three-quarters of the whole were with Laconian I and II pottery, and the remaining quarter in the mixed Laconian III and IV deposits. But where the Laconian IV was by itself only one of these objects was found, and this suggests that those from the mixed deposits belong to its earlier elements."[173] These objects resemble long forks, the prongs or tines of which either terminate in small points or flat ends. Like the pointed objects, they also have drill holes opposite their ends. Dawkins reports that these objects were found "in enormous quantities, but so broken that exact figures are impossible."[174]

[171] See Dawkins 1929a, pls. 164, 166 for both types. one example even has a representation of a person (Dawkins 1929a, pl. 166, 3).

[172] Based on the description, these objects may have been found in the "Geometric" and Laconian I layers. Dawkins 1929a, 238.

[173] Dawkins 1929a, 237.

[174] Dawkins 1929a, 237.

Although the pronged objects have "tines," they are much longer than typical weaving forks and have no obvious parallel in known weaving tools. However, their design suggests that they were meant to handle thread, and they may have functioned as a type of beater for weft threads or as a way to separate different parts of the textile. Arthur MacGregor has identified somewhat similar tools from the British Isles made from cattle metapodials, which have a series of long prongs or teeth. However, there is considerable debate about what they were used for, with only some scholars suggesting they were used for weaving.[175]

Objects Connected with Tablet or Card Weaving: Other worked animal objects in the sanctuary appear to be associated with card or tablet weaving. Square bone or ivory objects found at the sanctuary exhibit five drill holes (four at the corners and one at the center), a common design for tablets used in this weaving process (fig. 4.13).[176] The drill holes are used to separate the warp and the shed, and the manipulation of the orientation of the tablet creates the design. Comparable examples in bone have been found in the Iron Age settlement of Longola di Poggiomarino (northeast of Pompeii),[177] the Iron Age necropolis of Casa di Ricovero at Este,[178] and similar objects in other materials are found across cultures (see fig. 4.14). In addition to the cards or tablets themselves, objects which may have acted as spacers were also found at the sanctuary. Spacers help "to prevent the groups of various tablet threads tangling together," and are generally long, thin, and made from a rigid material;[179] examples in bone have been found in burials in Verucchio.[180] There may be other examples of bone spacers in the early Greek world, as Houby-Nielsen has proposed that such objects were found in a burial context in Athens (see § 4.2.2). At the sanctuary of

[175] MacGregor 1985, 190, fig. 102.

[176] Dawkins 1929a, 241–42, pls. 170, 10–11, 173, 1.

[177] Gleba 2008, 139, fig. 97.

[178] Gambacurta and Serafini 2007, 47, fig. 2.

[179] di Fraia 2017, 143.

[180] Knudsen 2012, 260.

Artemis Orthia, Dawkins reports 23 examples of objects (five were complete) with a series of short drill holes through the width, which could have been used as spacers.[181] Analysis of two examples of these objects at the Ashmolean Museum indicates that the diameter of the drill holes measure slightly smaller than 7 mm, potentially large enough to use with thread (see fig. 4.15).

Other Evidence for Weaving at the Sanctuary of Artemis Orthia

Beyond the worked animal objects, other evidence suggests that there may have been a connection between the cult of Artemis Orthia and weaving or textiles. Multiple scholars cite Alcman's *Parthenion* 1 as evidence for young girls offering a φᾶρος (cloak) to Artemis Orthia. Alcman writes: "for our young pigeons, as they carry the cloak (or 'plough' or 'offering = wreath') to Orthria during the ambrosial night like a bright star, puffed up they fight."[182] Carter highlights the similarities between Alcman's *Parthenion* 1 and "certain Sumerian hymns associated with the sacred marriage of the goddess Inanna and her bridegroom, the shepherd Dumuzi."[183] Citing the Near Eastern imagery of the sacred tree used on some of the ivory plaques from the sanctuary, Carter further suggests that an environment borrowing Near Eastern ideas may have allowed for a ritual of *hieros gamos* and that Alcman's poem represents the text used for that ritual.[184] Pomeroy also points to the text as evidence for some sort of ritual, arguing that the *Parthenion* implies the young girls would have woven the cloak together.[185] However, there is disagreement about the translation of the *Parthenion* as a result of the scholiast Sosiphanes, who wrote αροτο above φᾶρος, indicating that it should be read as plow. Carter makes several arguments in favor of reading φᾶρος as robe, including the fact that the meaning of φᾶρος as robe is common "from Homer on," while

181 Dawkins 1929a, 238, pl. 163, 2–4.

182 *Alcm. Parthenion* 1 60–63 Trans. Tsantsanoglou (2012, 70).

183 Carter 1988, 91.

184 Carter 1988, 96.

185 Pomeroy 2002, 30.

its meaning as plow is limited to only a few later sources. Additionally, Carter points to accounts of women bringing robes to goddesses.[186] Similarly, Jessica Priestley vehemently argues in favor of φᾶρος, citing the fact that αροτο has been crossed out, as well as a tradition of similes between robes and the heavens.[187]

In a recent translation, Kyriakos Tsantsanoglou writes that he has "no evidence in favour of or against Sosiphanes' claim."[188] Moreover, Tsantsanoglou highlights an interpretation of D. Lypourlis, who argues that φᾶρος should be interpreted from φέρω (offering). Tsantsanoglou writes:

> φάρος is neutrally interpreted from φέρω, namely = "offering" this is then identified with the wreaths offered by maidens to Artemis Orthia, as seen in numerous lead figurines found in the sanctuary of the goddess. Lypourlis also maintains that these wreaths are representations of the sun, thus pointing to an etymology of Orthia from Alcman's Ὀρθρία. It might be added that apart from the archaeological evidence, the offering of wreaths by Spartan maidens is mentioned by Alcman himself, fr. 3.65 ff., where, unlike our partheneion, the girl having the wreath (πυλεών), and not the wreath, is likened to "a divine star of the shining heavens."[189]

While the textual evidence is unequivocal at best, both Lin Foxhall and Pomeroy argue that some of the lead figurines depict textiles or weaving equipment.[190] Pomeroy highlights a series of these figurines as "miniature weaving implements,"[191] but it is unclear exactly what sort of tools they are meant to depict (nos. 23 and 24 appear to be weaving combs). She also identifies multiple lead plaques (rather than figurines) as related to textiles or weaving.[192] In

186 Carter 1988, 92.

187 Priestley 2007, 182–83.

188 Tsantsanoglou 2012, 67.

189 Tsantsanoglou 2012, 68.

190 Pomeroy 2002, 30, note. no. 119; Foxhall 2013, 151.

191 Pomeroy 2002, 30, note 1; Dawkins 1929b, pl. 185, nos. 14, 15, 17, 23, and 24.

192 Dawkins 1929b, pl. 181, nos. 27, 28; pl. 185, nos. 12, 21, 22; pl. 186, nos. 20, 21.

addition to many that Pomeroy listed, Foxhall also identifies a bronze depiction of a textile, a lead depiction of a textile, and a male hat in lead.[193]

Foxhall argues that these dedications were made by women, writing "this suggests either formal rites or private worship at the sanctuary by women, focused on feminine concerns that paralleled the well-documented masculine rites."[194] Cecilie Brøns makes a similar suggestion about garment offerings, suggesting that they might mark life stages of women.[195] The large number of these possible weaving tools in bone could be another aspect of textile dedication at the sanctuary; however, interpreting these objects as weaving tools is difficult because they lack comparanda. Unlike spindle whorls, loom weights, and distaffs, which are widespread throughout the Aegean, there are no clear parallels for these objects in Greece or elsewhere. As a result, there is nothing to indicate definitively that these objects are related to weaving. A possible explanation for this seeming uniqueness is that these tools were specifically created as dedicatory objects, rather than functional tools; they are idealized representations meant as offerings to Artemis. The lack of wear (especially around the drill hole and tip) on the pointed objects suggests they were not actually utilized for the work with which they appear to be related. Instead, they may have served as a representation of weaving tools that normally were made from a more ephemeral material like wood. The large numbers of these objects suggest that this was a regular form of dedication, which likely had its own set of meanings. As Brøns and Foxhall suggest, these objects could have been the result of maturation rites, which may explain their large numbers at the sanctuary. Their regularity, distinct shapes, and lack of comparanda indicate that the dedicants were part of a community of worshippers who understood these objects as having specific meanings.

The association between Artemis cults and weaving is not particular to Sparta, as excavations of the sanctuary of Artemis at Brauron produced weaving tools, including spindles,

[193] Foxhall 2013, 151; Dawkins 1929b, pl. 90, d; pl. 180, no. 18; pl. 186, no. 27.

[194] Foxhall 2013, 151.

[195] Brøns 2014a, 129.

loom weights, and fragments of epinetra.[196] Additionally, bone distaffs or spindles were found at Lindos,[197] as well as at the Artemision at Delos.[198] Significant quantities of epinetra were also found at the Artemision at Thasos.[199] Besides the material evidence, 4th century BCE inscriptions found on the Athenian Acropolis record dedications of female garments made to Artemis Brauronia.[200] Brøns notes that the Brauron catalog records a distaff and weaving sword.[201] She also highlights similar dedications within the Hekatompedon records, which show weaving swords in ivory, as well as one in silver. Both the Brauron and Acropolis records demonstrate that weaving tools were occasionally offered as dedications in later periods.[202] These records lend credence to the idea that the seemingly idiosyncratic dedications seen at the sanctuary of Artemis Orthia could have represented such tools.

4.3.2 The Sanctuary of Athena Alea at Tegea (46 Objects+)

Tegea was occupied in the Early Iron Age, with the earliest evidence for cult activity starting in the 10th century BCE.[203] While there is material from the Final Neolithic period, Early Helladic period, and a "fair quantity" of material from the Late Helladic period,[204] it

[196] Epinetra are cylindrical ceramic objects that are thought to be worn over the knees and thighs of individuals softening wool. There are a number of differing hypotheses surrounding the exact function of these items, although they are thought to relate to the spinning process in some way, see Badinou 2003, 7–12. For the Brauron examples, see Brøns 2014a, 127; Badinou 2003, 146–47, nos. E 24, E 25, E 27, E 31.

[197] Blinkenberg 1931, 135 nos. 333–36, pl. 13.

[198] Gallet de Santerre and Tréheux 1947, 198–99, no. 36, fig. 16.

[199] Maffre and Tichit 2011, 145–46.

[200] Linders 1972, 4.

[201] IG II^2 1517.

[202] Brøns 2014a, 127.

[203] Voyatzis 2004, 188.

[204] Østby 2014, 15.

is not evident whether the nature of the Late Bronze Age activity is cultic.[205] Mary Voyatzis divides the site into four phases: the Early Iron Age, the Geometric expansion, the Archaic–Early Classic period, and the Late Classical period.[206] The earliest archaeological context is the bothros, located in the area of the Pronaos of the later temple (4$^{\text{th}}$ century BCE). The bothros was divided into eight strata, whose material ranges from the Protogeometric to the Late Geometric (ca. 925–750).[207] The earliest architecture dates to the Geometric expansion, with evidence for two "superimposed, apsidal buildings of wattle and daub" with no stone foundations.[208] Erik Østby hypothesizes that an earlier building could have preceded these, although there is no evidence; he writes: "it is certain, however, that the two small, apsidal structures which have so far been discovered under and between the foundations of the Early Archaic temple were cult buildings, the earliest so far discovered anywhere in Arcadia."[209] The first building dates to 720–700 BCE, while the second dates to 700–680/670 BCE; Voyatzis also states that there is "some sort of a transitional temple, dated to 675–625."[210] By the third phase (Archaic–Early Classical), a monumental stone temple was built around 625–600 BCE and stood until it was burned down in 395 BCE.[211]

The sanctuary at Tegea has a unique connection to ritual uses of animal materials, as the temple of Athena Alea was said to have displayed the tusks and hide of the Kalydonian boar. Pausanias describes seeing the hide, which was "rotted by age and by now altogether

---

205 Østby (2014, 16) writes: "the material is insufficient as anything more than a vague indication that human activity at the site before the Iron Age may have been connected with religious cult, perhaps a sanctuary, and the limited documentation for the Submycenaean period remains an important obstacle for any hypothesis on full continuity." See also Voyatzis 2004, 188.

206 Voyatzis 2004, 188–94.

207 Voyatzis 2004, 189.

208 Voyatzis 2004, 190.

209 Østby 2014, 21.

210 Voyatzis 2004, 190, 1990, 20–22.

211 Voyatzis 2004, 192.

without bristles."[212] He also reports that Augustus took one of the tusks to Rome, which was "about half a fathom (ὀργυιᾶς) long."[213] Based on Pausanias' description, Adrienne Mayor argues that these tusks were from prehistoric elephants "dug up in Pleistocene beds near Tegea."[214] The presence of such an offering may have inspired aspects of dedicatory practice, as unworked boar tusks were also found at the site.[215] The distribution of the worked animal objects indicates that they came from the temple sector (29 objects) and the northern section (17 objects), while none came from the bothros.[216] Many of the objects were associated with one of the early cultic structures, or the debris in between, giving them some of the best chronological information of any assemblage.[217] The total lack of worked animal objects from the bothros suggests that the pattern of worked animal object dedication did not precede the mid-8th century BCE, and only began toward the end of the century. This fits into a pattern seen at other sites with earlier cultic assemblages that lack worked animal objects (e.g., Perachora, see § 4.3.4), indicating that the practice of dedicating worked animal objects begins at the end of the 8th century BCE at the earliest.

As Tegea is roughly 50 km from Sparta, there is considerable overlap between the types of worked animal objects at both sanctuaries (e.g., recumbent animals, circular seals, and double axes). The circular seals have a definite resemblance to the examples from Artemis Orthia, but at least one of them resembles the circular seals that are thought to be Corinthian.[218] There are also a series of rectangular bone beads and small sections of

212 Paus. 8.47.2.

213 Paus. 8.46.5.

214 Mayor (2000, 142–43) also discusses Procopius' account of elephant-sized tusks purportedly belonging to the Kalydonian Boar (Procop. *Goth.* 5.15.8).

215 Dugas 1921, 429.

216 Voyatzis 2014b, 516,a.

217 Voyatzis 2014b, 517–22.

218 While this seal is heavily damaged, the neatness of its border is much more reminiscent of the Corinthian examples. Voyatzis 1990, 347, no. M2(s), pl. 186.

decorated shaft bones that are exact parallels to examples from the sanctuary of Artemis Orthia.[219] While Østby et al. argue that Sparta would have been the source for the ivory objects found at Tegea, it may be more accurate to understand the commonalities between these assemblages as products of the same individuals, workshops, or communities of practice.[220]

4.3.3 The Sanctuary at Kythnos (400 Objects+)

A large assemblage of worked animal objects was discovered at a sanctuary on Kythnos located "at the North extremity of the North Plateau of the Upper Town."[221] The majority of the bone and ivory finds come from the adyton of the temple, a votive deposit from the interior of the temenos, as well as "the area between the temple and the fortification wall, around the altars and below the northern retaining wall."[222] The sanctuary at Kythnos contained one of the largest collections of spectacle fibulae, totaling 138 and making up more than a quarter of the worked animal object assemblage.[223] Varvarinou-Vai divides the rest of the objects into four categories: "clothing accessories, jewels, seals, and reliefs."[224] However, it should be noted that Varvarinou-Vai did not fully publish the nearly 400 objects, and an earlier article by Mazarakis Ainian mentions objects like "cylindrical tubes," which were not included in the subsequent publication.[225] Among the objects published by Varvarinou-Vai were several recumbent animals, circular seals, and double axes, making this assemblage similar to those of Perachora and Artemis Orthia. Varvarinou-Vai suggests that the circular

219 Voyatzis 2014b, 521, nos. Bo. 12, 14–17.

220 Østby, Luce, Nordquist, Tarditi, and Voyatzis 1994, 124.

221 Koukoulidou, Mazarakis Ainian, Theodoropoulou, Touloumtzidou, Varvarinou-Vai, Zimi, and Papadopoulou 2017, 193.

222 Varvarinou-Vai 2017, 193.

223 Varvarinou-Vai 2017, 193.

224 Varvarinou-Vai 2017, 193.

225 Mazarakis Ainian 2005, 98.

seals from Kythnos may have been made in Corinth,[226] as their style and detail are closer to the Corinthian examples (including those found at the Argive Heraion) than those from the sanctuary of Artemis Orthia. Additionally, one of these seals displays a small motif of four incised dots surrounding a slightly larger circle,[227] which J.M. Stubbings calls a "loose rosette" when describing an identical pattern on examples from Perachora.[228] This motif is seen on several of the Perachora seals, but not on seals from any other assemblage.[229]

In addition to the objects more commonly dedicated at other assemblages, the sanctuary at Kythnos also featured several unique items, including a pair of ivory sphinxes in *à jour* relief. These carvings or plaques differ from those *à jour* examples from the sanctuary of Artemis Orthia (most of which were made from bone). The other notable examples of *à jour* reliefs were found in the Halos deposit at Delphi (see § 4.3.11), but those carvings exhibit significantly more three-dimensionality than the comparatively flat examples from Kythnos. Based on their style, Varvarinou-Vai suggests that they may have come from a Corinthian workshop; however, they have no specific comparanda.[230] The sanctuary also contained a small statuette of a woman in Daedalic style, which Varvarinou-Vai suggests was a pinhead.[231] The statuette is missing its head, although the details of the body are sufficiently preserved to differentiate it from other figures of ivory and bone in the Greek world. Perhaps the best comparison for this statuette is a larger statuette from the Idaean Cave, but the two objects are only generally similar.[232]

Another seemingly idiosyncratic object is a small seal/pendant in the form of a hu-

---

226 Varvarinou-Vai 2017, 196.

227 Varvarinou-Vai 2017, 198, fig. 15.

228 Stubbings 1940, 417.

229 Stubbings 1940, 415–17, 427–28, nos. A 30, A 34, A 79, A 83, A 84, pls. 176, 181.

230 Varvarinou-Vai 2017, 197.

231 Varvarinou-Vai (2017, 197) does not provide evidence for the idea that it was used as a pinhead, but if it were used in this way, it would be a unique object.

232 Sakellarakis 2013, 191, fig. 20, no. MH: E 709; see § 4.3.10.

man face, with a sphinx on the reverse. Several seals with human heads were discovered at the sanctuary of Artemis Orthia, but none that resemble the example from Kythnos. Varvarinou-Vai states that it exhibits "obvious oriental characteristics" and assumes that it was "imported from the East Mediterranean."[233] However, its eastern origins are far from definite. It shows Daedalic as much as Eastern qualities, so it may not necessarily be an import. These seemingly unique or idiosyncratic examples within the Kythnos assemblage illustrate that the known corpus of sculpture and relief in bone or ivory remains incomplete. Such objects complicate the ideas of regional style and notions of the workshop as a fixed place, instead they further illustrate that the mobility and independence associated with the onset of the Iron Age brought objects and individuals from distant locations into the milieu of Greek sanctuaries. The finds at Kythnos make it one of the richest and most important collections of worked animal materials in the Greek world, comparable to the assemblages of Perachora or the sanctuary of Artemis Orthia. While the majority of the materials were fairly standard dedications (double axes, recumbent animals, circular seals, and spectacle fibulae), they serve to reify the shared dedicatory practices resulting in similar forms of animal materials across different sanctuaries. Additionally, several comparatively "unusual" objects such as the Daedalic statuette, sphinx relief, and seal in the form of a human head may indicate that many workshops or craftspeople operating in Aegean might be underrepresented in the archaeological record.

4.3.4 The Sanctuary of Hera Limenia at Perachora (427 Objects)

After the sanctuary of Artemis Orthia, Perachora produced the second largest assemblage of worked animal materials. The assemblage contained nearly 60 spectacle fibulae, as well as around 100 circular seals that were stylistically distinct from the examples from Artemis Orthia (see § 4.6.1). There were also small numbers of miniature double axes, recumbent animals, truncheon/rod pendants, as well as nearly 40 flute pieces. Perachora

[233] Varvarinou-Vai 2017, 196.

comprises two sanctuaries: the sanctuary of Hera Akraia and the sanctuary of Hera Limenia. The sanctuary of Hera Akraia is located immediately adjacent to the harbor, while the sanctuary of Hera Limenia is located 200 m. from the sea at a higher elevation.[234] John Salmon writes that "the first temple of Hera Acraea was a primitive apsidal building whose date can only be determined by the pottery found in the closely associated Geometric Deposit. Some of the pieces from this deposit were made during the Corinthian MG II period, which covers roughly the first half of the eighth century; and it is likely that at least a few reach back to the first quarter of the century."[235] The Geometric deposit stopped receiving votives ca. 735 BCE, and Salmon argues that the end of the Geometric Deposit was connected to a probable collapse of the temple.[236] By the mid-8th century BCE, most dedications were made at the sanctuary of Hera Limenia. Based on shared ceramic shapes and designs (e.g., kotylai and nick-in-rim skyphoi) between the Geometric deposit (associated with the sanctuary of Hera Akraia) and finds from the sanctuary of Hera Limenia, there appears to be a small overlap in the time that these deposits were open. However, Salmon believes that the shared vessel types were not prevalent enough to demonstrate conclusively that the deposits were acquiring votives concurrently. The majority of the votives come from the sanctuary of Hera Limenia, including all but one of the worked animal objects.[237]

The date of the Hera Limenia sanctuary would suggest that it is one of the older dedicatory assemblages of worked animal materials in Greece, as the earliest examples seem to date to the end of the 8th century BCE. Stubbings dates one of the seals to this period, although this date is based on a stylistic determination.[238] While Perachora contains many early dedications, the majority of the worked animal objects date to the 7th century BCE

[234] Salmon 1972, 161.

[235] Salmon 1972, 161.

[236] Salmon 1972, 163.

[237] Stubbings (1940, 410, see note 1) believes the one example from the Akraia sanctuary was originally deposited at the Limenia sanctuary and was washed downhill.

[238] Stubbings 1940, 412, No. A 23, pl. 175.

and fit into the same patterns of dedication seen at the other sanctuaries. As no worked animal objects were found in the Geometric deposit associated with the sanctuary of Hera Akraia, the practice of dedicating these objects started after the deposit was closed. Even if there was overlap between the time that the Geometric deposit was in use and the period that the sanctuary of Hera Limenia began accepting votives, the earliest worked animal objects postdate 735 BCE. As a result, the chronology of the worked animal assemblage at the sanctuary of Hera Limenia is not particularly different from the assemblages found at other sanctuaries (e.g., the sanctuary of Artemis Orthia). Moreover, Stubbings' stylistic dating of many of the objects puts them in the second half of the 7th century BCE.[239] With the notable absence of worked animal objects at the sanctuary of Hera Akraia, Perachora demonstrates that the practice of dedicating these objects began in the 7th century BCE, with little 8th-century BCE precedent.

4.3.5 Aetos, Ithaca (78 Objects)

Occupation at Aetos occurred in two phases, beginning in the Protogeometric period, and followed by a Geometric phase (starting ca. 780).[240] Aetos is generally viewed as having a cultic component, although no direct evidence for a sanctuary has been found. Catherine Morgan casts doubt on Aetos' role as a sanctuary, instead arguing that it represents "the central place of Ithaka, probably with its own local cult."[241] The worked animal materials from Aetos do not have clear dates owing to the disrupted nature of the site, but their deposits generally date between the late 8th and early 7th century BCE. The majority of the bone and ivory finds appear to have been found in conjunction with structures in the western part of the site. One of these structures, referred to as the "Agora" (made up of Wall 21), overlaid

[239] Stubbings 1940, 404–7.

[240] Heurtley and Lorimer 1932, 121–24; Morgan 1988, 315.

[241] Morgan 1988, 316.

a possible temple wall (Wall 27, see fig. 4.16).[242] Underneath a "mass of loose fallen stones" (presumably from Wall 27), excavators found "what [they] took to be the temple treasure, ivories, amber, and bronze."[243] Presumably these finds correspond to what was found in Nucleus 15, an archaeological context located nearby Wall 27. South of Wall 27, Jock Anderson and Sylvia Benton identified a hearth, as well as a "straggly, apsidal line of stone" that may be have been associated with the hearth in an earlier structure.[244] The majority of the bone and ivory objects were found south of this area, near some Archaic/Geometric walls (walls 25, 28, and 30).[245] Unfortunately, it is not clear what the association is between these walls and Wall 27 (the possible temple wall), nor the relationship between the finds and the architecture. However, the worked animal objects at Aetos are comparable to those found at other sanctuaries, and the concentration of the objects strongly suggests that this assemblage was dedicated. While the stratigraphy does not permit a precise chronological classification beyond Geometric/Archaic, the materials have comparanda at sites like Perachora and the sanctuary of Artemis Orthia. As the Aetos assemblage contains recumbent animals, spectacle fibulae with designs specific to Perachora, and circular seals of the Corinthian type, these objects likely were not dedicated any earlier than the second quarter of the 7$^{\text{th}}$ century BCE.

Aetos is viewed as having a strong Corinthian element, and was previously thought to be a Corinthian colony. As a result of the presence of Corinthian pottery and votives at Aetos, Nicolas Coldstream describes it as likely the site of a "Corinthian staging-post."[246] Similarly, Nancy Demand describes Aetos as "a shrine and a Corinthian settlement" and Michael Shanks argues that Aetos was part of a (loosely defined) *koine* marked by, among

242 Anderson and Benton 1953, 257.

243 Anderson and Benton 1953, 257.

244 Anderson and Benton 1953, 257.

245 Anderson and Benton 1953, 256, fig. 1; see fig. 4.16.

246 Coldstream 1977, 168.

other more general cultural practices, the consumption of Corinthian pottery.[247] Morgan's view of the site is more nuanced, as she sees Ithaca as a "contact zone" between regions.[248] She argues that there is not enough evidence to see Ithaca as something like a formal colony of Corinth and writes that it "should not [be] seen as a passive recipient-rather it was an active, independent force in its own right."[249] A relationship between Aetos and Corinth suggests that their worked animal assemblages should also exhibit a degree of similarity. There are some general commonalities between the Perachora and Aetos assemblages (e.g., recumbent animals, circular seals, double axes, and spectacle fibulae), but these features alone do not provide an especially compelling argument for shared bodies of material culture between the Corinthian sphere and Ithaca.[250] However, the circular seals at Aetos show a greater affinity with the Corinthian examples than those from Sparta. Some of the spectacle fibulae also have a marked similarity to those found at Perachora; one example from Aetos shows incised triangles (what Stubbings refers to as "dogtooth") surrounding the inner circles of the disks.[251] Similar designs can be seen on many of the spectacle fibulae from Perachora, and this motif is rarely seen on examples found elsewhere.[252]

There are also objects that appear both within the Corinthian sphere and at Aetos that have few convincing parallels anywhere else. One such object found at Aetos is either a small plaque, or possibly a flat bead, with several rows of incised ring-and-dot motifs. The object has five rows of ring-and-dot motifs, with the two rows on the left and right each containing five motifs; the central row only has three.[253] An example of the same type of object from

---

247 Demand 2011, 239; Shanks 1999, 189.

248 Morgan 2007, 71.

249 Morgan 1998, 297.

250 Additionally, recumbent animals and double axes were found in much larger numbers at the sanctuary of Artemis Orthia than at Perachora.

251 Anderson and Benton 1953, 346, no. C.46, pl. 63.

252 Stubbings 1940, 435, nos. A 127, A 130, A 135, A 138, A 139, A 142, pl. 183.

253 Heurtley and Robertson 1948, 116, no. C21, pl. 47.

Perachora is similar, with the two left and right rows each containing five ring-and-dot motifs, and the central row has only four.[254] The examples from Aetos and Perachora are both pierced, and Stubbings considers them "dividing beads" for a necklace.[255] While similar beads have been found at Siphnos[256] and the sanctuary of Artemis Orthia,[257] the Perachora and Aetos examples are the most similar to one another. Additionally, a square fibula with the same design scheme was found at both Aetos[258] and the Corinth North Cemetery (see fig. 4.5).[259] Both objects have square fibula plates with two rows of interconnected ring-and-dot motifs separated by incised lines. Both fibula plates have holes for an attachment, and the example from the North Cemetery retained the metal catch. While the motifs are found on many other items created in the 7th century BCE, the specific design choices suggest that the similarities between these two objects are not coincidental.

The commonalities among the worked animal assemblages at Aetos and the Corinthian sites provide further evidence for the connection between these two areas. Beyond the Corinthian pottery found at the site, individuals at Aetos also dedicated worked animal objects that may have been created around Corinth, or by individuals originating from the area. This is not to say that the assemblage looks exclusively Corinthian, as it contains many types of objects found in the other sanctuary assemblages, suggesting that visitors to Aetos were aware of the larger trends of worked animal material dedication. A "Little Lion Seal" found at Aetos also indicates individuals brought ideas and objects from outside the sphere of Corinth.[260] Aetos represents the westernmost findspot of a "Little Lion Seal," as the

254 Stubbings 1940, 444, No. A 324, pl. 188.

255 Stubbings 1940, 444, No. A 324, pl. 188.

256 Brock and Young 1949, 25, nos. 8A–C, pl. 11.

257 Dawkins 1929a, 241, pl. 170, 12, 13.

258 Heurtley and Robertson 1948, 116, no. C20, pl. 47.

259 Blegen, Palmer, and Young 1964, 62, Grave 113, no. 113-1, pl. 13.

260 Anderson and Benton 1953, 346, nos. C.57, pl. 68.

majority were found around Euboea, the Cyclades, and as far east as Rhodes. The Aetos assemblage has undeniable Corinthian influence, but it is also the product of individuals dedicating objects within a "contact zone."

If Aetos did serve as a stopping point for Greek sailors heading toward the western Mediterranean, at least one worked animal object attests to the interests and concerns of these individuals. The object, a rib of some fairly large animal (possibly cattle), shows a rudimentary depiction of two ships incised onto the bone.[261] With the exception of the ship plaque found at the sanctuary of Artemis Orthia,[262] this subject matter is fairly unusual within the corpus of worked animal objects.[263] Additionally, the use of a rib as a medium for drawing is also unique. This carved rib is vaguely reminiscent of 18th-century American scrimshaw, an art form "created in the occupational milieux of the men and women who hunted whales 'on the briny ocean,' for whom scrimshaw was an integral part of daily life and culture."[264] It is impossible to say what purpose the carved rib served for its creator, or whether it was meant to be received as a dedicatory object. Yet the object provokes ideas of the instability of a seafaring life and the anxieties of Greeks leaving behind their homeland.

4.3.6 The Archaic Artemision at Ephesus (350+ Objects)

Ephesus has a long history as a locus of interaction between Greeks, Anatolians, and a variety of other groups. Its location as a crossroads between the eastern parts of the Aegean and western Anatolia differentiates it from sanctuaries on the mainland, and the impressive assemblage of worked animal objects (many of them ivories) reflects the inherently multicultural aspects of worship at Ephesus (see § 3.4.4). When D. G. Hogarth uncovered the ivories that were presented in the initial publications, they were said to be associated

[261] Heurtley and Robertson (1948, 117, no. C44, pl. 46) describe it as having "very little style."

[262] Dawkins 1929a, 214, pls. 109, 110.

[263] Heurtley and Robertson (1948, 117) compare the incision technique and subject matter to "certain Late and Subgeometric Boeotian fibulae."

[264] Frank 2012, 16.

with the so-called "primitive structures," architecture that predated the Croesus temple. Since the earlier excavations, the architectural sequence of the Artemision has become increasingly well understood, and the "primitive structures" have become better defined. One of the major subsequent discoveries of early architecture came from an area that Hogarth called the "Basis,"[265] located under "the northern outer rim of the *crepidoma* of the archaic *dipteros* (Croesus temple)."[266] While Hogarth originally believed this area to house three temples (temples A, B, and C), Anton Bammer's excavations revealed that temples A and B were actually separate components of the Peripteros temple (temple B corresponding to the cella).[267] A sondage revealed a sequence of pottery beginning in the Bronze Age, and whose latest date was the Middle Geometric. As a result, Bammer dated the construction of the Peripteros to the second half of the 8th century BCE.[268] Bammer reasserted this early date in a more recent article, writing: "die Datierung des Peripteros ist damit geometrisch, man könnte sogar bis in die späte protogeometrische oder subprotogeometrische Zeit zurückgehen."[269]

Since Bammer's work on these structures, subsequent publications have further refined the sequence of temple architecture at Ephesus. Michael Weißl has articulated four structures that predate the Croesus temple: the Naos 1 (the Peripteros), Naos 2 (temple B), Sekos 1, and Sekos 2 (temple C).[270] However, Weißl's rejects Bammer's early dating of the Peripteros and instead dates it to the second quarter of the 7th century BCE; he writes: "die spätgeometrische Keramik aus der Aufschüttung in Sondage 740 liefert einen *terminus post quem* um ca. 680 v. Chr., womit ein früharchaischer Datierungsansatz für den Peripteros im

265 Hogarth 1908a, 33.

266 Bammer 1990, 137.

267 Bammer and Muss 1996, 33; Bammer 1990, 138.

268 Bammer 1990, 141–42.

269 Bammer 2005, 214; translation: the dating of the Peripteros is therefore Geometric, one can even put it back to the late Protogeometric or Subprotogeometric period.

270 Kerschner and Prochaska 2011, 73–91; Weißl 2003, 313–33.

zweiten Viertel des 7. Jahrhunderts plausibel scheint."[271] Weißl dates the other structures as follows: Naos 2 - second half of the 7th century BCE, Sekos 1 - end of the 7th century BCE, Sekos 2 - beginning of the 6th century BCE. Additionally, the Dipteros (Croesus temple) dates to ca. 570 BCE.[272] In Aenne Ohnesorg's monograph on the Croesus temple, she demonstrates that stylistic aspects of the architecture set it comfortably between the beginning and middle of the 6th century BCE, and asserts the traditional date of 560 BCE (based on the beginning of Croesus' reign) is likely 10 years too late.[273]

Many of the ivories (as well as other votives made from different materials, including gold) were found clustered around several remains of structures (so-called "cult bases") assumed to have religious functions, which led Bammer to advance the idea that these bases were used for individual local cults.[274] However, Weißl argues that Bammer's idea of a religiously pluralistic Ephesus guided the interpretation of these bases as cultic. While he suggests that these bases could have been used to hold votives, Weißl also writes that "fragmentierte Weihegaben, die unterhalb und neben den sog. Kultbasen gefunden wurden, deuten aber nicht zwingend, so wie es vorausgesetzt wurde, auf Kulthandlungen im ummittelbaren Bereich ihres Fundplatzes hin."[275] One of the cult bases discovered in the vicinity of the temples (Cult Base D) had a large cluster of ivories surrounding it, and is stratigraphically below the level of the Croesus temple and contemporary with the Sekos 2 phase of the temple (beginning of the 6th century).[276] Bammer views the construction of the Croesus temple on top of this cult base as a conscious action by Croesus to destroy

---

[271] Weißl 2003, 324; translation: The Late Geometric ceramic from the deposit in Sondage 740 supplies a *terminus post quem* of around ca. 680 BCE, which makes an early Archaic dating approach for the Peripteros in the second quarter of the 7th century BCE plausible.

[272] Weißl 2003, 330, fig. 11.

[273] Ohnesorg 2007, 127–28.

[274] Bammer 1988, 23; Bammer and Muss 1996, 39–40.

[275] Weißl 2003/2004, 188; translation: Fragmented offerings, those found beneath and near the so-called cult bases, do not necessarily indicate, as it was assumed, cult acts in the immediate area of their discovery.

[276] Bammer 1988, 23; Kerschner and Prochaska 2011, 92, fig. 12.

pluralistic cultic practice at Ephesus in favor of a unified sanctuary.[277] Weißl is undoubtedly more conservative in his interpretation of the cult bases than Bammer; however, the mass of votives surrounding these bases is strong evidence for their religious function. Andreas Pülz also sees the concentration of gold votives surrounding the cult bases (including Cult Base D) as evidence for the religious importance of these individual sites.[278] If the mass of well-preserved ivories found surrounding Cult Base D are in stratigraphic association with the feature, a cultic function of the base seems the most reasonable explanation.

In addition to the sequence of temples and Cult Base D, a structure in front of the Croesus temple may have also been a location for dedications. This structure, originally called a Hekatompedon because of its dimensions (roughly 33 x 16 m), has also been reinterpreted by Weißl. Instead of a temple, Weißl argues that the structure functioned as a monumental altar that was either immediately preceding or contemporary with the construction of the Croesus temple (dated to between 600/590 and 575 BCE).[279] At least two ivories were found in the immediate vicinity of the altar, and several more were found between the altar and the front of the Croesus temple. To the south of the "Hekatompedon" is another smaller feature that has been variously interpreted as an "altar,"[280]"Rechteckfundament,"[281] and "Base,"[282] which had three ivories clustered around it as well.

The association between the original ivories and the temple sequence remains somewhat unclear. In Hogarth's account of the excavations of the Basis, he notes that all the large fragments of ivory (which may have been pieces of furniture) and all the statuettes were

[277] Bammer 1988, 23.

[278] Pülz 2009, 154.

[279] Weißl 2003, 343.

[280] Weißl 2003/2004, 171, fig. 1.

[281] Weißl 2003, 335, fig. 12.

[282] Bammer 1992, 195, fig. 1.

found outside the Basis.[283] However, in the case of the bone and ivory objects which were not statuettes, Hogarth details 105 objects, including 12 fibula plates, 40 pins and pinheads, 41 (20 partially preserved examples) astragali "of all types" (presumably natural and ivory imitations), five pendants, two "bodkins", two dividing beads, two small pieces of inlay, and one miniature double axe.[284] Carter sees the prevalence of these types of objects as evidence that "Greek ivory-carvings, and perhaps Greek ivory-carvers, were present at Ephesos from the earliest periods revealed by Hogarth's excavation."[285]

While the exact findspots of the other ivories from Hogarth's excavations were not recorded, Bammer describes the approximate locations of these original ivory finds: "Most of the ivories have been excavated outside the so-called 'basis' of the temple, especially at the western and northern rim of the temple of Croesus, but also in the area of the square base south of the 'Hekatompedon.'"[286] Excavations by the Austrians since 1965 have added to the considerable number of ivories originally published by Hogarth. Like Bammer, Ulrike Muss describes the ivories (presumably from both Hogarth's excavations and subsequent work) as found in the area between the altar and the Archaic temple, specifying that most of the finds were made on the western and northern edges of the Archaic temple, as well as the area around the so-called Naiskos, and at the northern Cult Base.[287] Of these more recent finds, Bammer has recorded the precise locations of 21 of some of the more impressive ivory objects found since 1965 (see fig. 4.17).[288]

According to Bammer, only a few bone or ivory finds appear to be associated with Naos

283 Hogarth 1908a, 36; Smith 1908, 155.

284 Hogarth 1908a, 233–34; Carter (1985, 235) also records a seal among these items.

285 Carter 1985, 235.

286 Bammer 1992, 185.

287 Muss 2008, 104.

288 Bammer 1992.

1/Peripteros, including an ivory "head-aryballos" dating to the 7th century BCE,[289] "objects of ivory and bone decorated with concentric circles," as well as a "semicircular ivory panel engraved with a 'woven band.'"[290] Finally, a plaque showing "a griffon in front of a tree of life" was also found, which Bammer identifies as a likely Near Eastern import.[291] Based on Bammer's description, it is unclear how many bone objects were found in the Peripteros, as none are published. The lack of worked animal objects associated with the earliest structure implies that the practice of using worked animal objects for dedication may not have been widespread during the second quarter of the 7th century BCE. Carter's interpretation of the objects found within the Basis suggests that the deposit was filled in the mid-seventh century, which may suggest that worked animal object production began sometime between the early and mid-7th century.[292]

The findspots of the ivories from the later excavations appear to be strongly associated with either the Sekos 2 (Cult Base D, start of the 6th century BCE) or the Croesus temple ("Hekatompedon," second quarter of the 6th century BCE). However, the vast majority of the worked animal objects (over 300) from Hogarth's excavations could have been associated with either the Naos 2, Sekos 1, or Sekos 2 temples, placing them between the middle of the 7th century and the beginning of the 6th century BCE. This is consistent with both the pattern of worked animal object dedications in the Greek world, and the stylistic assessment of many of the statuettes found at the site.[293] Carter articulates a sequence of ivory production at the site, writing: "Ivory-carving of non-figured ornaments such as fibulai and pins must have begun here before the middle of the seventh century. Statuettes in the round began to be made in the last quarter of the seventh century and continued into the first quarter of the

---

[289] Bammer 1992, 185, no. 9 (87/K 233), pl. 1.

[290] Bammer 1990, 150.

[291] Bammer 1990, 153, fig. 29, pl. 22, 1992, 186, 191, no. 20, pl.9e.

[292] Carter 1985, 235.

[293] Muss 2008, 104; Şare 2010, 60–64; Işık 2001, 85.

sixth century."[294] Ephesus appears to conform to a similar pattern of worked animal object production present at other sanctuaries.

"Bone" Objects in Ivory

Certain ivory objects from the Archaic Artemision at Ephesus suggest that craftspeople were highlighting the interplay between the materials they employed and what the object is meant to represent, as they created objects made to imitate bone using ivory. Hogarth describes one class of these objects as "bodkins," which he identified as a bone object in the shape of an ulna, and published an image of an unmodified ulna next to them to show their similarity. He also claims that natural ulnae were discovered, but it is unclear whether they were found in association with other worked animal objects within votive contexts or as some part of the dietary waste stream from other parts of the site.[295] Like an ulna, an ivory "bodkin" has a lunate opening at its head and a tapering body. Hogarth published these objects as bone, and suggests that the lunate openings may have been for holding thread or weaving.[296] A direct study of one of these objects at the British Museum revealed that it was made from ivory rather than bone, and as Hogarth suggested, was meant to imitate the shape of an ulna or an object made from the bone. Such bone objects are widespread across cultures (see fig. 4.18). The remains of a bone tool thought to be made from an ulna was found at Methone (ID 447), and similar tools are often found in prehistoric contexts.[297] It is unclear to what extent such tools were still used in the Iron Age, but the example from Methone suggests that craftspeople in later periods were still familiar with the tool.

While it is possible that the "bodkin" was intended as a hair or clothing pin, its size and thickness make it unwieldy for these purposes. As an ivory object, is unlikely that it

[294] Carter 1985, 240.

[295] The "bodkins" were found in the Basis deposit. (Hogarth 1908b, 193, 233–34).

[296] Hogarth (1908b, 193) also writes that the objects "must have performed the function of miniature tent pegs."

[297] Arabatzis 2016, 10.

had any practical use as a tool, and the example from the British Museum did not show any obvious wear. Rather than possessing any functional use, the "bodkins" seem to have been designed as a replication of a quotidian object in a high-value animal material. The details of their construction support the craftsperson's desire to imitate bone objects, because the top of the "bodkin" from the British Museum exhibits a small channel, mimicking the remnants of the olecranon process found on the ulna. The open portion of the object is also a clear imitation of the trochlear notch of the bone. Unlike objects made from an actual ulna, the craftspeople responsible for the "bodkins" had to shape each of these features individually. As a fully carved object, the process of its creation involved removing significant portions of valuable material. Making such an object out of ivory with bone so readily available seems illogical; however, these objects speak to the importance of animal materials in a dedicatory setting.

A different example of craftspeople replicating the natural features of a bone in ivory comes from another class of objects at Ephesus. Nearly 100 small ivory objects resembling astragali were also found in the Basis deposit alongside a large number of natural astragali.[298] These objects are not exact or precise replicas; rather they approximate the shape of an astragalus, invoking the bone in a general way. Many of the artificial astragali were inlaid with amber, and one example had gold studs. Additionally, most of them are pierced, and Hogarth believes they were strung together.[299] It should be noted that Ulrike Muss does not mention any connection between these objects and astragali, as she describes them as "Doppelspulen, deren Funktion ungeklärt ist."[300] Hogarth also argues that these objects were a part of divination rituals, in the way that natural astragali were used (see § 4.6.10); however, it seems unlikely that the finer ivory examples would have been thrown. Moreover, based on a direct study of over 30 examples of the British Museum, the majority are mostly complete

[298] Hogarth 1908a, 190, 233–34.

[299] Hogarth 1908b, 190.

[300] Muss 2008, 104; translation: Double spools, whose function is unknown.

and in good condition, indicating that they were not damaged. Additionally, the artificial astragali do not have distinct sides, making them difficult to use as a divination tool. The astragalus shape also had its own set of meanings outside of divination (see § 4.6.10). Like the carved ulnae, these objects are the result of craftspeople removing significant portions of the material to create an object that was easily accessible in bone. Astragali have a long history of creation in other materials like metal and glass.[301] However, the examples from Ephesus are different because ivory is so visually similar to bone, making the aesthetic distinctions between them fairly minimal. Alan Greaves offers a similar interpretation of these astragali from Ephesus, noting their skeuomorphic qualities, as well as highlighting their "thing-power" in recognition of "their own agency, or vital materiality."[302] Greaves sees these objects in a state of being "somewhere between the earthly and the divine," which was mirrored in their skeuomorphic status as both bone and ivory object.[303]

Both the ivory ulnae and astragali indicate the craftsperson's consciousness about the role of the material within the dedicatory setting. While a bone tool made from an ulna or an astragalus are both fairly mundane objects, the choice of rendering it in an exotic material can change its meaning. Despite a similar external appearance between ivory and bone (the difference between the two materials may have been unintelligible for the average dedicant), the craftsperson chose ivory to create a skeuomorph of a bone object. In both examples, craftspeople remade otherwise natural features in an exotic and valuable material. These objects sit at the intersection of systems of value derived from their association with animal bodies, as well as their economic or exchange values. In their transformation, these ivory objects function as both a luxury item and an invocation of the power of animal materials. These objects acknowledge that the natural form of bone is powerful in itself; an object made from ivory the form of which imitates bone is a proclamation that offerings made from

[301] For metal examples, see § 4.6.10; for glass examples: Prêtre 2016, 24, nos. 56, 57, pl. 2.

[302] Greaves 2013, 527.

[303] Greaves 2013, 526.

animal materials are not simply an expedient or economic option.

4.3.7 The Samian Heraion (126+ Objects)

The Samian Heraion is unique among other sanctuaries due to its abundance of imports, and the exceptional environment of preservation at the site.[304] The waterlogged conditions at the Heraion allowed for the recovery of a number of organic objects, including several carvings in wood. Helmut Kyrieleis argues that wooden objects were popular among the "common" people and that they show a wide range of quality, with some that are "true masterpieces," and others that are among the "simplest wood-carvings of popular art."[305] He also highlights pieces of rock crystal, coral, stalactite, and multiple pine cones, as examples of other offerings of the "common man." The relationships between the natural objects and the status of individuals dedicating them are likely more complicated than Kyrieleis outlines, as natural objects may have had deep symbolic power divorced from the wealth of the dedicant. Regardless, the unique preservation at the Samian Heraion provided many clear examples of more common offerings within the archaeological record. The finds at Samos underscore how both the preservation environments of Greece and the selective publication of sanctuaries (i.e., authors declining to provide images of lesser quality examples of an object) may make objects made by non-skilled individuals less visible within the archaeological record. Rather than the Samian Heraion being an outlier, it is likely that other votive assemblages also contained a wider range of objects that either failed to preserve or were overlooked.

In addition to the so-called offerings of the "common man," a remarkable collection of ivories has been recovered at the Heraion. In her publication of some of the ivories from the site, Freyer-Schauenburg outlines objects whose origins are Greek, Near Eastern, and Egyptian, with the non-Greek objects making up two-thirds of those published.[306] Since

[304] Kyrieleis 1993, 114.

[305] Kyrieleis 1988, 217.

[306] The initial publication of Freyer-Schauenburg (1966a, 3–12) does not cover all the finds from excavations up to that point, as Philip Brize (1992, 163) reports that the publication only covered 33 of 126

Freyer-Schauenburg's work, additional ivory objects have been discovered and published,[307] including several objects which Philip Brize believes to be the creation of Samian ivory workers.[308] Only some of the published ivories can be linked to excavation areas or structures at the site, and most of those examples were found in association with either the South Building or the Rhoikos altar. Additionally, several ivories excavated during the 1983 and 1984 seasons came from deposits in the south-east corner of the site "between the altar and the seashore."[309] Kyrieleis also alludes to the structures north of the Rhoikos altar being used as treasuries for votives (including ivories).[310]

The sequence of temple construction at the Heraion begins with the Hekatompedon, which is thought to be constructed as early as the 8th century BCE.[311] It was replaced before the 6th century BCE with the "Rhoikos temple," which, as Kyrieleis asserts, "must have been destroyed shortly after completion" sometime in the "Late Archaic" period.[312] A temple to an unknown deity at the south of the site (South Building) was constructed at approximately the same time as the Rhoikos temple, and completed in the mid-6th century BCE.[313] Both the stylistic attributes of the Greek ivories and the structures they were associated with indicate that much of the ivory dedication occurred between the end of the 7th and 6th centuries BCE. In her initial publication, Freyer-Schauenburg dates the majority of the Greek objects to either late in the 7th or 6th century BCE.[314] Additionally, the ivories

inventoried objects.

307 Brize 1992; Kyrieleis 1980, 348, fig. 18; Furtwängler 1981, 136, pls. 26–30; Sinn 1982.

308 Brize 2020.

309 Brize 1992, 163.

310 It is unclear if ivories were actually found in association with these "treasuries," or whether Kyrieleis (1993, 105) is speculating that they could have been held there.

311 Kyrieleis 1993, 100.

312 Kyrieleis 1993, 100.

313 Kyrieleis 1981, 92.

314 Freyer-Schauenburg 1966a, 123–24.

Brize presents were found in deposits dating to the 7th–6th centuries BCE.[315] Finally, Ulrich Sinn's analysis of an ivory head found during the 1979 excavations of temple D places the piece in the third quarter of the 6th century BCE. With the exception of a small number of early pieces,[316] the material from Samos suggests that ivory dedication began at the end of the 7th, and reached its apex in the 6th century BCE. These dates are consistent with the structures with which the pieces are associated: the Rhoikos altar and Southern Building, and their concentration around these structures suggests they may have been presented or displayed there before being deposited (see fig. 4.19).

The Samian Heraion contained examples of both imported ivories as well as larger, more complex elephant ivory carvings, many of which make use of significant portions of the tusk. As a result, the assemblage found at the Samian Heraion appears most comparable to those of Thasos and Ephesus. Like the Samian Heraion, the Artemision at Thasos appears to have a strong presence of imports or objects strongly inspired by non-Greek iconography; both sites contained carved lion heads and lion statuettes with obvious Near Eastern parallels.[317] Like the Samian Heraion, Ephesus also provides evidence for craftspeople using complex carving techniques to create objects appealing to Greek tastes.[318] Such complex carving can be seen in a type of horse protome made from a large piece of ivory, and similar examples were found at Samos,[319] Ephesus,[320] and Thasos.[321] In a more general sense, the emphasis

[315] Brize 1992, 163, 2020, 78–79.

[316] Freyer-Schauenburg (1966a, 17, 50, nos. 1, 10, pls. 1, 11) argues that a fragment of a sphinx is a piece of late Mycenaean work, and that a seal originated in the early 7th century.

[317] For the Thasos examples, see § 4.3.9; Samos: Freyer-Schauenburg 1966a, 8–10, nos. E. 2, E. 91, E. 92, pl. 22–24.

[318] The relationship between the identity of the craftsperson and the style of the work is always inherently complicated. In locations like Samos and Ephesus, it is even more difficult to say whether or not something is "Greek."

[319] Freyer-Schauenburg 1966a, 4, no. E. 3, pl. 3, 4b.

[320] Smith 1908, 164–65, no. 27, pl. 23, 3.

[321] Prêtre 2016, 46–47, no. 188, pl. 6.

on carving in the round among the objects found at Ephesus speaks to a similar approach toward both the creation and dedication of ivory objects at both sites, even if there are only a few direct parallels.

Despite these similarities, the assemblage of worked animal objects from the Heraion at Samos remains markedly idiosyncratic. While many ivory objects have been found at the site, there appear to be only a few instances of worked bone objects. The exceptional preservation environment at Samos provided evidence for a range of organic dedications (e.g., pine cones and coral) that Kyrieleis attributes to the "common man," making it all the more unusual that worked bone objects do not appear to be especially prevalent.[322] Additionally, almost none of the worked animal objects are of the types found in other dedicatory contexts, such as spectacle fibulae, circular seals, or recumbent animals.[323] Freyer-Schauenburg directly compares the Samos assemblage to those at Perachora and the sanctuary of Artemis Orthia, writing that the number of individual pieces from the other sites far outnumber what was found at Samos.[324] Unlike other sanctuaries, the Samian Heraion lacks smaller worked animal object dedications, indicating the ideas and practices involving animal materials at the sanctuary differ from other parts of the Greek world.

The prevalence of ivory might indicate that dedicants viewed bone as an inadequate substitution for ivory rather than a meaningful material in its own right. Poppy seed capsules made of worked animal materials found at the site might attest to this preference, as 20 ivory examples were found, but only a single version in bone was discovered.[325] The near-exclusive

322 Kyrieleis 1988.

323 An example of a carved eye was found, and such objects have been found in a number of other sanctuaries (see § 4.6.2).

324 Freyer-Schauenburg 1966a, 124.

325 Brize (2020, 86, no. IV 9, pl. 69, 1–4) also publishes a handle which he believes might be bone, writing that it had a brighter color than other ivory objects found in the area. Coloration is a difficult criterion for ivory classifications, as a variety of taphonomic factors can influence the color of the material. Ivory coloration was a helpful metric for some of the Methone classifications, see ID 252. As Brize is comparing this example to several others from the same site, color may be meaningful attribute. However, the images of the object may show cone-within-cone splitting, which is characteristic of ivory (see § 5.2.4).

use of ivory for poppy seed capsules also might reflect how craftspeople and dedicants thought about these objects, perhaps viewing ivory as a particularly apt medium for an offering to a deity. [326] Therefore these preferences surrounding worked animal objects may be the result of a special emphasis on ivory, rather than a rejection of bone. Regardless, the ideas and practices created an assemblage that is markedly distinct from those of other sanctuary sites.

Offerings of another type of animal material at the Samian Heraion also differentiate it from other sanctuaries: the dedication of unmodified bones of exotic or extinct animals. In a 7$^{\text{th}}$-century BCE layer at the site, excavators found a fossilized femur end that was initially thought to belong to a Miocene mastodon or rhinoceros. More recently, the paleontologist George Koufos studied a photograph of the bone (the specimen itself appears to be missing), but found the image was not sufficient to make a taxonomic determination.[327] A systematic review of the materials from H. Walter's excavations in the area of the great altar to Hera also led to the identification of two large fossilized bone fragments; however, Kyrieleis does not indicate that any taxonomic identification was made.[328] Kyrieleis argues that the source of these fossils is local, as rich fossil beds lie in the vicinity of the modern-day village of Mitilinii, about 10 km away from the Heraion.[329] Evidence for the dedication of fossils is not wholly unprecedented; Kyrieleis highlights a study of the faunal remains from the sanctuary at Kalapodi, in which Manfred Stanzel identifies a thick-walled, fossilized bone that may have belonged to a Pleistocene proboscidean.[330] The evidence from Kalapodi suggests that the fossil material at the Samian Heraion is not the result of wholly anomalous dedicatory behavior. Instead, it seems likely that fossil collection was practiced in the Greek world for multiple reasons, including the political concern for the acquisition of "Hero Bones,"

---

326 A similar connection between form and material appears to be a factor in the creation of the recumbent animals (see § 4.6.4).

327 Kyrieleis 2020, 31, note. 149.

328 Kyrieleis 2020, 32.

329 Kyrieleis 2020, 31.

330 Stanzel 1991, 15; Kyrieleis 2020, 32.

and perhaps, as a material for craft production (see § 5.4.2). As a result, it is possible that fossilized bones were dedicated at other sanctuaries, but have not been recovered or identified properly.

Several other exotic skeletal remains were also discovered, including "skull fragments from a 5m long Egyptian crocodile (*Crocodylus niloticus*) as well as skull and horn fragments from two African antelopes (*Alcelaphus uselaphus*)."[331] The Heraion also contained at least 14 unworked hippopotamus canines and 20 fragments of ostrich eggshells.[332] While an aspect of uniqueness or exoticism connects all of these animal materials, dedicants may have interpreted these objects distinctly from one another. Fossils or "Hero Bones" may have been seen as something more singularized (see § 4.1), set apart from more overtly economic understandings of materials with elite or luxury connotations. The value of fossilized bones may have been drawn from their real or supposed history, an idea that is parallel in the social and economic practices of the medieval relic exchange. Patrick Geary shows that such relics were not fully outside the commodity sphere, but also that their particular value was attached to the details of their circulation, as well as the connection to the body of the saint from which they originate. In his discussion of these objects, Geary writes: "[W]e know that relics were in fact dealt with both as gifts and as commodities, even though a price list could never be established. During the periods of their careers when relics were objectified, how was value equivalency determined? Did it cease to have any meaning once a relic had again become subjectified in a new social context?"[333] If these fossilized objects were seen as "Hero Bones," they might have been treated differently from an object like an ostrich egg, a luxury good found in the suite of intercultural elite consumption practices in both the Bronze and

---

331 Kyrieleis 1993, 109.

332 Hippopotamus canines: Brize 2020, 79; earlier publications listed the number as six canines, see Boessneck and von den Driesch 1983, 21–24; Reese 1998, 142. Ostrich eggshells: Boessneck and von den Driesch 1983, 21.

333 Geary 1986, 189.

Iron Ages.[334] While the fossils, ostrich eggshells, skeletal material, and hippopotamus teeth are all unique and organic, they did not necessarily exhibit the same meanings and values. The dedications of unworked animal materials from foreign and extinct animals could have occurred at other sanctuaries, but the combined evidence for these materials at the Samian Heraion suggests a strong emphasis on the conspicuously foreign or exotic attributes of these items.

The ability of individuals at Samos to acquire hippopotamus canines did not appear to affect ivory production practices, as there is little evidence for the use of hippopotamus ivory as a production material. Brize argues that some of the ivory objects at the Heraion can be expected to be made from hippopotamus ivory, but he also states that most of the objects exhibit characteristics of elephant ivory (e.g., Schreger lines and cone-within-cone splitting).[335] Even if future research demonstrates that hippopotamus ivory was used at the Heraion as a production material, the vast majority of the published objects can be characterized as elephant ivory. There may be practical reasons for craftspeople avoiding hippopotamus ivory: The dentin of hippopotamus ivory is denser than that of the ivory of elephants, potentially rendering it more challenging to carve.[336] In addition to the hardness of the material, the curved shape and smaller size of hippopotamus canines limits craftspeople to specific shapes. As evidence for worked hippopotamus ivory remains lacking in the post–Bronze Age Greek world (see § 3.1.1), craftspeople may have lacked the skills and experience for working with such a material. However, the choice to dedicate hippopotamus canines may have been part of the same ethos which placed a strong emphasis on elephant ivory and prized the animal materials from other exotic sources. Individuals on Samos also may have viewed an unworked tooth as something more powerful than a carved object.

[334] Hodos 2020.

[335] Brize (2020, 79) states systematic investigation of this issue is still pending.

[336] In her discussion of the morphology of hippopotamus ivory, Katherine Lafrenz (2003, 10) highlights the fact that terms like “harder” or “softer” may be subjective and dependent on a suite of factors.

Without direct evidence for the production of worked animal objects, interpretation of the assemblage at Samos remains complicated. It is unclear what part of the Samian assemblage can be said to be made by craftspeople operating in the Greek world, a characterization that is inherently nebulous in a place within the multicultural spheres of East Greece and Western Anatolia (see § 3.4). While the assemblage is marked by unique ivory objects lacking obvious parallels in the Greek corpus (e.g., the kneeling youth and carved poppy seed capsules), large numbers of impressive ivory objects, even those thought to be made by individuals in the Greek sphere, are not necessarily evidence for local production. Instead, Samos may have been a place that imported ivory objects and attracted itinerant craftspeople, but was not necessarily home to permanent workshops. The discovery of multiple impressive ivory objects, along with fewer bone objects, might imply that craftspeople in the vicinity of Samos were engaging in forms of production that were different from earlier mainland practices. Rather than create the smaller objects seen at other sanctuaries, the craftspeople responsible for the objects at the Samian Heraion may have emphasized larger and more complex forms of ivory carving in the late 7th and 6th centuries BCE (see § 3.4.3).

4.3.8 The Harbour Sanctuary at Emporio (Chios) (35 Objects)

Excavations at Chios occurred in several areas of the site including a series of houses, the Athena temple, and the Harbour sanctuary. All of the worked animal materials were found in the Harbour sanctuary, which Boardman divided into six phases.[337] The objects cluster between periods II (beginning in 660) and IV (ending before 550), with no later examples and only one earlier. This distribution conforms to the larger pattern of worked animal material use in the Greek world, which was most active only after the mid-7th century BCE. The worked animal materials from Emporio include aulos fragments, double-disk spectacle fibulae, and a "Little Lion Seal." A smaller assemblage found at the nearby site of Kato Phana

[337] Boardman 1967a, 62.

also contained a spectacle fibula and a "Little Lion Seal."[338] However, the rest of the objects from the Harbour sanctuary are not especially similar to other dedicatory assemblages. Four objects found at the sanctuary were made from the cranium of a large animal (possibly cattle). These objects are in the form of a disk with two piercings, two triangular strips with multiple drill holes, and a rectangular piece with a single drill hole. As Boardman points out, these objects are "not readily paralleled on other Greek sites nor easily explained."[339] The interior of animal crania are marked by distinct, wavy sections of bone; the effect of making objects from this material is a striking reminder of their organic nature. Additionally, the use of cranial bone cannot be explained as a choice of convenience: it is more difficult to procure a workable piece of cranial bone than a long bone or metapodial. The use of cranial bone suggests that craftspeople wanted to create objects whose meanings were rooted in their materials. The dense folds of bone (located on the interior of the cranium) helped to dictate the shape of these objects and the placement of the drill holes. The craftsperson was guided by the material, while making no effort to disguise its organic qualities. These pieces are examples of the dialogue between craftspeople and agentive animal materials, resulting in objects which appear as a compromise between the will of the producer and the "undulations and torsions" of the material.[340]

One of the most unique objects in the assemblage is a statuette of a horse and rider in ivory. The statue is only partially preserved, but based on its context (from a level dating to Period III), Boardman states that the statue "cannot have been made much later than the middle of the seventh century."[341] From a stylistic point of view, Boardman argues that there are no direct comparisons to be made, even though there is no shortage of ivory carving

---

338 Lamb 1935, 153–54.

339 Boardman 1967a, 242.

340 Deleuze and Guattari 1987, 408; see § 2.3.1.

341 Boardman 1967a, 242.

examples at the nearby sites of Ephesus and Old Smyrna.[342] The Samian Heraion is likewise close, and contains some of the most notable pieces of Greek ivory carving, although the Chios example is not necessarily similar to the examples from Samos. The Chios statuette might appear to be a stylistic outlier compared to the rest of the Greek ivory assemblage, but much of the non-mainland ivory statuary (especially the late-7th and 6th-century BCE pieces) appears to be influenced by different Ionian and western Anatolian styles (see § 3.4.3).

4.3.9 The Artemision at Thasos (362 Objects)

According to tradition, the island of Thasos was colonized by Paros around or slightly earlier than the middle of the 7th century BCE.[343] The excavations of the 1950s by François Salviat and Nicole Weill demonstrated that the earliest dedications at the Artemision were contemporary with the foundation of the colony (ca. 680).[344] The majority of the dedications were found in the west embankment ("Remblai Ouest"), an Archaic context on the greater terrace. This area appears to be located near the Hellenistic Peribolos, although Prêtre has said that an exact topographic association between most objects and the location of their contexts is impossible to determine.[345] However, some of the exact findspots of the objects are known, and many of those cluster around the monumental altar. The altar dates to the start of the 5th century BCE, and its construction demanded a large amount of earth be moved to compensate for the slope of the terrace; this construction backfill contained much of the Archaic votive materials found near the altar.[346] The objects from this construction deposit are of an earlier date, so it is not certain whether there is any connection between the location of these votives and the subsequent construction of the altar.

---

342 Boardman 1967a, 242.

343 Graham 1978, 87, 2001.

344 Prêtre 2016, 1.

345 Prêtre 2016, 7.

346 Garlan, Martin, Picard, Koukouli, Grandjean, and Holtzmann 1978, 826–27.

The Artemision at Thasos demonstrates how a northern locale, significantly distant from Ephesus, Sparta, and Corinth, is an example of both continuity and disconnection with the practices of other sanctuaries. With one of the largest collections of worked animal materials in the early Greek world, the assemblage is comparable to that of Perachora or Kythnos.[347] While most of the objects are Archaic, some deposits contained later (Classical–Protobyzantine) material as well. The Artemision lacks many of the objects that were found at other sanctuaries, as only a single miniature axe was found, and no seals or recumbent animals were recovered. One poorly preserved ivory object is roughly similar to the recumbent animals, as it appears to have been a carving of a lion, with a lightly incised face on the reverse.[348] However, the object is too badly preserved to determine whether it was similar in form to other recumbent animals, and the incised face on the reverse is too shallow to qualify as intaglio. However, the sanctuary also contained large numbers of more common dedications like astragali and fibula plates.

One difference between the objects from Thasos and other contemporary sanctuary assemblages is the use of antler as a raw material in 29 objects. Some of the seeming singularity of the assemblage may be a result of Prêtre's detailed study of the materials. Due to the structural similarity between antler and bone, authors of older publications may have misidentified antler.[349] While antler may have been present at other sanctuaries, there is not a wealth of evidence for the material in either publications or museum collections. As a result, the use of antler at Thasos for objects like spectacle fibulae remains a distinct feature of the assemblage (see fig. 4.20). In light of similar fibula plates made of antler at Methone (e.g., ID 2), the prevalence of the material at Thasos may be indicative of a regional

347 Prêtre's (2016) recent publication *La fibule et le clou: ex-voto et instrumentum de l'Artémision* is one of the most detailed and accurate studies of the animal materials of early Greece. As such, this work will attempt to paraphrase or summarize little, as the original publication is exceptionally comprehensive.

348 Prêtre 2016, 42–43, no. 179, pl. 18.

349 Some of the circular seals from Perachora published as bone appear to have been made from antler (see § 4.6.1).

preference of northern Greece. Despite being relatively rare elsewhere, antler was also found at other northern sites: Kastanas, Sindos, and Torone (see fig. 4.21).

As a colony of Paros, Thasos retained connections to its motherland that are evident in the archaeological assemblage. Additionally, A.J. Graham also traces the continued relationship between Thasos and Paros for centuries after its colonization within textual sources.[350] This relationship is reflected in one of the most common types of objects found at the Artemision: Cloisonné disks. The distribution of these objects outside Thasos would suggest that they were associated with the Cycladic islands; several examples were found in the relatively conscripted area of Paros (one example), Kythnos (two examples), Delos (one example), and Despotiko (one example). However, these are outnumbered by the 18 examples found on Thasos. The disks from Thasos strongly resemble the examples found on the Cycladic islands, and no other examples have been found elsewhere. This distribution of the disks suggests it is a result of the ongoing relationship between Thasos and its motherland. The design likely originated either on Thasos or the region around Paros, and was exchanged between the two areas.

Like the Samian Heraion, the Artemision at Thasos contained ivories that were either imported from or inspired by eastern sources. The Artemision contained three carvings of lions in ivory, including two which depict the whole of the animal and have areas for dowels and mortise attachments; they are thought to be elements of furniture.[351] The other example is a carving of a lion's head which is also thought to attach to furniture.[352] This type of object is a well-known form in Near Eastern assemblages, with an excellent comparandum originating from Fort Shalmaneser at Nimrud.[353] Salviat asserts that the full carvings of lions

[350] Graham 1999, 71–81.

[351] Prêtre 2016, 45, nos. 185–86, pls. 6–7.

[352] Prêtre 2016, 45–46, nos. 187, pl. 7.

[353] Herrmann and Laidlaw 2013, 291, no. T303, pl. 242.

are unambiguously North Syrian or Phoenician.[354] He provides convincing comparanda from Zincirli, objects which have similar spaces for dowels and mortise attachment, suggesting that all of these objects share an underlying logic of construction.[355] Prêtre does not indicate that she believes these to be imported; instead, she asserts that they are reminiscent of the Olympia bronzes and writes that “le traitement en flammèches de la crinière est un motif récurrent des éléments mobiliers et des ornements de vaisselle de l’époque archaïque.”[356] Similarly, she believes the lion head to be a Greek adaptation of an older eastern form, and compares it to examples of ivory lions found at Ephesus.[357] If the lion head is an example of indigenous ivory carving, it represents a highly skilled work that closely copies Eastern models. However, the creation of such a close adaptation of a Near Eastern design represents an atypical choice within the corpus of Greek bone and ivory carving. Most objects with clear Near Eastern precedents have still undergone a significant transformation by Greek craftspeople, changing these objects to “suit” Greek tastes, and because their production choices are the result of learning technical acts in specific cultural environments. This approach to the adaptation of Near Eastern objects is evident from an early period, with the creation of the Dipylon ivories. It continues with the East Greek statuary of the 6th century BCE (e.g., the kneeling youth from Samos), and the depictions of nude female figures on Rhodes.

Another object from the Thasos assemblage that appears unique among Greek ivory carvings is an image of a woman in profile created from a series of lightly incised lines. The figure fully dictates the shape of the object, as there is no excess ivory background. As a result, the image of the woman appears cut out and somewhat similar to *à jour* carving.

[354] In the 1962 publication, Salviat (1962, 106) does not discuss the lion head, thought it was excavated in 1958.

[355] Salviat 1962, 99, figs. 3–6.

[356] Prêtre 2016, 45; translation: The flaming treatment of the mane is a recurring motif of the items of furniture and ornaments of vessels of the Archaic era.

[357] Prêtre 2016, 46.

Prêtre argues that the figure is a Samian type, the clothing having comparanda in korai found on the island.[358] While the stylistic aspects may have clear predecessors in other media, the way the material is used and the choice of fine incision is unusual in Greek ivory carving. There are some Greek examples bearing fine incision, such as the depiction of a griffin on the back of one of the square female heads from the Kamiros well.[359] Additionally, certain objects from Ephesus also appear to use this technique, including a piece of inlay featuring the lower-half of a cow and a lotus bud (likely Hathoric imagery) that Hogarth suggests is "Naukratite work," as well as three examples of another Egyptianizing scene in inlay that show lotus buds in the water.[360] A similar piece of inlay was also found in the Papatislures Cemetery on Rhodes.[361] Interestingly, several of the pieces that use this technique specifically use foreign imagery, and may be imports.

The image of a woman in profile also has some precedents in animal materials, including six examples in bone from the sanctuary of Artemis Orthia,[362] and one Laconian plaque in bone found at Dhimitsana.[363] Two similar bone or ivory plaques were also found on the Athenian acropolis (NM 6530, 6531).[364] Marangou describes these plaques as unmistakably Laconian based on the depiction of large eyes, peculiar mouth formations, and short, thick necks.[365] While the Athenian examples share some traits with Laconian carvings, they are markedly different from the five plaques found at the sanctuary; perhaps they originate from some unknown workshop nearer to Athens. Two somewhat similar carvings also come from

358 Prêtre 2016, 42, no. 178, pl. 6.

359 Smith 1908, 179, no. 3, pls. 30, 14; 31, 17.

360 Hogarth 1908b, 195, pl. 40, 22, 26.

361 British Museum accession number: 1864,1007.697.

362 Dawkins 1929a, 215–16, pl. 112, 1–3; Marangou 1969, 168–71, nos. 112–16.

363 Richards 1891, pl. 11.

364 Richards 1891, 42, figs. 1–2; Marangou 1969, figs. 152–153. Marangou claims that these examples are ivory, but the images of these objects appear to show the cancellous structure of bone.

365 Marangou 1969, 186–187, figs. 152–53.

Ephesus, both show an Egyptianizing woman in profile holding a sistrum.[366] While these other examples share some similarities with the object found at Thasos, none offer a direct parallel. Outside of the Greek world, ivories created in an Assyrian style also make use of fine incision without carving in relief.[367] However, the technique of using small, shallow incised lines is most associated with the Iberian ivories.[368] Examples of Iberian ivories were found at the Samian Heraion,[369] demonstrating that these objects were known in the Greek world and could have been an influence on the example from Thasos. However, the Thasos carving is only superficially similar to other Greek, Assyrian, and Iberian examples. Rather than being a product of an established style, the object from Thasos appears to be an example of a development in Greek ivory carving practices that lacks comparanda, and which may have originated in either the north or east Aegean.

4.3.10 The Idaean Cave

The Idaean Cave assemblage is another notable group of objects that is somewhat atypical of the broader patterns of ivory use in Greece. It is an incredibly rich deposit, with more than 1,034 ivory fragments recorded after the 1986 excavations, many of which belong to larger objects; Sakellarakis argues that it is the largest ivory assemblage found in a Greek sanctuary.[370] The objects found within the cave are strongly varied, they include statuettes, vessels, pyxides, forks, combs, beads, seals, carved eyes, components of furniture, as well as other forms.[371] Another notable aspect of the ivory assemblage is the presence of imported objects. Sakellarakis states that the majority of the foreign ivories occurring on Crete were from the Idaean Cave, comprising nearly two-thirds of all imported ivories from

366 Bammer 1992, 190, nos. 18–19, pl. 9. c–d.

367 Mallowan and Davis 1970.

368 Sanz 2014, 228–29.

369 Freyer-Schauenburg 1966a, 104–10, nos. 26–28, pls. 29–30.

370 Sakellarakis 2013, 168.

371 Sakellarakis 2013, 173.

the period.[372] The objects have been identified as primarily North Syrian, but with Egyptian and Phoenician examples as well.[373] Many of the imported objects have been dated to the 8th century BCE on a purely stylistic basis,[374] suggesting that deposition at the Idaean cave predates the intensive ivory dedication practices seen in the 7th century BCE.

In addition to imported objects, there are some ivories thought to be made by Greeks. They are also dated on a stylistic basis, and many are thought to have been made after the 8th century BCE.[375] A Daedalic ivory statuette, for example, is thought to be from the second half of the 7th century BCE.[376] Some of the Greek objects have strong parallels in other 7th-century votive assemblages, including over 100 examples of carved eyes in bone or ivory (see § 4.6.2). While many of the Greek ivories appear to be from the 7th century BCE, some may also be earlier; Sakellarakis dates two similar janiform heads (nos. MH: E 709 and αρ.αν. Ελ 83/8) to the 8th and 7th centuries BCE respectfully.[377] Sakellarakis sees these objects as heavily influenced by eastern motifs, and he thinks they may represent Greek adaptation of foreign ivory carving styles and techniques.[378] A combination of 8th-century BCE imports, objects that appear to span the 8th and 7th centuries BCE, and distinctly 7th-century BCE Greek ivories, all seem to suggest that the practice of ivory dedication at the Idaean Cave was a long-lived tradition. If the imports were dedicated shortly after they were made, the Idaean cave offerings would predate many of those made at mainland sanctuaries.

The identity of the ivory carvers responsible for the non-Greek works within the cave is an aspect of a larger debate about foreign craftspeople on Crete. The ivories were only one

---

372 Sakellarakis 1993, 355–59.

373 Sakellarakis 2013, 173.

374 Sakellarakis 1993, 348, 2013, 179; Hoffman 1997, 54–66.

375 Sakellarakis 2013, 190–94.

376 Sakellarakis 2013, 191, fig. 20, no. MH: E 709.

377 Sakellarakis 2013, 192.

378 Sakellarakis 2013, 192.

element of the overall assemblage, which exhibited strong Near Eastern features in multiple media. With evidence of spectacular finds like a bronze tympanum depicting Zeus in Assyrian and other Near Eastern styles,[379] the Idaean cave may have been a location that attracted non-Greek craftspeople to Crete. In her analysis of the tympanum, Gail Hoffman sees the specificity of the Zeus myth to the Idaean Cave as evidence for foreign artisans creating such an object locally. She writes that "while not conclusive, most would argue that such an object was made on commission for the Cave."[380] Similar ideas about resident or itinerant non-Greek craftspeople have also been proposed for the ivories; Barnett theorizes that foreign artisans were drawn to the prestige of the shrine and "were assured there of a good market." He further speculates that political instability brought about by the Assyrian Empire would have pushed artisans into the West.[381] Adding to this theory, Sakellarakis proposes that many of the Phoenician ivories understood to be elements of furniture would have required to be assembled by skilled foreigners. He even speculates that the ivory components belonged to a "superb piece of furniture, a throne said to have been seen by Pythagoras."[382]

For the most part, there is no ivory equivalent to the bronze tympanum that combines Greek ideas with foreign imagery; the imported ivories do not appear to be adapted to Greek tastes. While eastern influence is evident in objects like the janiform heads, these do not necessitate the presence of foreign craftspeople, especially as janiform objects in bone or ivory are present elsewhere on Crete, as well as on Rhodes. Several objects appear foreign, but lack an exact parallel in the corpus of eastern ivories; their uniqueness may imply that they were created for the cave.[383] One such indeterminate eastern work is a skilled carving of a bird, perhaps a falcon or hawk. Sakellarakis suggests that it could be a symbol of Zeus, but

379 Burkert 1992, 16; Hoffman 2005, 357; Braun-Holzinger and Matthäus 2000, 298–310.

380 Hoffman 2005, 357.

381 Barnett 1948, 6.

382 Sakellarakis 1993, 361, 2013, 199–200.

383 Sakellarakis 1993, 355, 2013, 190.

also that it may be a depiction of Horus.[384] Regardless, this is fairly insubstantial evidence and only suggestive of the imports being tailored to Cretan audiences.

Furthermore, the non-Greek ivory assemblage does not appear to be from one source. While it is difficult assigning stylistic traits of Levantine ivories to a given region or ethnic group,[385] Sakellarakis himself attributes the non-Greek objects to different cultural sources (i.e., North Syrian, Phoenician, Egyptian). This may suggest that the Idaean Cave attracted a variety of foreign craftspeople, but perhaps it only indicates that parts of the non-Greek assemblage were imported, rather than made locally. As Hoffman highlights, the small sizes of the objects would allow them to be transported easily.[386] Beyond the quantity of imported/non-Greek ivories, there is little about the Idaean assemblage that points to the local production of these objects. Therefore the Idaean Cave ivory assemblage does not provide evidence that allows for the differentiation between objects created locally by foreigners and those created abroad. In the absence of objects that seem to hybridize ideas and motifs from Greece and the Near East, nothing about the Idaean Cave assemblage necessitates an explanation of local production. The early date of some of the ivories notwithstanding, the Idaean Cave assemblage is fairly similar to that of Samos. Sakellarakis' theory about imported furniture is also problematic. He has not demonstrated any evidence that the ivories were originally part of pieces of furniture in the cave, such as been shown for some of the ivories at Nimrud.[387] As imports, these objects may have been separated from their original pieces of furniture before they reached Crete. Even as furniture panels disconnected from their original uses, these ivories would have been appealing, valuable objects.

384 Sakellarakis 2013, 190, no.3/αρ.αν. Ελ 84/465, pl. 110, 3; the hawk is not wholly dissimilar to an example from Smyrna, see Cook, Nicholls, and Pyle 1998, 26, no. 1110, pl. 21.

385 Feldman 2014.

386 Hoffman 1997, 158.

387 Herrmann and Mallowan 1974; Winter 1976a.

4.3.11 The Halos Deposit at Delphi

The Halos Deposit (also known as the *fosse de l'aire*) at Delphi contained some of the most remarkable examples of ivory work in the Greek world, including multiple components of the earliest-known examples of composite chryselephantine sculpture. The contents of the Halos deposit date to between the late 8th century and late 5th century BCE.[388] Based on a thick layer of ash found within the deposit, Amandry argues "les corps des statues chryséléphantines et de la statue de taureau plaquée d'argent étant en bois, on y avait mis le feu dans la fosse, et l'ensemble s'était affaissé à mesure que le bois se consumait."[389] Regardless of whether the burning was deliberate,[390] all of the statues are significantly blackened from exposure to flames. The deposit contained a trio of large scale (near life-size) composite chryselephantine statues, which Amandry identifies as the Delphic triad of Apollo, Artemis, and Leto.[391] In addition to heads carved in the round, the statues also contained large scale body parts, such as masterfully carved hands and feet (see fig. 4.22).[392] Additionally, two other sets of three smaller faces were also found, which Lapatin suggests may represent the Horai or the Charities (see fig. 4.23).[393] These also had corresponding body parts of a smaller scale, indicating that they were also pieces of composite statuary. The statues are thought

[388] Amandry 1939, 89, 1991, 191– 93. In reference to the chronology of the deposit, Lapatin (2001, 57) writes that "a *terminus post quem* of *c*.420 BC for the deposition of the entire cache is provided by the mouth of an Attic lamp found in one of the two pits, the homogeneous contents of which are evidence of their contemporaneity."

[389] Amandry 1991, 193.

[390] Lapatin (2001, 60) does not refer to a deliberate burning. In dismissing the theory that the statues were related to the dedications of Croesus that were destroyed in the Temple of Apollo in 548 BCE (Fuchs and Floren 1987, 394–95), he writes that "the event which ruined the Halos material, moreover, appears to have been an isolated, rather than a widespread disaster."

[391] Amandry 1939, 117.

[392] Amandry 1939, 93–95; Lapatin 2001, 58.

[393] Lapatin 2001, 60.

to date to the 6th century BCE and to originate in East Greece.[394]

In addition to the statuary, excavators found over 2000 fragments of ivory, which correspond to about 200 figures carved in *à jour* relief (see fig. 4.24). The figures are thought to be part of a single object dating to the 6th century BCE,[395] which Amandry and Carter assume to be similar to the Chest of Kypselos as described by Pausanias.[396] Like the decorations on the Chest of Kypselos, the ivory figures are part of a series of mythological scenes, including the Boreads chasing the Harpies and the Kalydonian boar hunt.[397] Carter writes that "the small reliefs, in particular, seem better dated in the first half of the sixth century, while the large chryselephantine figures, the smaller composite figures, and the composite reliefs appear more at home in the second."[398]

This deposit also contained an ivory statuette of a "lion tamer," a man holding a spear and a lion. The statuette has clear Near Eastern influences, and the rendering and pose of the lion appear particularly Assyrian. DeVries and Rose controversially ascribe the statue to Phrygian craftspeople, and they also attempt to connect it to Midas' gift of a throne to Delphi.[399] Oscar Muscarella forcefully argues against this proposition, writing that DeVries and Rose "have effectively verified both the *non-Phrygian* origin and the fabricated cultural history of the Delphi statuette."[400] Muscarella highlights that Pierre Demargne,[401]

---

[394] Lapatin collects a number of the geographic attributions, reproduced here: North Ionia: Walter-Karydi 1970, 10; Phokaia: Langlotz 1975, 128; Chios (possibly): Amandry 1986, 231–2; South Ionia: Carter 1985, 255, 1989, 355; Ephesus: Floren 1987, 395 Samos: Croissant 1983, 38, 1986, xxiv, 1988, 126; Rolley 1994, 268–269.

[395] Amandry 1939, 103–104; Barnett 1982, 60.

[396] For Pausanias' description, see 5.17.5–5.19.10; Carter 1989, 359; Amandry 1939, 105–106.

[397] Amandry 1939, 103–106; Carter 1989, 357–358.

[398] Carter 1989, 360.

[399] DeVries and Rose 2013.

[400] Muscarella 2016, 186.

[401] Demargne 1964, 398.

Amandry,[402] and Boardman[403] all believe the statue to be a 7th-century BCE work from East Greece, Ionia, or Lydia.[404] Barnett asserts that the object comes from Rhodes based upon similarities to the ivories within Kamiros assemblage and a depiction of a person on "a curious vase" found in a grave from Kamiros as well.[405] While no evidence specifically precludes the Delphi statuette from originating in Rhodes, none of the Kamiros materials are especially strong parallels and there is no shortage of seemingly Near Eastern and Anatolian-inspired ivory work throughout Ionia, East Greece, and western Anatolia.

The Halos deposit is remarkable for several reasons: the *à jour* reliefs are some of the most impressive examples of ivory carving and they serve as evidence for types of objects (and uses of ivory) that have not been preserved or remain undiscovered. Moreover, the lion tamer is a fascinating object that seemingly draws on several disparate iconographic and stylistic sources. Finally, the chryselephantine statuary remains some of the most unique and radical works within the assemblage. The choice of ivory as a material for a cult image represents a departure from its use as a medium for smaller votives throughout the 7th century BCE. While an object like the kneeling youth from Samos was created using the same principles, the scale of the statues from Delphi makes them *sui generis.* With all of these unique works found in the same assemblage, the Halos deposit represents the interconnected environment of East Greece, Ionia, and the western Anatolian littoral.

4.4 The Corycian and Koroneia Caves

Evidence for a specific form of practice existing around the dedication of large numbers of astragali at cave sanctuaries has been found at both the Corycian (Phocis) and Koroneia caves (Boeotia). These sites differ from the others with notable assemblages of worked animal

402 Amandry 1944.

403 Boardman 1978, 16.

404 Muscarella 2016, 185.

405 Barnett 1948, 17.

objects, as the start of this practice seems to postdate the material from most of the other sanctuaries, and it continues into the Classical period. Moreover, while these caves may contain small numbers of other worked animal objects,[406] astragali represent the majority of the finds made from animal materials. The Corycian cave provides an extraordinary record of this dedicatory practice; excavations from the cave produced 22,771 astragali, with evidence of anthropogenic modification on 4,062 of those bones.[407] The cave has a long record of human activity, as both Paleolithic and Neolithic levels were discovered at the site.[408] Mycenaean occupation was represented through ceramics, although they lacked a precise stratigraphic association.[409] Ceramics dating to the Archaic, Classical, and Hellenistic periods were also found, although pottery from the Geometric period is lacking; the ceramic evidence suggests that the Post–Bronze Age use of the site begins at the end of the 7th century.[410] As a result, Amandry associates the astragali with the periods between the 6th and 3rd centuries BCE, the period during which the site was occupied as part of its use as a sanctuary of Pan and the Nymphs.[411] In subsequent research, Katerina Trantalidou and Ismini Kavoura show that other cave sanctuaries of Nymphs (e.g., the Koroneia, Kryoneri, and Koutites caves) contained worked astragali, with the Koroneia Cave exhibiting large numbers. Trantalidou and Kavoura record 4,433 astragali, with 1,970 worked examples from still ongoing excavations.[412] The chronological and stratigraphic sequences at the Koroneia cave are only roughly understood, so the authors treated all the material as belonging to the

406 Jacquemin 1984, 168.

407 Amandry 1984c, 348; Trantalidou and Kavoura 2007, 462, table 1.

408 The Paleolithic levels were not excavated and sterile layers separating the Neolithic levels suggest that the cave was not occupied continuously during the earliest periods (Touchais, Perlès, Courtois, and Dimou 1981, 104).

409 Lerat 1984, 24–25.

410 Amandry 1984a, 29, 153.

411 Amandry 1984c, 376,b.

412 Trantalidou and Kavoura 2007, 462, table 1.

Archaic–Roman periods.[413]

The astragali found in the Corycian and Koroneia caves originate from a similar set of animals, including cattle, sheep, goat, red deer, fallow deer, and roe deer.[414] Additionally, astragali from at least one dog and one pig were found at the Koroneia cave,[415] while the Corycian cave contained a few astragali belonging to an ibex or other similar wild bovid.[416] In François Poplin's study of the material from the Corycian cave, as well as the analysis of Trantalidou and Kavoura of the Koroneia cave material, the researchers did not detect overly pronounced preferences for a given side or sex of the animals.[417] Instead, both the Koroneia Cave and the Corycian cave show a plurality of approaches to dedicating and working astragali. Each site shows that individuals worked the astragali in many different ways: craftspeople drilled different numbers of holes through the astragali in separate orientations (the medial-lateral or posterior-anterior directions). Some chose to abrade the bone, while others would cut through it. At Koroneia Cave, Trantalidou and Kavoura observed astragali that had been "impregnated with a red/yellow colour of organic (egg yolk, purple, madder) and inorganic material (red, yellow ochre)."[418] Poplin also reports a red color on some examples from the Corycian cave.[419] A small subset (31 examples) of astragali at the Corycian cave exhibit inscriptions, including the names (or abbreviations) of Heracles, Thetis, Achilles, Ajax, Nyx, and Nike.[420]

These caves represent sites of a distinct and long-lived practice involving animal ma-

413 Trantalidou and Kavoura 2007, 461, see footnote 14.

414 Trantalidou and Kavoura 2007, 464; Poplin 1984, 384–86.

415 Trantalidou and Kavoura 2007, 464.

416 Poplin 1984, 384–86.

417 Poplin 1984, 389; Trantalidou and Kavoura 2007, 464.

418 Trantalidou and Kavoura 2007, 467.

419 Poplin 1984, 390.

420 Amandry 1984c, 370–72.

terials within potentially mysterious places, locations that reveal the inadequacy of a strict nature-culture dichotomy. In her discussion of Greek caves as spaces rife with the potential for sensory deprivation and altered consciousness, Yulia Ustinova writes that "it is almost self-evident that Pan and the Nymphs, unrefined deities of nature, would be worshipped in the wild, in their pristine abodes."[421] Ustinova emphasizes how crucial the setting was for the worship occurring in that location, even if her notion of a "pristine abode" ignores the fact that these caves were the sites of thousands of dedications of astragali. Instead, human and non-human forces would have served as co-creators in the generation of these particular sacred and subterranean spaces. Ustinova presents many compelling reasons as to why the worship of Pan and the Nymphs would have been especially fitting in such a place. Citing an inscription at the Corycian cave left by a woman who "heard the Nymphs and Pan," Ustinova speculates that the text may refer to an auditory hallucination.[422] Moreover, she sees the astragali as evidence for divination (see § 4.6.10), arguing that the cave is the perfect venue to induce prophecy and that it was the "seat of a lot oracle."[423] Regardless of how these astragali were used, Ustinova's ideas about the power of a subterranean setting provide some reasoning for how cave sites became a locus for a sustained dedicatory practice involving worked animal objects. The astragali were taken into a liminal space, perhaps bringing together humans and deities in a way that was impossible in other locations. Under these conditions, the astragali may have become "activated," enhancing their powers as divinatory tools or aptitude as dedications to the gods.

However, the animals themselves must also be considered as a crucial element of this practice. The thousands of astragali found at these caves represent at least half as many

421 Ustinova 2009, 67.

422 *SEG*. 3.406: Νυμφῶν [καὶ] Πανὸς κλύουσα . . . ἐλήφ[θη]. Ustinova 2009, 66, 2017, 70. W.R. Connor (1988, 162, note 24) argues for the connection between prophesy and nympholepsy. He refers to Amandry's idea that the Corycian cave was used for prophesy, and cites *SEG*. 3.406 as a "possible case of nympholepsy."

423 Ustinova 2009, 66.

animal lives.[424] The presence of astragali from wild animals (e.g., the three species of deer, perhaps a wild goat from the Corycian cave) alongside domestic ones, suggests a variety of conceptions of a worthy astragalus. Moreover, the many different ways of decorating or altering these bones further show that there were a multiplicity of ideas surrounding astragalus dedication. As these objects could have been created outside of workshops, it raises the possibility that the dedicant was responsible for killing the animal and preparing the astragalus. Perhaps a hunter recognized the particular power of a red deer and felt it especially apt as an offering to Pan and the Nymphs. Alternatively, a shepherd may have selected an astragalus from a sheep that produced especially fine wool. An individual taking a bone offering into a sacred space may have put thought and consideration into that object, potentially bringing with them their individual relationship with that animal.

4.5 The Rhodian Assemblages

The Rhodian assemblages merit a separate discussion because they are drawn from roughly contemporaneous funerary and dedicatory contexts, confined to a limited geographic range. Worked animal objects were found at the sanctuary of Athena Lindia (Lindos), the acropolis and well deposit of Kamiros, as well as the nearby Papatislures cemetery. Additionally, worked animal object assemblages were found at both the cemetery and sanctuary at Ialysos. The assemblages from Lindos and the Kamiros well are considerably larger than the others on Rhodes; their combined total exceeds 300 objects. Distinct assemblages across Rhodes show indications of regional practices surrounding worked animal material dedication that were not performed in other places. Additionally, Rhodes' position as an eastern island made it an intersection for Greece, Anatolia, and the Levant. Ceramic evidence from Rhodes suggests that the island reached a heightened level of interaction with Phoenicians during the

[424] A minimum number of individual (MNI) approach considers that both the left and right astragali of a single animal could be represented within these assemblages. Such a metric would dictate counting only the astragali from the most numerous side per taxa.

7th century BCE.[425] Giorgos Bourogiannis refers to this period as the "Phoenician apogee" of Rhodes, and he writes that "the transformation that occurred in Rhodian pottery during the first decades of the seventh century is unparalleled in the Aegean world and strongly suggests the existence of uniquely strong links between Rhodes and the Levant."[426] Similarly, Susan and Andrew Sherratt view Rhodes as a strategic point in the Eastern Mediterranean which helped integrate "maritime and inland areas" during the 7th century BCE. They view Greeks living in places like Rhodes and Ionia as supplying trade networks with metalwork, textiles, and Ionian finewares.[427]

The worked animal objects inspired by the Near East within the Rhodian assemblages were probably not being produced as trade commodities like the metalwork and textiles described by Sherratt and Sherratt. However, they are indicative of the new level of Phoenician interaction described by Bourogiannis.[428] These objects hint at an even more integrated form of social connection between Greeks and Phoenicians, possibly representing Phoenicians visiting Greek sanctuaries or the Greek adaptation of Near Eastern imagery for their dedication to Greek deities. Coastal sanctuaries like Ialysos, Lindos, and Kamiros would have been vital nodes of interaction and trade during the 7th century BCE, so dedicatory practices at these places may have been inspired or carried out by non-Greeks. Additionally, truncheon or rod pendants, whose form is thought to originate in the Levant (see § 4.6.8), were found at both the Kamiros well and Lindos. While truncheon or rod pendants were found in greater numbers at sites like Perachora and Ephesus, their presence on Rhodes during this period suggests that the island may have been where they were first introduced to Greeks. While

[425] Specifically the prevalence of the Phoenician mushroom-lipped jug, see Coldstream 1969; Bourogiannis 2013.

[426] Bourogiannis 2013, 161.

[427] Sherratt and Sherratt 1993, 370.

[428] Antonis Kotsonas is generally skeptical of the Phoenician origins of most ceramic material found in Aegean contexts outside of Kommos, calling examples from Karabournaki "φοινικικό τύπο" (Phoenician-type). However, he affirms that small concentrations have been found at Ialysos and Miletus; Kotsonas 2012, 238, see note 1620.

ivory is often looked at as a material ripe for expressions of stylistic or cultural hybridity due to its long history in the Near East, bone objects like female figurines, distaffs, and truncheon/rod pendants have the same potential to demonstrate the effects of intensified interaction between Greeks and non-Greeks on Rhodes during the 7th century BCE.

4.5.1 Lindos (113 Objects)

The assemblage at Lindos includes many kinds of objects found in other sanctuaries, such as spectacle fibulae, flute pieces, and truncheon or rod pendants. However, Lindos contained only a single seal (circular), and no miniature double axes or recumbent animals. The majority of the objects are bone, and many of the ivory objects seem to be imported.[429] Compared to the Kamiros assemblage, Lindos has slightly fewer examples of ivory, although they make up a larger proportion of the total finds. The Lindos assemblage also contained 23 objects that are likely spindle whorls (all identified as bone),[430] along with four objects thought to be distaffs or spindles (also identified as bone).[431] In her study of Near Eastern and Aegean spinning tools from the Late Bronze and Early Iron Ages, Caroline Sauvage identifies a series of spinning tools with comparable decoration found across the Near East. She sees strong parallels for the Lindos tools among Near Eastern examples, writing that "the Lindos 'distaff' is strongly reminiscent of the Ugarit and Delos spinning kits, and this object could therefore be either a distaff or an Iron Age spinning kit."[432] Contrary to Christian Blinkenberg, Caroline Sauvage identifies these tools as either ivory or bone/ivory, but she does not specify why she makes this classification.[433] The combination of the spindle whorls and the distaffs or spindles indicates that a significant portion of the worked animal objects was related to spinning, demonstrating a marked focus on these crafts within the dedicatory

---

429 Blinkenberg 1931, 149–50, 212, nos. 419–21, 684, pl. 16.

430 Blinkenberg 1931, 141–43, nos. 383–403, pl. 14.

431 Blinkenberg 1931, 135, nos. 333–36, pl. 13.

432 Sauvage 2014, 215.

433 Sauvage 2014, 214–15.

assemblage, further illustrating the use of worked animal materials for dedicated textile tools (see § 4.3.1). However, as Sauvage demonstrates, the spindles or distaffs are stylistically rooted in older, Near Eastern traditions. The Lindos assemblage adds to the evidence for Greeks on Rhodes co-opting Near Eastern material culture and integrating it into their own religious practices.

4.5.2 The Kamiros Well and Acropolis (219+ Objects)

The Kamiros well contained a unique assemblage of worked bone and ivory objects, comprising a major part of a votive collection originally dedicated at the Kamiros acropolis sanctuary.[434] Other objects in this assemblage include bronze votive figures, bronze rings, faïence figurines, gold jewelry, stone loom weights, as well as beads made from various materials.[435] Salmon writes that a date range of 720–580 BCE would "account for [the] whole spectrum of datable votives" in the Kamiros well.[436] Despite the geographic proximity between the Kamiros acropolis and Lindos, there is no significant overlap between the assemblages. The Kamiros well assemblage contains no spectacle fibulae, spindles/distaffs, or spindle whorls. Additionally, the Lindos assemblage exhibits none of the carvings of women or images inspired by "Woman at the Window" scenes found in the Kamiros well and at Ialysos. While there was evidence at both Lindos and the Kamiros well for the fish pendants and rectangular sections of bone (see below), the worked assemblages are significantly different from one another. However, both the spindles/distaffs from Lindos, as well as the carvings of women at the Kamiros well rely on Near Eastern ideas and styles. Moreover, both Lindos and Kamiros contained the truncheon or rod pendants, objects whose best comparanda comes from contemporary examples in the Levant (see § 4.6.8). Despite differences

434 Salmon (2019, 138–40) notes that the bone and ivory objects number 174 of the 444 objects that were recovered in the well deposit (this appears to fall short of the total number of objects excavated there, based on my direct study of them in the British Museum).

435 Salmon 2019, 141–42.

436 Salmon 2019, 143.

between these assemblages, they both illustrate how Rhodes became increasingly connected to western Anatolia, the Levant, and the Near East.

4.5.3 The Sanctuary of Athena at Ialysos (14 objects+)

The sanctuary at Ialysos contained over 5,000 objects, making it the largest votive assemblage on Rhodes. However, the excavations of the 1920s left behind few records, and many of the objects were found in mixed deposits south and west of the Hellenistic temple.[437] The pottery in deposits associated with the sanctuary of Athena dates to the middle of the 8th century BCE at its earliest, and the end of the 6th century BCE at the latest.[438] No comprehensive study of the worked animal materials has been made beyond an article focusing on 14 bone and ivory objects with connections to the Near East.[439] However, in a separate article, Marina Martelli mentions that multiple spectacle fibulae were found,[440] as well as pendants, sleeves, styli, and flute pieces.[441] The objects with external influences appear to be a mixture of imports and Greek interpretations of Near Eastern motifs. Carvings of nude women found at the site strongly parallel the examples from the Kamiros well, indicating that these figurines are a distinctly Rhodian practice that borrows and appropriates iconographic traditions from the Near East. While the limited publication of the finds from Ialysos makes its comparison to other sanctuaries difficult, a recumbent animal found at the site suggests that common 7th-century BCE worked animal dedications also took place at the site. Perhaps the sleeves mentioned by Martelli are similar to those distinctly Rhodian worked bone shafts found at both Lindos and the Kamiros well (see § 4.5.4).

---

437 Martelli 1988, 104.

438 Martelli 1988, 105.

439 Martelli 2000.

440 Martelli 1988, 108–9.

441 Martelli 1988, 113.

4.5.4 Shared Material Practices within the Rhodian Assemblages

Worked Bone Shafts at the Kamiros Well and Lindos

One of the most distinct practices involving worked animal objects at Rhodes was the dedication of quadrangular sections of worked bone that were decorated with incised circles; evidence for this practice was found primarily at the Kamiros well, but also at Lindos. Beyond Lindos and Kamiros, the only other examples of strong parallels for these objects come from outside the Greek world.[442] The Kamiros well contained the majority of these objects, with 59 worked and decorated bone shafts primarily made from the metapodials of sheep or goat, although some may also have been made from long bones of other animals.[443] Craftspeople removed the proximal and distal ends, and then shaped each of the faces of the bone (posterior, anterior, medial, and lateral aspects) to create a rectangular profile. Generally the posterior and anterior sides resulted in a wider rectangular surface than those made from the medial and lateral sides. Based on differences in production choices and motifs, these objects were assigned to several groups. Some of these groups are so homogeneous in style and production techniques that they appear to be made using the same tool or by the same individual or workshop (Group 3). Others, like Group 1, are unified by design choices, but seem to be made by individuals with varying degrees of skill; the groups seem to indicate several technical approaches toward the creation of similar objects.

Group 1: The largest group (29 objects) is also the most heterogeneous, and exhibits some of the widest range in the abilities of craftspeople creating incised circles using the compass technique. This group contains shafts decorated with single columns of a ring-and-

442 Excavations of the Hochdorf Tumulus in Baden-Württemberg, Germany (dated to the late 6$^{\text{th}}$ century BCE) contained identical examples of these objects (Biel 1987, 176–77, no. 91, fig. 233), as well as other objects thought to be produced in Greece or strongly influenced by Greek workshop practices, including a cauldron decorated with bronze lions (Biel 1987, 178). The connection between the Hochdorf Tumulus and the Greek world strengthens the idea that these worked bone shafts found there originated in Rhodes.

443 One example is rounder and exhibits a foramen that is suggestive of a long bone like a humerus. British Museum accession number: 1864,1007.578

dot motif, most of which have two rings. However, some of these objects have ring-and-dot motifs with several rings (i.e., a "bullseye") or just a single ring.[444] Several of the examples in this group are neat and well designed, indicative that the creator had experience with the use of a compass tool (see fig. 4.25). However, some examples exhibit uneven ring-and-dot motifs, indicating that the creators struggled to create circles using a compass tool, or did not use one at all. One of the examples showing poorly incised ring-and-dot motifs also shows conspicuous saw marks on the surface of the bone, indicating a more inexpert approach to preparing the object (British Museum accession number: 1864,1007.534. See fig. 4.26). While a consistent (and simple) motif unifies these objects, the vastly different production choices (e.g., whether or not the producer used a compass tool) is strong evidence that this group of objects was the result of work by several different individuals. It is possible untrained individuals were responsible for creating their own dedications.

Group 2 (fig. 4.27.): Eight examples of these worked shafts are separated from the others based on their reliance on a guilloche motif. The motif may appear on multiple sides, and is often a single, interconnected pattern that spans the length of the bone. While these objects may also have other motifs, the lengthy, interconnected guilloche distinguishes these from objects with other motifs; they are also generally neater.[445]

Group 3 (fig. 4.28): Five worked shafts are shorter than the rest, and are marked by a double ring-and-dot motif that was deeply incised into the bone. Most of the ring-and-dot motifs are arranged in a pattern of two columns, and no other motifs appear on these shafts. The ring-and-dot motifs on these objects are neater than others in the assemblage, are strongly polished, and are all of the same dimensions. The similarities among these

[444] British Museum accession numbers: 1864,1007.554, 1864,1007.551, 1864,1007.568, 1864,1007.549, 1864,1007.570, 1864,1007.541, 1864,1007.558, 1864,1007.580, 1864,1007.567, 1864,1007.581, 1864,1007.542, 1864,1007.543, 1864,1007.544, 1864,1007.546, 1864,1007.565, 1864,1007.559, 1864,1007.563, 1864,1007.560, 1864,1007.605, 1864,1007.577, 1864,1007.561, 1864,1007.548, 1864,1007.547, 1864,1007.534, 1864,1007.550, 1864,1007.532, 1864,1007.533, 1864,1007.530, 1864,1007.531.

[445] British Museum accession numbers: 1864,1007.564, 1864,1007.562, 1864,1007.536, 1864,1007.540, 1864,1007.552, 1864,1007.574, 1864,1007.576, 1864,1007.582.

objects suggest they may have been made together, using the same fixed tool.[446]

Group 4 (fig. 4.29): Three examples show a specific pattern of two single ring-and-dot motifs arranged in a row, followed by three or four double ring-and-dot motifs in a column on the posterior or anterior face. Each show only one of the medial or lateral sides is decorated with a column of double ring-and-dot motifs, while the other is blank. The other posterior or anterior face may be decorated in the same way. Each of these examples has an even, rectangular profile and a flat surface. The neatness of the patterns, combined with the regularity with which the bone was shaped, suggests a more skilled hand.[447]

Other Worked Shafts: Nine objects do not fit into any specific group, but show experimentation with design.[448] Two examples show circular patterns that extend over multiple sides, giving the object a lively, almost animated appearance and are also the most similar to the carved shaft bones found at Lindos (see fig. 4.30). Some of these objects are expertly designed, but their distinct and unique approaches defy classification. Finally, several of the bone shafts are also undecorated[449] or are only decorated with incised lines (see fig. 4.31).[450]

While Salmon suggests several other possible purposes for these objects (e.g., gaming pieces or jewelry), his argument that they may be votives presents the most likely possibility.[451] The only other comparable examples of these objects in the Greek world come from the sanctuary of Athena Lindia (also on Rhodes), suggesting that these objects functioned as votives as a component of a dedicatory practice specific to Rhodes. The uniformity of

446 British Museum accession numbers: 1864,1007.571, 1864,1007.556, 1864,1007.553, 1864,1007.565, 1864,1007.566.

447 British Museum accession numbers: 1864,1007.535, 1864,1007.575, 1864,1007.579

448 British Museum accession numbers: 1864,1007.573, 1864,1007.572, 1864,1007.545, 1864,1007.538, 1864,1007.578, 1864,1007.585, 1864,1007.537, 1864,1007.569, 1864,1007.557

449 British Museum accession numbers: 1864,1007.588, 1864,1007.587, 1864,1007.583, 1864,1007.616, 1864,1007.597, 1864,1007.599.

450 British Museum accession number: 1864,1007.539.

451 Salmon 2019, 158.

the Rhodian examples indicates a consistent and patterned practice, in which individuals targeted a specific bone from a sheep or goat, and then prepared it for dedication. While these bones are designed and have been transformed into something changed, they are not a representation or skeuomorph of some other object. Instead, the material and design are intimately bound to create something new, yet recognizably animal. Two of these objects show traces of burning, one of which is strongly localized to one end of the object.[452] Salmon highlights the fact that the bone objects were the only ones within the Kamiros well assemblage to show burn marks, which he says may "result from intentional charring, as the object is held at one end by the dedicant and pointed towards the fire at the other."[453] These instances of intentional charring suggest that the dedications of bone objects at the Kamiros well were an element of other dedicatory practices.

As craftspeople with different skill levels were seemingly responsible for the worked bone shafts, the act of creating these objects was likely open to a wide array of individuals. These worked bone shafts, especially the examples showing less aptitude for production techniques, may represent offerings made by non-wealthy individuals. Kyrieleis suggests a similar phenomenon at Samos, where a variety of objects thought to be simpler or of lesser quality were discovered (see § 4.3.7). Many of the shafts showing different skill levels were made in the same styles, indicating that the craftspeople were making the same types of objects. As a result, the variation within these objects may only have been perceived as a result of the skill of the craftsperson, rather than an indication of their value. Even the nicest examples may have been understood as having a lower value than objects made from metal, faïence, or ivory. Instead, these objects likely drew their value from their animal origins. While these shafts do not have the inherent (i.e., commercial or commodity) value of metals, their connection to the animal gives them a different kind of value within the sphere

452 British Museum accession numbers: 1864,1007.585, 1864,1007.608.

453 One of the other objects to show burning was one of the carvings of a naked woman. Salmon 2019, 150; Smith 1908, 179, no. 5, pl. 30, 16.

of religious dedication. This value may be drawn from a conception of the materiality of animal bodies which allows worked bone to retain active power. Drawing on the alternative ideas of partible bodies (see § 2.1.2), the worked shafts from Rhodes may have represented active, ongoing aspects of an animal body. As a potentially partible aspect of the animal's body, the votive offering may signify more than the object itself. Breaking apart the body of the animal may not have ended its animalhood, nor rendered it inert or inactive. Instead, such worked shafts may have offered a way to dedicate an aspect of the animal without the whole of its body.

The variation seen within these worked bone shafts also offers a way to think about technical choices and the social environment of production surrounding the creation of these objects. A schematization of the production of these bone shafts demonstrates that there was a range of different combinations of technical choices leading to their creation (see fig. 4.32): Individuals chose between types of bones (e.g., a long bone or a metapodial), shaped the material differently, and made several choices about its decoration. These many separate paths to the creation of a worked bone shaft provide strong evidence that they were made by several groups of individuals, in different social arrangements. These different environments would have had implications for the technical decisions and design choices present in the worked bone shafts. While the schematic, a *chaîne opératoire* of the technical process, indicates that these objects were made in several ways, it says nothing about the social context. This is a central criticism by Dobres of *chaîne opératoire* studies; she writes:

> [F]or all their detail, the pictorial diagrams representing ancient operational work chains typically fail to provide any sense of the interactive social milieu in which certain sequential technical operations did (or did not) occur [...]. Yet this combined material, social, and embodied context is the only way to understand the dialectical unfolding of technique and technician in prehistory.[454]

Several interconnected factors surrounding the production of these shafts help to place them within their "material, social, and embodied" contexts. However, Dobres cautions

[454] Dobres 2000, 175–76.

against “shredding the web to understand its inner workings,” and she argues that “ferreting out and affixing boundaries around the material, social, and symbolic ‘sides’ of technology creates in its wake a false object of study: material things, separated from the agents who work and transform them.”[455] This approach demands viewing the social, animal, and religious aspects of these objects as essentially inextricable. As a result, the changing dynamic between human and animal bodies that renders bone into votive is simultaneously social, religious, and fundamentally tactile, a Maussian “total social fact” (see § 2.3). To understand worked animal objects properly, the social context also needs to include the non-human world; animals, lively animal bodies, and humans are all acting as agents during these processes (see § 2.3.1). The technical choices as outlined in figure 4.32 are not disembodied actions separate from their social context; rather, they are a locus for negotiation and redefinition of the environment in which they are enacted.[456]

The structure of Greek dedicatory practice provided a space for objects to be in dialogue with one another; individuals made dedications in a public location, allowing others to imitate, challenge, or reify the aptness of the object or its design with their own items. The worked bone shafts are especially “in dialogue” with one another because so many were dedicated and they relied on a series of related, but differing technical and stylistic choices. This “conversation” can be interpreted as many individuals negotiating proper ways of making these objects. The technical practice of creating the object is also a negotiation, and the animality of the material is inherently a component of this process. One of the technical steps that differentiate the worked shafts from one another is the degree to which the producer altered the shape of the bone. The schematic delineates this part of the process into three choices: retain the natural shape of the bone; cut sides to create a rectangular profile, or cut sides to a defined edge (see fig. 4.32). This represents a technical choice, as well as an enactment of the relationship between the producer and the animal material. During

455 Dobres 2000, 98.

456 Dobres 2000, 100.

this step, the producer chooses to what extent they interact with and alter the once-living material, resulting in an object which may or may not become divorced from its original shape. The question of how one makes a worked bone shaft for dedication at Kamiros or Lindos is being mediated by the craftsperson, the animal aspects of the material (the organic structure of the bone), and the ontological status of the bone as a partible aspect of an animal body. While the *chaîne opératoire* only reveals technical choices, those options reflect deeply entrenched, wholly inextricable, aspects of public dedication (i.e., how a worked shaft bone should appear when dedicated); the body knowledge guiding the craftsperson (i.e., how the individual embodies tactile knowledge about how that bone feels and reacts), as well as the animality of the material (i.e., what it means to interact with that material as an element of a once-living animal).

Fish Pendants

Another practice seemingly distinct to Rhodes and other nearby islands was the creation of pendants in the shape of fish, found at both Lindos and the Kamiros acropolis (see fig. 4.33). While these pendants are different sizes, they are all thin, generally resemble fish (they often exhibit a "tail fin" at the bottom), and most have a piercing or suspension hole. At least four were found at Lindos, while three were found on the Kamiros acropolis. The examples from Kamiros are partially burnt, which Salmon believes to be the result of deliberate practices, rather than the product of a fire on the acropolis.[457] Another similar flat pendant, possibly intended to represent a fish, was found in a grave in the Seraglio cemetery on Kos.[458] Smaller fishlike pendants were also found at Lindos[459] and the Kamiros well.[460] Additionally, three similar small pendants were found in another grave in the Seraglio

[457] Salmon 2019, 150.

[458] Tomb 23; Morricone 1978, 173, fig. 312.

[459] Blinkenberg 1931, 102, no. 213, pl. 10.

[460] British Museum accession numbers: 1864,1007.638, 1864,1007.639, 1864,1007.664.

cemetery (see fig. 4.34)[461] The fish pendants may be an element of a larger form of worked animal material dedication occurring on Rhodes and nearby Kos, as there were other flat pendants, similar in appearance, found on both islands. A comparable flat pendant also was found in another grave at Ialysos on Rhodes, and the excavator L. Laurenzi thought it resembled a dagger, as well as the fish pendants found at Lindos.[462] The Kamiros well contained several small, flat objects in bone, many of which resembled spearheads or another type of weaponry. While some of them lack a suspension hole,[463] a number are pierced like the fish pendants (see figs. 4.35 and 4.36).[464] The difference between the smaller fish pendants and "spearhead" pendants is not always clear, and these may be all the same type of object. Another flat pendant found in the Kamiros well also may well be imitating an animal-tooth pendant, as it resembles the tooth of a bear (or some other large carnivore); the creation of animal-tooth pendants is fairly well attested during the Early Iron Age and Archaic periods (see § 5.4). Regional objects like the fish and other flat pendants of Rhodes and Kos illustrate how the general patterns of worked animal material dedications are made up of a constellation of related practices and local customs, which do not necessarily accord with those on the mainland. Instead, the Rhodian objects illustrate that the customs of worked animal material dedication were not uniform across the Greek world.

Depictions of Women Influenced by Near Eastern Traditions

Table: 4.5

Figures: 4.37, 4.38, 4.39, 4.40, 4.41, 4.42, 4.43, 4.44, 4.45, 4.46, 4.47, 4.48, 4.49, 4.50

The sanctuaries of Kamiros and Ialysos contained depictions of female figures that were influenced by Near Eastern and Levantine works. Few of these objects appear to be copying specific compositions; rather, they are Greek interpretations of motifs that were common in

[461] Tomb 63; Morricone 1978, 255, fig. 550.

[462] Laurenzi 1936, 164, no. 16, fig. 150.

[463] British Museum accession numbers: 1864,1007.686, 1864,1007.637.

[464] British Museum accession numbers: 1864,1007.654, 1864,1007.655, 1864,1007.672, 1864,1007.681.

the Levantine ivories and other media. One of these motifs, the "Woman at the Window" scene, appears to have had a degree of influence on Greeks in Rhodes. Winter describes ivories using the "Woman at the Window" scene, writing that "the plaques maintain a relatively consistent format, with their frames surrounding the frontal female. Often characterized by tenons evident at top and bottom, they were clearly intended to have been inserted into (wood) furniture."[465] In her study of the ivories from Room SW 37 at Fort Shalmaneser, Georgina Herrmann describes those examples as "[varying] considerably in fixing technique and detail."[466] In subsequent publications, "Woman at the Window" scenes have been categorized as coming from multiple workshops, effectively spanning the "Syrian," "Phoenician," and "Intermediate" style divide.[467] While Winter questions the attribution of the North Syrian examples, she argues that the widely shared nature of the motif meant it was "recognizable throughout the Levant—that is, Israel, Phoenicia, and at least some of the states of Syria—and [it] *did* have cross-regional meaning for contemporary viewers."[468] The widespread appeal and use of the motif likely contributed to its transportation from the Levant, and subsequent reinterpretation by craftspeople on Rhodes.

The influence of the "Woman at the Window" scene is most evident in an ivory plaque found at Ialysos, which depicts only a window (but no woman). With its outer border and ornate balusters in the form of Papyrus plants, this plaque strongly resembles other Near Eastern models; Martelli classifies it as a Phoenician piece with parallels from Fort Shalmaneser and Arslan Tash.[469] Other Rhodian objects from the Kamiros well seem to evoke just the female figure from the "Woman at the Window" scene, and none are a perfect

[465] Winter 2016, 180.

[466] Herrmann 1986, 13.

[467] Herrmann, Laidlaw, and Coffey 2009, 154; Gansell, Meent, Zairis, and Wiggins 2014, 18; Rehm 2003; Suter 1992; however, there is some disagreement about this, as Wicke (2009, 262–63) argues that when the "Woman at the Window" motif is depicted in ivory, it is limited to southern Syrian works.

[468] Winter 2016, 180–1.

[469] Martelli 2000, 106.

analog for any specific example of this motif. Like the Near Eastern scenes, these objects (two complete examples and at least one broken example) show a frontal view of a woman's face rendered in a rectangular setting. The Greek examples show the woman wearing a *polos,* with hair framing the face on either side. However, most of the examples from the Kamiros well have designs on the reverse, indicating that they would not have been affixed to furniture like the Near Eastern examples. The designs on the back suggest the carvings from Kamiros were a conceptually different object, and did not carry the same meanings as the Levantine examples. The connection between the Kamiros objects and the "Woman at the Window" scene is fairly tenuous, although the window plaque from Ialysos suggests that this motif may have been transported to Rhodes at the time the objects from the Kamiros well were created. These depictions of women from the Kamiros well speak to the degree to which Greek craftspeople were adapting and changing Near Eastern motifs, rather than copying them outright. Additionally, these pieces demonstrate another style of ivory carving that has little, if any, comparanda in the rest of the Greek world. Like the carving of a woman from Thasos or the statuette of a rider from Chios, the Kamiros pieces are evidence for another regional practice of ivory carving that appears to have remained localized.

In addition to carvings that were inspired by the "Woman at the Window" motif, the sites of Kamiros and Ialysos also produced several carvings of nude women wearing a *polos.* Some of these objects are carved in the round, while others have a flat back or are part of a plaque; at least one example from Ialysos was suspended as a pendant. Three examples (two from Ialysos and one from Kamiros) show two female figures shoulder to shoulder, while one figure from Kamiros is janiform. Like the earlier Dipylon statuettes, and the janiform statuettes found in the Idaean Cave and Knossos North Cemetery, these depictions of nude women are part of a tradition with roots in the Near East. Böhm argues that the objects from Rhodes (among other Greek examples) are based on North Syrian works, but should not be thought of as copied from specific models, as their artistic language is particularly

Greek.[470] In examining the prevalence of these figures in Greece, Böhm argues that a naked goddess is incommensurate with early descriptions of Greek divinity, and cannot be linked to a specific goddess like Aphrodite before the Classical period.[471] Instead, Böhm asks whether these figures bring any of their original meanings with them into their new Greek contexts. She writes that, especially in the case of ivories, "es ist wahrscheinlicher, daß die griechischen Elfenbeinfiguren nur noch die Bedeutung eines säkularisierten Motivs hatten, mit dem man bei mangelnden Hintergrundkenntnissen lediglich die erotische Sphäre assoziierte."[472] She also emphasizes that objects like the Dipylon ivories and the Knossos fan handle were used as grave goods meant to highlight the exotic material as a marker of wealth; the use of such objects in this manner suggests they are divorced from their original meanings.

However, many of the Rhodian examples are more modest objects made from bone; they likely were not perceived in the same way as imported ivory figures or high-value imitations. These other depictions of nude women within the Greek corpus (e.g., the Dipylon ivories, the Knossos fan handle, the spoon from Lindos) were either elements or models of elements of other types of objects (e.g., parts of furniture). The Rhodian figures from Ialysos and Kamiros differ, as they appear to be distinct items. Additionally, most are smaller, more modest bone objects; it is unlikely that these figures were dedicated for their perceived value or exoticism. Instead, they were part of the same religious ethos that resulted in individuals dedicating animal objects at Kamiros, Ialysos, and Lindos. Böhm's view that the nude goddess archetype does not have a clear Greek equivalent remains a difficulty for interpreting these objects within Greek contexts. Yet the Rhodian examples were made in a region of consistent interaction between Greeks and Phoenicians. Rhodes was an environment rich with the potential for such objects to have been used by Phoenicians, or Greeks with some

---

[470] Böhm 1990, 70.

[471] Böhm 1990, 126.

[472] Böhm 1990, 136; translation: it is more likely, that the Greek ivory figures now only had the meaning of a secularized motif, which, lacking background knowledge, one only associated with the erotic sphere.

understanding of these depictions of nude women as non-secular beings. The use of these objects on Rhodes leaves open the possibility that individuals who cannot be easily classified as "Greek," "non-Greek," or "Phoenician" were making dedications in Greek religious spaces. At Ialysos, high numbers of imports suggest a degree of integration among Phoenicians, Greeks, and Cypriots. More compelling evidence for this interaction comes from a late 7th-century BCE grave containing ceramic body sherds exhibiting graffiti in both Phoenician and Greek; Matteo D'Acunto describes the inscription:

> [T]he word "*kd*", which means "the container" (also known in Greek as κάδος), is preserved. Another body fragment from the same tomb and certainly the same vase has a partially preserved Greek inscription with the usual formula of possession of the vase - […]νος ἠμί - thus suggesting the tempting hypothesis that this was a true bilingual inscription in Phoenician and in Greek.[473]

D'Acunto draws attention to this grave to indicate that Ialysos was a place where the Greeks and individuals from the eastern Mediterranean entered into close relationships, some of which may have been the product of immigration.[474]

The specific regional and social contexts present on Rhodes require an interpretation of the depictions of nude women that allows for a view of their deposition as a product of multicultural interaction. Rather than interpreting the Rhodian examples as part of the same phenomenon that resulted in Greeks co-opting Near Eastern iconography, such as is argued in the case of the Dipylon ivories, these objects may have been a result of specific social relationships on Rhodes. Such dedications might have been the result of Cypriots, Phoenicians, and Greeks enacting some religious practice that did not require an exact association between the nude woman and a specific Greek goddess. Instead of a Greek adaptation of a Near Eastern motif, these objects may have been a non-Greek approach to dedication using a small, worked animal object, like those deposited in sanctuaries across Rhodes.

[473] D'Acunto 2017, 465.

[474] D'Acunto 2017, 465.

4.6 Distinct Classes of Worked Animal Objects

The following items are highlighted because they are specific forms of objects represented in multiple sanctuaries; most were found in large numbers at least one site. Sanctuary assemblages may contain many shared object types that are more general (e.g., a bead or a pin), but the objects listed below only represent those with strong stylistic cohesion. Objects of a more general type, but whose form differs among sanctuaries, are not listed below. This approach focuses on only strongly comparable objects, but it risks ignoring potentially shared aspects of dedicatory practice that were expressed with different kinds of objects. For example, there may be specific and shared meanings underlying the dedications of stylistically dissimilar combs across sanctuaries. The reverse argument may also be true; objects of the same type and style may have expressed different meanings depending on where they were dedicated. The recumbent animals found in large numbers in the sanctuary of Artemis Orthia may have contextually specific meanings that were not shared when the same type of object was dedicated at the sanctuary to Athena at Ialysos. Furthermore, some of the best evidence for the engagement between humans and animal materials does not come from wide-ranging and shared practices. Instead, repeated forms of dedications specific to an individual sanctuary or region speak to practices that enmesh humans and animals within their communities. Regardless, the following categories represent specific objects which were rarely used as grave goods, but were common in sanctuary assemblages. As a result of their distinct attributes and distribution, these items represent aspects of a shared dedicatory practice that began at the end of the 8^{th} century BCE at the very earliest and reached its height in the 7^{th} century BCE.

4.6.1 Seals

Seals and sealing practices were not new to the Iron Age, as evidence for their use dates to the Early Helladic and Early Minoan periods; ivory seals were also a common aspect of Bronze Age Material culture.[475] Atypical ivory seals from a late 9^{th}-century BCE tomb in Athens ("The Tomb of the Rich Athenian Lady") are evidence that this type of object continued to be crafted in ivory during the Early Iron Age. Seals from the 7^{th} century BCE found in multiple votive contexts take on several forms, and many feature shared motifs. Boardman argues that seals were used primarily for decoration rather than to create actual impressions. However, one fired sealing was found at Perachora, which Boardman sees as a "cheap dedication," "the offering of a seal engraver," or perhaps the result of an individual making an impression from a personal seal to "guarantee or ensure its effective use."[476] Microscopic study of one of the circular seals from the sanctuary of Artemis Orthia revealed a drill hole with use wear, suggesting that it was suspended for an extended period. Stubbings reports similar traces of wear, as well as evidence for repairs on the examples from Perachora.[477]

Circular Seal

Sites: The sanctuary of Hera Limenia at Perachora (98), The sanctuary of Artemis Orthia at Sparta (89), The Argive Heraion (15), Kythnos (15), The sanctuary of Athena Alea at Tegea (7), Aetos (Ithaca) (4), Olympia (2), The Harbour sanctuary at Emporio (Chios) (1), The Archaic Artemision at Ephesus (1), Kastro Hill on Siphnos (1), The sanctuary of Athena Lindia (Lindos, Rhodes) (1)

Figs. 4.51, 4.52, and 4.53

Sources: Table 4.6

Circular seals represent one of the most widespread offerings in animal materials in early Greece, with major collections of these objects found at the sanctuary of Artemis Orthia, the sanctuary of Hera Limenia at Perachora, and the Argive Heraion. Owing to the geographic proximity of Perachora and the Argive Heraion, the seals from those two

---

475 Boardman 1970, 21–22.

476 Boardman 1970, 114.

477 Stubbings 1940, 411.

sites are generally similar. The examples from Sparta are recognizably different; most are made from bone and show simpler, more rudimentary designs. Comparing the two groups of seals, Stubbings writes that "the Spartan seals have the undigested conventions of their oriental prototypes still clinging to them, and appear grotesque and hasty, while the best of those from Perachora are alive and carefully finished and thoroughly Greek."[478] Additionally, Stubbings considers the Perachora examples more uniform, and "do not vary enough in style to suggest a variety of traditions."[479] As a result, Stubbings highlights two examples among the Perachora assemblage that he believes to be Spartan, as well as arguing that certain seals from Olympia, Delphi,[480] and the Argive Heraion were all from the same workshop.[481] In addition to these seals from Perachora, Olympia, Delphi, and the Argive Heraion, seven circular seals from Kythnos also appear to be a product of the same community of practice responsible for the seals from those sites (see § 4.3.3 above).

In his study of the circular seals at the sanctuary of Artemis Orthia, Dawkins further breaks down the category into the following classes: "circular seals with a central attachment" (Class 2); "bone disc-seals drilled across a diameter, sides chamfered" (Class 3), a similar set of seals but with no chamfer and are "merely bone discs drilled across a diameter" (Class 4).[482] Based on Dawkins' publication, as well as a direct study of unpublished examples of seals in the Ashmolean, Fitzwilliam, and British Museums, there are at least 89 circular seals from the sanctuary of Artemis Orthia; however, this is likely a conservative estimate (see table 4.7). Based on Dawkins' publication and the objects within the museums, bone appears to be the dominant choice of material.[483] Stubbings reports that over 100 bone

---

[478] Stubbings 1940, 411.

[479] Stubbings 1940, 411.

[480] Stubbings (1940, 411) does not provide a reference for the example from Delphi, but describes it as an "isolated" find.

[481] Stubbings 1940, 411.

[482] Dawkins 1929a, 229–30.

[483] Dawkins only identifies seven seals as ivory, but there may be more.

and ivory seals were found at the sanctuary of Hera Limenia at Perachora, most of which were circular. In contrast to the sanctuary of Artemis Orthia, many of the circular seals at Perachora were ivory; at least 53 examples were either listed as ivory, or the photograph shows unequivocal evidence for the use of the material. Several seals show a high degree of pitting, resembling the tight cancellous structure of the interior of antler.[484] While Stubbings classifies these as bone, they may have been carved from antler, which would be a material choice unique to Perachora.

Four-sided Seal

Sites: The sanctuary of Artemis Orthia at Sparta (25), The Argive Heraion (2), Aetos on Ithaca (1), The sanctuary of Hera Limenia at Perachora (1)

Figs. 4.54 and 4.55

Sources: Table 4.8

These seals are made from the shaft of a bone that was cut into four oval-shaped faces. Each side was decorated, usually with images of animals, human faces, or mythological creatures. The majority of these seals were found at the sanctuary of Artemis Orthia, and limited numbers (two or fewer) were found at other sanctuaries. The repertoire of images and decoration is similar to the circular seals also found at the sanctuary of Artemis Orthia, although sometimes the carving appears more skilled among the four-sided seals. The form of this seal has Bronze Age Minoan precedents (referred to as "Giebelprisma"), but they significantly predate the Archaic examples and are made from bone and ivory. An ivory seal from Agia Triada shows remarkable similarity to many of the examples from the sanctuary of Artemis Orthia.[485] Other examples, including the Archanes seal, show similar oval faces.[486] It is difficult to establish whether the Minoan examples were actually an influence on the later Archaic seals. Boardman writes that "in Minoan glyptic, as we have seen, animal

484 Stubbings 1940, 413–20, nos. A26, A35, A40, A45, A48, pls. 175, 177, 178.

485 Mosso 1907, 249, fig. 117a.

486 Platon 1969, 144–45, no. 126; 457–62, no. 391; Pini, Platon, and Salies 1977, 473, no. 310.

seals, discs, and three- or four-sided seals were known in ivory, and on stone prisms there appear ostrich-like birds and S-patterns very like those on the Archaic ivories. If there is any connection it should be through the handling of Cretan seals of the types mentioned, and these could not have come by locally."[487] However, none of the four-sided archaic seals have been found on Crete, and they seem to be localized around Sparta.

Feline Head Seal

Sites: The sanctuary of Artemis Orthia at Sparta (1), Ephesus (1)

Sources: Table 4.8

While only two examples of these seals are known, they are remarkably similar. Both feature felines with a triangular face, which are not wholly dissimilar to some recumbent animals. The intaglio on the example from the sanctuary of Artemis Orthia features three birds, while the intaglio on the seal from Ephesus shows a rider; both examples are pierced with a drill hole.[488]

"Little Lion Seals"

Sites: The sacrificial area north of the sanctuary of Apollo Daphnephoros at Eretria (5), The Kamiros well (Rhodes) (2), Aetos, Ithaca (1), Delos (1), Kato Phana (Chios) (1), The Harbour sanctuary at Emporio (Chios) (1), Grave at Lefkandi (1), Tachi (Ancient Potniai, Boeotia) (1), Kamylovryssi Paralimnis (Boeotia) (1)

Figs. 4.56

Sources: Table 4.8

These seals are carved in the form of a small, crouching lion. Their intaglio often shows a rough rendering of a quadruped, which is sometimes winged.[489] Carter posits that these seals "form a closely coherent group and were most likely made in one place and within a

487 Boardman 1970, 117.

488 Dawkins 1929a, 240, pl. 168, 6; Smith 1908, 168, no. 40, pl. 27, 4.

489 Huber and Poplin 2009, 630.

relatively short period of time."[490] Furthermore, she dates them to the late 8th century BCE and argues that their distribution was the result of interaction between Euboea and the Cyclades at the end of the Geometric period (see fig. 4.57). Based on subsequent analysis of all known examples, Sandrine Huber and François Poplin date these seals to around 700 BCE, and believe them to have been created "aux confins entre le monde oriental, dont il emprunte les modèles, et le monde grec insulaire."[491] Their study also confirmed that every known example is bone rather than ivory.

At least one of the "Little Lion Seals" was found in a grave, differentiating this category from most other types of objects which are exclusive to sanctuaries. Yet the "Little Lion Seals" are also one of the earliest classes of worked animal objects that can be dated more definitively to the end of the 8th century BCE. The example found in a burial at Lefkandi might indicate that the divide between grave good and dedication was not as firmly established prior to the 7th century BCE. This type of item may well be one of the first worked animal objects of the Early Iron Age to achieve widespread popularity across Greece, making it one of the forerunners of the phenomenon of worked animal object dedication.

Anthropomorphic Seals

Sites: Zagora (1), The sacrificial area north of the sanctuary of Apollo Daphnephoros at Eretria (1)

Sources: Table 4.8

These two seals show a carved man within a rectangular border. Based on their distribution and decoration the seals are thought to be made by the same workshop producing the "Little Lion Seals," also around 700 BCE.[492]

---

[490] Carter 1985, 67.

[491] Huber and Poplin (2009, 632); translation: Of the confines between the Eastern world, from which borrows the model, and the world of the Greek islands.

[492] Huber and Poplin 2009.

4.6.2 Carved Eyes

Sites: The Idaean cave (128+), The Halos Deposit at Delphi (6), Amnisos (5), The Heraion at Samos (3), Aegina (2), The Khaniale Tekke Tombs (2), The Knossos North Cemetery (1), The sanctuary of Artemis Orthia (1), The Archaic Artemision at Ephesus (1), The sanctuary of Athena Lindia (Lindos, Rhodes) (1)

Sources: Table 4.9

Examples of carved eyes were found throughout the Greek world, with a strong concentration in Cretan contexts. Nearly all the eyes exhibit a recessed area for inlay, although only few examples of inlaid material were found.[493] The majority of these objects were discovered within sanctuaries, but at least three eyes were found within graves in two cemeteries on Crete. One example was found in Tomb 292 of the Knossos North Cemetery, dating to between the Protogeometric B and Late Orientalizing periods.[494] The other carved eyes found in a burial context come from Tomb 2 of the Khaniale Tekke burials, the pottery of which dates to between the Protogeometric B and Early Orientalizing periods.[495] The Cretan evidence for this practice is also evident in the Idaean cave assemblage, which contained the largest known concentration of these objects, with at least 128 examples made from bone or ivory.[496] Four additional Cretan examples were found at the sanctuary of Zeus Thenatas at Amnisos, although they lack a firm context.[497] Amnisos also produced an 8$^{\text{th}}$-century BCE limestone head with a preserved inlaid ivory eye similar to those found at the site and other

[493] Brize (2020, 87) notes that two unpublished examples from the Samian Heraion both preserved an amber inlay. Additionally, a photograph of one of the examples from Delphi might show a trace of amber in one of the eyes, but it has not been indicated by Amandry (1939, 93–94, fig. 7).

[494] Coldstream and Catling 1997, 273, no. 292.f69, pl. 310.

[495] Boardman dates the end of the Early Orientalizing period to 680 BCE.Boardman 1967b, 57, 64, 70, no. 73; Hutchinson and Boardman 1954, 227, no. 73, pl. 29.

[496] In addition to the bone and ivory examples, one eye was carved from rock crystal. Sakellarakis 2013, 194, no. EAM 11788/11ε, pl. 114.

[497] Marinatos 1937, 222, 227, fig. 6.

Cretan contexts.[498] While Crete appears to be the Greek origin for this practice, both Evely and Boardman point to Near Eastern comparanda for these eyes, citing examples from Hama and Hasanlu.[499] The examples found in the Khaniale Tekke tombs and the Idaean Cave suggest that the practice could have begun on Crete before spreading to the mainland and other islands (e.g., Samos and Aegina), where it became a primarily 7$^{\text{th}}$-century BCE practice.

As in the case of Amnisos statue, carved eyes may have been intended as components of other objects. For example, some of the carvings from the Halos deposit at Delphi have been associated with elements of the statuary found there, although others do not appear to correspond to a specific work. Likewise, the example from the sanctuary of Artemis Orthia is one of the loosest parallels for the other objects and may have been intended to be inlaid in something else. Regardless, the large collection found in the Idaean cave provides strong evidence that these carved eyes were also being produced as complete objects for dedication. The examples from Aegina, Ephesus, and Lindos all may well represent dedicatory offerings comparable to those found in the Idaean cave. Unlike many of the other worked animal objects found in sanctuaries, the uses of carved eyes appear varied and fluid throughout time. The creation of these objects appears conceptually similar to another Greek tradition: decorating ships with eyes. Both practices suggest a symbolic, or perhaps apotropaic, power in the use of eye imagery. Deborah Carlson offers an interpretation of the decoration practice that speaks to the ability of these eyes to alter the ontological status of the ship; she writes: "An anthropomorphic function endows the ship with a spirit capable of seeing the sea, and the accounts of Aeschylus and Philostratos suggest that the ancient Greeks did indeed believe that ships' eyes behaved in this way."[500] The creation of these eyes in the early Greek world speaks to an understanding of the power of an object that stares back at its viewer, regardless

[498] Mieke Prent (2005, 235) suggests that the limestone head may have been created by "the hand of a North-Syrian sculptor."

[499] Evely 1996, 632; Boardman 1967b, 64.

[500] Carlson 2009, 359.

of whether it is within a statue, protome, ship, or on its own. In the case of the examples made from an animal material, they are imbued with the status of something that was once alive, neither inert nor lifeless.

4.6.3 Miniature Double Axes

Sites: The sanctuary of Artemis Orthia at Sparta (93), The sanctuary at Kythnos (17), The sanctuary of Athena Alea at Tegea (7), Tocra (5), The sanctuary of Artemis Hemera at Lousoi (4), The sanctuary of Hera Limenia at Perachora (3), The Menelaion at Sparta (2), Aetos (Ithaca) (2), The Archaic Artemision at Ephesus (2), The Artemision at Thasos (1), Kastro Hill on Siphnos (1), Olynthos (1), Methone (1)

Figure: 4.58

Sources: Table 4.10

Miniature double axes have been found in bone and ivory, as well as other materials like bronze.[501] The miniature axes in bone are nearly all drilled, a feature that Dawkins suggests is intended to hold a handle (no such examples survive).[502] However, an example from Ephesus has a small wire running through the drill hole.[503] Moreover, some of the examples from the sanctuary of Artemis Orthia and Perachora[504] have drill holes in the other direction (through the flat surface), inconsistent with the idea that these openings were meant to hold a miniature haft. Stubbings argues that they were "no doubt worn as charms" and points to a Caeretan hydria in the Vatican showing a "'necklace' of alternate double axes and beads" on its neck.[505] The consistency of the drill holes appears to support

501 Gold: Hogarth 1908a, 103, pl. 5. 34; lead: Dawkins 1929b, 264, pl. 180, 34; terracotta: Dawkins 1929b, 159, no. 12; bronze: Dawkins 1929b, 199, pl. 85.

502 Dawkins 1929a, 238.

503 Smith 1908, 170; it should be noted that none of the other examples have metal staining, suggesting that this was an atypical practice.

504 Stubbings 1940, 443, no. A 317, pl. 188.

505 Stubbings 1940, 443.

this idea, as this feature is a near constant, and thus essential, part of the construction of the miniature axe. However, these drill holes are not necessarily evidence that Archaic examples were worn as necklaces. Many of the dedicated objects made from animal materials have one or more drill holes in them, but were still unlikely to have been worn. As a result, the drill holes found on the double axes may have been used to suspend objects after they were dedicated.

While miniature axes have been found in media other than worked animal materials, the association between these items and their animal sources seems particularly strong. The assemblage from the sanctuary of Artemis Orthia comprises dozens of examples, the design choices of which vary considerably. While there are some consistent design motifs (incised zig-zags and incised lines), the axes appear to be made by individuals with different levels of skill in incising bone. Perhaps some were made in workshops by craftspeople, while others were made by the dedicants themselves. While some examples are made from ivory, the vast majority are bone. The relative simplicity of these objects may explain the choice of bone, as it afforded the creator of the object (perhaps the dedicant) access to the values of an organic material within a sanctuary setting (see § 4.1). The double axe, already a powerful symbol rooted in the Bronze Age, was rendered lively and active in bone. This connection between symbol and material is evident in an example from Tegea, where the craftsperson inscribed a representation of the double axe on an otherwise unmodified piece of bone.[506] The craftsperson responsible (likely the dedicant) understood that the double axe was infused with meaning when it was created from an animal material, even if it was only an incised representation on a scrap of bone.

4.6.4 Recumbent or Couchant Animal Carvings

Sites: The sanctuary of Artemis Orthia at Sparta (160), Aetos (Ithaca) (14), The sanctuary of Hera Limenia at Perachora (12), The sanctuary at Kythnos (7), The Archaic Artemision

[506] Voyatzis 2014a, 240, no. BoN 7, fig. 21.

at Ephesus (3), The sanctuary of Athena Alea at Tegea (2), The Kamiros well (Rhodes) (2), The sanctuary of Artemis Hemera in Lousoi (1), Kastro Hill on Siphnos (1), the sanctuary at Mandra on Despotiko (1), The Argive Heraion (1), Tocra (1), The sanctuary of Athena at Ialysos (1)

Figure: 4.59 and 4.60

Sources: Table 4.11

These objects comprise a distinct set of animal carvings presented in a recumbent pose, most often on a rectangular base. However, a few instances (in particular, dog carvings) appear on circular bases. Like the seals, many of the recumbent animals exhibit an intaglio below their bases.[507] The intaglio designs primarily feature animals like those on the circular seals, as well as more scenes involving humans; Dawkins found no correlation between the intaglios and the carved animals.[508] Many of the recumbent animals have a hole drilled through the width of the carving (usually through the body of the animal). Based on the study of examples from museum collections, and photographs from publications, it seems likely that this type of object was exclusively made in ivory, with no examples in bone.

These animal carvings were found in multiple sanctuaries, but were most concentrated within the sanctuary of Artemis Orthia. Carter presents two possibilities for the place of their origin: the Peloponnese or somewhere within the Corinthian sphere (including Ithaca [see § 4.3.5 for its connection to Corinth]). Seven of the recumbent animals—a relatively large number—were also found with circular seals thought to be Corinthian at Kythnos. However, based on the much larger number of recumbent animals found at the sanctuary of Artemis Orthia (more than 10x more than any other site), as well as stylistic similarities between the animal seals and other carvings at the sanctuary, Carter sees a single area of

[507] Carter (1985, 72) describes them as "Recumbent Animal Seals," although she also writes that they were "properly speaking, probably never intended as seals."

[508] Scorpions featured more commonly on the recumbent dog carvings, but Dawkins (1929a, 235) sees the round base as convenient for the scorpion design.

production in the Peloponnese as “the most economic hypothesis”[509] (see fig. 4.61). The defining feature of the recumbent animals, a pose of supplication, may have made carving easier as less negative space was needed than if the animal were shown on all fours. However, several complex depictions of the “beast of prey” motif are a testament to the ability and willingness to create complicated designs on the part of the ivory carvers.

Based on Dawkins’ publication, Boardman’s revised chronology, and Marangou’s stylistic analysis of these carvings, Carter dates the oldest examples from the sanctuary of Artemis Orthia to the second quarter of 7th century BCE, which is “consistent with Marangou’s dates for the earliest lions.”[510] However, three examples from Tegea were associated with Building 1 (early 7th century BCE), while one example was found outside Building 2 (late 8th century BCE),[511] suggesting that the recumbent animals could begin in the first quarter of the 7th century BCE. Owing to the general Near Eastern quality of these scenes, Carter presents an in-depth investigation of the possible origins for the recumbent animal carvings. She refutes the idea that they have a Hittite origin, instead finding the closest parallels in other recumbent animals in bronze from the Peloponnese, as well as in the Phoenician animal weights housed in the National Archaeological Museum in Beirut.[512] Interestingly, she notes that the examples from Sparta “resemble the Beirut bronzes more closely than [they] do the Peloponnesian bronzes.”[513] Carter also highlights a similar Bronze Age example from Platanos on Crete: this ivory seal features a recumbent bull with its head at a 90° angle and a hole drilled through its body. She cautiously suggests that Bronze Age examples could be the inspiration for these carvings, although it is not clear Carter believes this likely.[514]

[509] Carter 1985, 73.

[510] Carter 1985, 82.

[511] Voyatzis 2014b, 519, nos. Bo 2–4, fig. 14.

[512] Carter 1985, 73–79.

[513] Carter 1985, 78.

[514] Carter 1985, 83.

The discoveries of seven of these recumbent figures on Kythnos suggests that there may be a connection between this type of object and another depiction of a reclining animal on the nearby island of Kea (see fig. 4.62). The island features an Archaic statue carved from a block of limestone, showing a lion in a similar recumbent position with its head turned at the same 90° angle.[515] Additionally, the body is rendered in a way that makes it appear flat, similar to many of the recumbent ivory examples. However, the face of the sculpture on Kea is different from those lions depicted in ivory. The ivory statuettes have more triangular faces, while the Kea lion, with its round face and stylized whiskers, strongly resembles Neo-Hittite or Syrian sculpture. Regardless of the differences, the statue appears to be a near-contemporary to the ivory statuettes and exhibits the same pose. As in the case of the Levantine ivories, it is difficult to elucidate the particular relationship between smaller, more mobile objects with larger stone sculpture.[516] As the immediate inspiration for the statuettes remains an open question, the Kea statue may have either influenced or been influenced by the ivory carvings.

Whether or not these objects have a particular iconographic influence, their use in sanctuaries is distinct to the Greek world in the 7th century BCE. These recumbent animal figurines were created at a time when zoomorphic dedications were becoming increasingly popular, with the bronze horses of the Geometric period being a notable forerunner. Marangou draws a connection between the recumbent animals and the bronze bulls found at the Kabirion, another large collection of dedicated animal figurines.[517] The Kabirion bulls likely postdate the recumbent figures, as the earliest inscriptions on the bulls may date to the 6th century BCE.[518] Similarly, large numbers of zoomorphic figurines were found at Kato Syme on Crete, where they "predominate in the archaeological record from the 10th to the

515 Ridgway 1977, 221.

516 Feldman 2014, 22–26.

517 Marangou 1969, 112.

518 Roesch 1985.

first half of the 7th century BCE, after which they are almost completely absent."[519] However, the recumbent animal figurines differ from other zoomorphic dedications for several reasons. The ivory animals rarely have a clear equivalent in bronze or ceramic; however, at the sanctuary of Artemis Orthia there appear to be at least two recumbent animals which Droop describes as "rare bronze copies of the very common ivory type."[520] Regardless, the form of the recumbent animal appears to be restricted to ivory, indicating a connotation between the material and the meaning of the dedication. The exclusive use of ivory also suggests that craftspeople wanted to preserve the association between the material and the form, such that individuals who saw these objects understood them as ivory, even if they could not tell it apart from bone. There were also practical benefits to the use of ivory, as artists were able to render large, expressive eyes and other details. The animals were small enough that they could be carved from a solid block, without the craftsperson having to work around natural features; crafting the same object in bone would likely require consideration of the marrow cavity.

With 160 examples from Artemis Orthia and a few dozen scattered among the assemblages of other sanctuaries, the form of the recumbent animal represents a successful and popular ivory dedication throughout the Greek world. The recumbent animals are also remarkably consistent, perhaps indicating they all were made by either the same community or multiple communities aiming to make similar objects.[521] They are within the vanguard of items that define the sudden rise of worked animal dedications in the 7th century BCE, and it is no coincidence that they depict animals. The pose of supplication is a central aspect of these carvings, a powerful image likely responsible for their widespread popularity. The animals chosen for these carvings are both overtly wild (e.g., lions and other large felines), as

519 Erickson 2002, 77.

520 Droop 1929a, 197.

521 None of the publications from Tegea mention whether there is any intaglio on the bottom, and no decoration is shown in the illustrations. This could indicate that these objects were made differently than the others.

well as conspicuously tame (e.g., sheep and goats). One of the most revealing and idiosyncratic carvings is a Spartan "beast of prey" example showing a lion attacking a calf while being stabbed by a man at the same time (the third figure is a rare addition to one of these scenes, see fig. 4.60).

It is tempting to read this object with a modern, anthropocentric interpretation, in which these three figures occupy hierarchical positions, akin to the Great Chain of Being: man conquers beast, who has already defeated its prey; the human achieves supremacy over nature. Such an interpretation is heavily rooted in modern ideas that centralize humans while denying animals agency. These objects may express elements of human superiority over animals, such as in the Potnia Theron or master/mistress of animals scenes found throughout the Aegean and beyond (at least a single image of which was depicted on the intaglio below one carving). However, reducing these carvings to statements of human supremacy ignores their animal-material aspects as well as the role of the deity involved in the dedication. Rendered in animal material, these carvings, with their large eyes turned toward the dedicant, have a lively presence. They may be a commentary on the role of the deity as a mediator between the human and non-human worlds. In the context of dedication, these objects are simultaneously docile and animated, expressing the dynamic relationship among the worlds of human, goddess, and animal. Rather than supremacy, these objects may reflect the desire for a continuation of good relations between humans and animals, such as Oma's idea of a contract between the human and non-human (see § 2.2.2). Robin Osborne argues that offerings to a deity reflect something about the hopes of the dedicant, stating: "[T]o give a gift to the gods is to enter into a relationship from which the return is uncertain."[522] Perhaps these recumbent animals signify an anxiety or desire for deities to give shape and order to the world—to negotiate the place of the human between that which is wild and that which is tame.

---

[522] Osborne 2004, 2.

4.6.5 Double-Disk Spectacle Fibulae

For the full list of finds, see table 4.12

Figures: 4.63 and 4.64

Fibula disks are one of the most common forms of worked animal objects found within the Greek corpus from this period. Unlike many of the other worked animal objects, fibula disks functioned in multiple roles in society; they are one of the only worked animal objects consistently found in both burial and sanctuary contexts. They also have a clear precedent in metal that began in the Carpathian Basin in the 13th century BCE, before spreading out rapidly in the 11th/10th centuries BCE.[523] Blinkenberg claims that the oldest examples come from 8th century BCE layers from Ephesus, although the Ephesian chronology was subsequently adjusted, and the examples from Ephesus likely date to the 7th century BCE.[524] Before Boardman updated the chronology, the examples from the sanctuary of Artemis Orthia were also thought to be particularly early. Even with the updated chronology, Boardman writes that the fibulae from the sanctuary of Artemis Orthia are some of the earliest of the worked animal materials found there.[525] As some of the earliest examples come from the "Geometric" deposit, their dates would lie between the 8th and the first half of the 7th century BCE.[526] Evely claims that spectacle fibulae in Cretan contexts "no doubt belong to the earlier segment of the Early Iron Age (PG–?MG),"[527] citing examples from the Psychro cave and a tomb at Prinias.[528] A Cretan origin for spectacle fibulae made from worked animal objects before to the start of the Middle Geometric (850 BCE) seems unlikely given the large numbers of fibulae coming from post-8th century BCE contexts outside of Crete.

---

523 Pabst 2012, 340.

524 Jacobsthal 1951, 85–86; Stubbings 1940, 434.

525 Boardman 1963, 6.

526 Boardman 1963, 4.

527 Evely 1996, 630.

528 Rizza 1969, 25, no. P20, pl. 13.

Within his typology of fibulae found in the Greek world, Blinkenberg classifies the double-disk spectacle fibulae as "Type XV," with several subcategories; the two most common forms of the Type XV fibula are the Type XV 1 and XV 5. Type XV 1 is a bone fibula, typified by the two large disks and two smaller disks between them. The larger disks are decorated with ring-and-dot motifs in the center.[529] Type XV 5 is similar, except it is made from ivory and decorated with "torsades annulaires" (guilloche pattern).[530] Additionally, Blinkenberg's typology also makes the material a central feature, so fibulae with similar designs in different materials (e.g., bone and ivory) would be considered different types.[531] Blinkenberg's choice to group fibulae in this way properly reflects many fibulae within the archaeological record; the guilloche patterns of Type XV 5 are much more common in ivory, while the circle-and-dot motifs feature more prominently on bone fibulae. Yet there are examples of fibulae published as ivory with ring-and-dot motifs of the Type XV 1 fibulae, such as those at Oropos[532] and Aetos.[533]

As Blinkenberg's typology of fibulae was written before the publication of the Perachora material, it leaves out one of the more unique and diverse assemblages of fibulae. Within his analysis of the material from Perachora, Stubbings categorizes fibulae differently, dividing them into types α and β. In type α, the decoration of the fibula "consists of a thin plate of bone or ivory shaped into two disks separated by a 'bridge' with a smaller disk on either side." In type β, "the sides of this bridge are rounded off independently of the subsidiary disks which are merely incised upon it."[534] As the fibulae from the sanctuary have design

529 Blinkenberg 1926, 262–63.

530 Blinkenberg 1926, 268.

531 Types XV 9 and 10 are exceptions as they encompass both ivory and bone.

532 Mazarakis Ainian (1998, 53, fig. 24) lists the fibula as ivory, but the photograph does not provide definitive evidence for either material.

533 Like the example from Oropos, there are no clear indications that this fibula is ivory, although Anderson and Benton (1953, 346, nos. C. 46–C. 51) list it as such.

534 Stubbings 1940, 433.

types that are not paralleled in other sanctuaries, much of Stubbings' classification scheme is specific to the Perachora material.

The extent to which a large spectacle fibula would have been used as a practical item of adornment is unknown, yet some later iconographic testimony suggests they actually may have been worn. Brøns highlights Archaic statues, such as the winged Nike from the Artemision at Delos, that depict a type of disk-shaped clothing fastener similar to the spectacle fibula.[535] She also cites a group of caryatid mirrors (ca. 600–430 BCE) showing a figure of a woman "dressed in either *peplos* or *chiton* and *himation*, occasionally fastened by a large clasp or fibula placed flat on the shoulder, some of which possibly depict actual fibula types."[536] In two of the examples she highlights, the woman is featured wearing a fastener that looks like the fibulae made from worked animal materials.[537]

Larger, more ornate fibulae may have had a specific use within dedicatory contexts; Mazarakis Ainian and Varvarinou-Vai suggest that spectacle fibulae were attached to a cult image at Kythnos. More unwieldy fibulae may have been better suited for decoration than practical use (see § 4.1.1 above). Bold and deliberately eye-catching objects, conspicuously organic, spectacle fibulae embody much about the distinct appeal of worked animal materials in the early Archaic period. Their incised lines, guilloche patterns, and ring-and-dot motifs place the fibulae in a tradition of worked animal objects that use variations of these designs; they represent one of the most widespread expressions of the visual language of worked animal objects (especially those of the 7th century BCE).

---

535 Brøns 2014b, 75–76.

536 Brøns 2014b, 77.

537 Brøns 2014b, 78, figs. 4.20–4.21.

4.6.6 Flute or Aulos Sections

Sites: The sanctuary of Artemis Orthia at Sparta (13 pieces),[538] *The sanctuary of Hera Limenia at Perachora (nearly 40 pieces),*[539] *The Archaic Artemision at Ephesus (two pieces),*[540] *The sanctuary of Athena Lindia (eight pieces),*[541] *The Harbour sanctuary at Emporio (two pieces),*[542] *Methone (two pieces),*[543] *The sanctuary of Artemis Brauronia (one complete section)*[544]

Unlike many of the distinct classes of worked animal objects, sections of auloi or flute made in bone or ivory were not a particular development of the 7th century BCE. Examples of these instruments within the literary, iconographic, and archaeological records predate the Archaic period and continue into the Classical period and later. The earliest archaeological evidence for an aulos or an aulos-like instrument may be a Late Bronze Age example found at Mycenae. Additionally, depictions of auloi can be seen in the hands of an Early Cycladic male figurine, an impression from a ring and depiction on a fresco at Knossos, two depictions on frescoes from Agia Triada, and one depiction on the Agia Triada sarcophagus.[545] The aulos played a role in Greek life from an early period, and its presence was such a constant in religious practices that Herodotus remarks on the absence of auloi when describing sacrifice by the Persians.[546]

---

538 Dawkins 1929a, 236, pls. 161; 162, 1–8.

539 Dunbabin 1940, 448–51, no. A 394–A432.

540 Hogarth 1908a, 194, pl. 37, 12.

541 Blinkenberg 1931, 152–54, nos. 445, 448, 449–54.

542 Boardman 1967a, 242, nos. 598a–b, Fig. 164.

543 IDs 257 and 258.

544 Landels 1963.

545 Younger 1998, 30.

546 "They do not construct altars or light fires when they are going to perform a sacrifice, nor do they use libations, reed-pipes (αὐλῷ), garlands, or barley." Hdt. 1.132. See also Nordquist 1991, 81.

While the aulos was not an element of material culture specific to the 7th century BCE like other worked animal objects, its popularity as a votive may have developed in the environment of increased dedicatory behavior following the start of the 8th century BCE, leading to its deposition alongside other objects made from bone or ivory. Unlike the other dedicated worked animal objects, the aulos played a central role in religious practice, suggesting a continuum between ritual practices (e.g., dancing, sacrifice) and the act of dedication; these auloi may be the material components of otherwise transient aspects of religious practice (e.g., music). Angeliki Liveri suggests a litany of reasons for the meaning behind the dedication of musical instruments to female deities, including features of the cult relating to "the goddess as protectress of marriage, fertility, pregnancy, childhood, and growing up (*kourotrophos*)."[547] Like some of the other votives from Sparta, one of the aulos fragments is inscribed to Orthia.[548] This example underscores how the dedication was transformed from something that was a central part of worship into a gift to Artemis. The act of dedication effectively sacrificed this instrument, forever rendering it silent.

4.6.7 "Caps"

Sites: The sanctuary of Artemis Orthia at Sparta (9+),[549] *The Archaic Artemision at Ephesus (4),*[550] *The sanctuary of Hera Limenia at Perachora (3)*[551]

Figure: 4.65

A series of these objects was found at the sanctuary of Artemis Orthia and Perachora (Stubbings also reports that four were found at Ephesus and are now in the British Mu-

547 Liveri 2018, 46.

548 A. M. Woodward (1929, 370) transcribes as Τᾶι ϝορθα[ίαι(?)], suggesting the inscription could have continued after the break.

549 Dawkins writes that an immense number were found, nine were directly studied.

550 Stubbings (1940, 448) mentions studying four from Ephesus in the British Museum. While I had access to many of the worked animal objects from Ephesus at the British Museum, I only observed a single example within the British Museum collection (accession number: 1867,1122.129).

551 Stubbings 1940, 448, nos. A 389, A 390, A 392, pl. 189.

seum). These objects are roughly cylindrical and are made from the shaft of a bone (often a metapodial). Because they are made from the shaft, they have two open ends, one of which was sealed with a smaller piece of bone or ivory to create a rounded end (only preserved in some examples). Based on a microscopic study of nine examples from the sanctuary of Artemis Orthia, these objects appear to have been created with a lathe. In one example from the sanctuary,[552] the smaller part was made from ivory and the rest was bone. It has been suggested that these objects were the end of an aulos, but this idea is unlikely. Stubbings highlights that the caps were found in large numbers at the sanctuary of Artemis Orthia, while only 13 fragments of auloi were recovered.[553] Direct study of the "caps" from the sanctuary of Artemis Orthia showed them to have mostly unworked interiors, the interior of one example from the Ashmolean retains the shape of the metapodial from which it was made.[554] These objects would be incompatible with auloi, as the components of the instrument were designed to fit snugly into one another precisely. Additionally, the unworked interiors likely preclude the interpretation of these "caps" as other types of objects, including furniture components. While it is also possible these objects served as gaming pieces, their use remains an open question. Based on the varied nature of worked animal object dedications, these "caps" may have also had no specific function beyond a dedication.

4.6.8 Truncheon/Rod Pendants

Sites: The Archaic Artemision at Ephesus (17), The sanctuary of Hera Limenia at Perachora (6), The sanctuary of Athena Lindia (Lindos, Rhodes) (3), The sanctuary of Artemis Orthia at Sparta (3), The Kamiros well (Rhodes) (1)

Sources: Table 4.13

These objects are either cylindrical or tear-drop shaped pendants with a suspension

552 This example comes from the collection of the Metropolitan Museum of Art, accession number: 24.195.183.

553 Stubbings 1940, 448.

554 Accession number: AN1923.95.

hole at one end. Nearly all the examples are bone and have a section of carved or incised lines, usually near the suspension hole. Many of the pendants have multiple groups of such lines, and microscopic observation of examples from Ephesus indicates the pendants made on a lathe. Some examples show a degree of use wear, suggesting they were worn before being dedicated. Stubbings cites similar examples from Gezer, as well as a somewhat similar version in amber from Aetos.[555] The amber example is partially preserved, with only the rounded bottom remaining. As a result, it is not clear whether this amber object was originally a pendant. The examples from Gezer are more convincing parallels and are part of a larger trend of the Levantine manufacture of such pendants.[556] Amir Golani traces their distribution, finding examples from a number of other sites: Megiddo, City of David, Tell en-Naṣbeh, Tel Miqne-Ekron, Tel Batash, Tell Beit Mirsim, Lachish, Tel Be'er Sheva, Aro'er, Hazor, Samaria, Tell es-Sa idiyeh, Tel Beth-Shemesh, Tell el-Far ah, and Tel Kabri, among others[557] Golani also highlights the connection between these Levantine pendants and the examples from Ephesus and other Greek sanctuaries, suggesting that "the western examples of the late Iron Age II may possibly be seen as an import arriving via the Phoenicians or the adoption of an idea."[558] Direct observation of examples from Ephesus revealed a strong uniformity in production methods, as the objects appear to be cut using the same lathe techniques, potentially by the same hand; it seems more probable that the Ephesus examples would have been created locally. Instead, their presence on Rhodes during a period of heightened interaction with Phoenicians is a more likely entry point into the Greek world (see § 4.5).

---

555 Macalister 1912, pl. 226; Anderson and Benton 1953, no. D. 28, pl. 68; Stubbings 1940, 443.

556 Macalister 1911, 353.

557 Golani 2013, 173–74; see also Platt 1978; Limmer 2020.

558 Golani 2013, 170.

4.6.9 Cloisonné Disks

Sites: The Artemision at Thasos (18),[559] *The Delion at Paros (1),*[560] *The sanctuary at Kythnos (1),*[561] *The sanctuary at Mandra on Despotiko (1),*[562] *Delos (1)*[563]
Figures: 4.66

These items are all circular disks of bone, antler, or ivory, with a series of recessed areas, usually alternating between circular and rectangular sections; examples from Thasos retain pieces of amber inlay within the recessed areas. When Otto Rubensohn described the example from Paros, he speculated that it might only be usable with a "festen Unterlage" (solid base), which Yannos Kourayos and Bryan Burns took to mean to be a "pyxis lid," when describing the example from the sanctuary at Mandra on Despotiko.[564] Yet these objects have never been discovered with anything like a base or container, and the large number of disks found at the Artemision at Thasos suggests that they served a different purpose.[565] Prêtre's study of the disks produced at Thasos indicated that they were created with a lathe and that their backing was scored in order to affix them to another surface using glue.[566] A series of disks also was found at Thasos, less ornate than the cloisonné examples, that Prêtre argues are lesser versions. She believes them to be decorative but does not present a clear idea of their use, suggesting that they might be jewelry. However, Prêtre writes: "La destination exacte de ces disques n'est cependant pas assurée; la fonction même de bijou n'est pas totalement acquise quand ils ne comportent aucune trace de fixation à

559 Prêtre 2016, 26–28, nos. 64–81, pl. 4.

560 Rubensohn 1962, 72, no. 46, pl. 11a.

561 Varvarinou-Vai 2017, 196, fig. 10.

562 Kourayos and Burns 2004, 149, fig. 21.

563 Deonna 1938, 285, no. B5454/731, pl. 86.

564 Kourayos and Burns 2004, 149.

565 For a discussion of their origin, see section 4.3.9.

566 Prêtre 2016, 28.

l'arrière."[567] Prêtre's discovery that they were scored (like many of the Levantine ivories) may indicate that these objects were meant to be affixed to furniture.

4.6.10 Worked Astragali

The astragalus bone held a particular appeal in the ancient world, and it was rife with potential for a variety of meanings. Both ancient and modern cultures all over the world use astragali for multiple purposes;[568] individuals in ancient Greece also employed them in many different ways. Because they tend to land on one of four sides, the bones are often a component of gaming, and this feature also made them well suited for a form of cleromantic divination (divination by casting lots) known as astragalomancy.[569] Their use as a gaming piece also helped to create an association between the bone and childhood.[570] Jenifer Neils and her collaborators draw a clear association between astragali and adolescence based on literary and iconographic evidence, arguing that the bones were favorite toys among children.[571] The authors cite vase paintings, in which children are depicted playing with astragali on an Attic red-figure oinochoe[572] and an Attic chous,[573] both from the 5th century BCE. Within the Greek textual record, the association between childhood and knucklebones is made explicit, such as in two epigrams postdating the Archaic period. In a 3rd-century BCE epigram by Leonidas of Tarentum, he writes:

> To Hermes Philocles here hangs up these toys of his boyhood:
> his noiseless ball, this lively boxwood rattle, his knuckle-bones he

567 Prêtre 2016, 29; translation: The exact use of these disks is however not certain; the very function of jewelry is not totally established when they carry no trace of fixation to the back.

568 For their uses in the ancient world: Gilmour 1997; Affanni 2008; Mazzorin and Minniti 2013. For their uses in modern eras: Sutton-Smith 1951, 95; Yeniasir, Gökbulut, and Yaraşir 2017; Csornai-Kovács 2000.

569 Duval 2015; Bundrick 2017.

570 Bar-Oz 2001, 216; Amandry 1984c, 377.

571 Neils, Oakley, Hart, and Beaumont 2003, 264.

572 From the Getty, accession number: 96.AE.28.

573 From the British Museum, accession number: 1842,0728.928.

had such a mania for, and his spinning-top.[574]

Similarly, the 2nd-century BCE author Antipater of Sidon writes:

> Hippe, the maiden, has put up her abundant curly hair,
> brushing it from her perfumed temples, for the solemn time when
> she must wed has come, and I the snood that used to rest there
> require in my wearer the grace of virginity. But, Artemis, in thy
> loving-kindness grant to Lycomedes' child, who has bidden farewell
> to her knuckle-bones, both a husband and children.[575]

Alexia Petsalis-Diomidis views the reference to the astragali as a means of evoking "the past life of Hippe as a child."[576] Both epigrams utilize the image of adolescents leaving behind astragali as a symbol of growing older. Eleni Hatzivassiliou discusses this epigram in relation to a scene on a red-figure cup from Copenhagen showing a youth and four astragali at an altar.[577] Using both the scene and the epigram as evidence, Hatzivassiliou suggests that "children used to offer their knucklebone bags at a temple upon entering adulthood."[578] Similarly, Sheramy Bundrick examines astragali within sacrifice scenes, writing that "whenever the *osphys* is shown, the curling animal's tail reflects the deity's acceptance of sacrifice—itself a positive omen—while *astragaloi*, when included, would hint at further interaction between mortals and gods."[579] She also reexamines gaming scenes in vase painting, and suggests that some scenes may have a cleromantic or astragolomantic interpretation.

---

574 Εὔφημόν τοισφαῖραν, ἐϋκρόταλόν τε Φιλοκλῆς
Ἑρμείῃ ταύτην πυξινέην πλατάγην,
ἀστραγάλας θ' αἷς πόλλ' ἐπεμήνατο, καὶ τὸν ἑλικτὸν
ῥόμβον, κουροσύνης παίγνι' ἀνεκρέμασεν. Anth. Pal. 6.309.

575 Ἡ πολύθριξ οὔλας ἀνεδήσατο παρθένος Ἵππη
χαίτας, εὐώδη σμηχομένα κρόταφον·
ἤδη γάρ οἱ ἐπῆλθε γάμου τέλος· αἱ δ' ἐπὶ κόρσῃ
μίτραι παρθενίας αἰτέομεν χάριτας.
Ἄρτεμι, σῇ δ' ἰότητι γάμος θ' ἅμα καὶ γένος εἴη
τῇ Λυκομηδείδου παιδὶ λιπαστραγάλῃ. Anth. Pal. 6.276.

576 Petsalis-Diomidis 2018, 422.

577 Hatzivassiliou 2001, 123; Johansen 1938, pl. 271a.

578 Hatzivassiliou 2001, 123.

579 Bundrick 2017, 57.

The textual record of astragalomancy is sparse, although there are a series of 2nd-century CE "dice oracle" inscriptions from the region of Pamphylia in southern Anatolia.[580] Fritz Graf describes these oracles, writing:

> The inscriptions, when well preserved, are large and impressive: they often are inscribed on one large monolithic pillar of local stone that measures about five to six feet (1,50 to 1,70 meters) in height and nearly two feet (50 to 60 centimeters) in width; they thus stood about a man's height and must have weighed more than a ton.[581]

Graf demonstrates that the oracle was based on the idea that the four sides of the astragali had values of one, three, four, and six; the oracle was consulted by throwing five astragali, and adding together the value of the sides. The oracle texts list 56 sums,[582] with each of the 56 possible throws associated with a specific divinity (with either a favorable or unfavorable connotation), including Zeus, Athena Areia, the Moirai, the Eagle of Zeus, and many others.[583] Graf shows that these texts are both homogeneous and specific to the region. He also argues that the astragalus oracles were rare enough in Greece that Pausanias had to explain the use of an oracle at Bura, in Achaia. Pausanias writes:

> When one descends from Bura towards the sea, there is the Buraikos river and a not large image of Herakles in a grotto; he too is called Buraikos, and he offers an oracle from a list (πίναξ) and from astragaloi. Whoever intends to consult the divinity, prays in front of the image, and after the prayer, he takes up four astragaloi (plenty of them are lying around Herakles) and rolls them on the table. For any combination of the astragaloi, the inscription in the list gives an easily accessible explanation of the combination.[584]

Pausanias' description of the use of the oracle is similar to the Anatolian examples, suggesting a comparable practice also existed in Greece. While these oracles postdate the

---

580 Ormerod 1912; Graf 2005.

581 Graf 2005, 54.

582 Fifty six represents the total number of possible combinations, starting at five (five astragali that all turn up the side worth one), and ending at 30 (five astragali that all turn up the side worth six).

583 Graf 2005, 63–64.

584 Paus. 7.25.10, trans. Graf 2005, 62.

astragali within sanctuaries, they indicate that divinatory uses of the bone extended into the Common Era, across different parts of the Aegean. Despite the late date of these oracles, they provide a plausible model for how astragalomancy was practiced in the Archaic and Classical periods.

In addition to the textual and iconographic records, there are a wealth of natural astragali, astragali in other materials, and representations of the bone in the archaeological record. Worked astragali are known in the Aegean from the Early Bronze Age onward,[585] although they are more common in Iron Age contexts than in deposits from earlier periods. In the 7th century BCE, unmodified and modified astragali were found alongside other worked animal materials within many sanctuaries; examples were found in the Corycian cave, the sanctuary of Artemis Orthia, Ephesus, Perachora, and the Koroneia cave.[586] The practice of dedicating astragali was especially prevalent in certain cave sanctuaries, as large numbers were found in both the Corycian and Koroneia Caves (see §4.4). While astragalus dedication is most prevalent between the Early Iron Age and the Archaic period, the practice continued into the Classical period.[587] By the 6th–5th centuries BCE, both Athenian weights and coinage carried the astragalus as a symbol.[588] Additionally, a 6th-century BCE weight in the shape of the astragalus shows a votive inscription from Aristolochus and Thrason to Apollo, and it is thought to have been dedicated at Branchidai-Didyma sometime between 550–525 BCE.[589]

In addition to its associations with weights and coins, the astragalus has a distinct connection to ceramic decoration and design. As early as the Late Geometric period, potters were creating a pear-shaped ceramic vessel ("the phormiskos"), thought to imitate the

---

585 Gilmour 1997, 167.

586 Amandry 1984c, 1; Hogarth 1908a, 192; Stubbings 1940, 447; Trantalidou and Kavoura 2007.

587 Trantalidou and Kavoura 2007, 462.

588 Lang and Crosby 1964, 6; Shear 1933, 235.

589 The weight was taken from Ionia to Susa by Darius after the Ionian revolt during the first part of the 5th century BCE. Greaves 2012, 194; André-Salvini and Descamps-Lequime 2005, 15.

phormiskoi bags, that were known to hold astragali.[590] Within this category is a more narrowly defined class of vessels known as the Attic phormiskoi, as well as a slightly different group of Corinthian examples. The Attic phormiskoi are more often broken,[591] and the Corinthian group has a series of different traits including a broader neck, a resting surface, and an opening topped by a stopper.[592] The association between this vessel form and the bone is evident in Boeotian mold-made versions, which show a square opening and model astragali within. Hatzivassiliou examines the function of the Attic phormiskoi and asserts that they functioned as funerary objects reserved for an Athenian elite. She speculates that "since Attic phormiskoi did not actually contain astragals, their character was mainly symbolic and apart from models of knucklebone bags, they were probably also symbols of status."[593] In addition to phormiskoi, there were ceramic vessels made in the shape of the astragalus itself.[594]

As both the Attic phormiskoi and natural astragali were found in funerary contexts, the bone may well have a connection to the funerary realm. While this association seems to be strongest in Southern Italy and Sicily, astragali were also found in funerary contexts at Asine and the Papatislures Cemetery on Rhodes.[595] Some of the most notable uses of astragali in funerary contexts come from the cemetery of Locri Epizefiri in southern Italy, where Barbara Carè describes an "astragalomania" of the individuals interring their dead at the site: the cemetery contained burials with large numbers of astragali found across age classes.[596]

590 Neils (1992, 232) cites a Late Geometric example from Tiryns as the earliest example; see also Hampe 1976; Pinney 1986; Hatzivassiliou 2001; Kefalidou 2004.

591 Neils 1992, 233.

592 Hatzivassiliou 2001, 134.

593 Hatzivassiliou 2001, 140–41.

594 One example is the "Sotades Astragalus," a 5th-century BCE astragalus-shaped vessel which may show individuals dancing. The British Museum, accession number: 1860,1201.2. See Hoffmann 1997, 107–13.

595 Frödin and Persson 1938, 425; Jacopi 1932, 57.

596 Carè 2012.

It is often claimed that there is a special relationship between astragali and adolescence within the funerary realm, as astragali are thought to be a common grave good in burials of young adults and children.[597] However, after outlining the archaeological and philological scholarship supporting the association between the tombs of children and astragali, Carè suggests that there is no clear association between the astragalus and child burial at Locri Epizefiri. Instead, she argues that the symbolic properties of astragali may have been used in other ways not necessarily associated with age or sex.[598] It is possible that the association between astragali and child burial was stronger on the Greek mainland.

---

[597] Carè 2012.

[598] Carè 2012, 411.

Tables

Table 4.1: Worked animal objects from the Knossos North Cemetery

Find	Tomb	Chronology	Material	Citation
Bone pin (?)	40	LO	Bone	Coldstream and Catling 1997, 89, no. 40.f9, fig. 192, pl. 309
Bone pin (?) (Published as bone or shell)	40	LO	Bone?	Coldstream and Catling 1997, 89, no. 40.f11
Small rod	40	LO	Bone	Coldstream and Catling 1997, 89, no. 40.f14, fig. 192, pl. 309
Horncore	59	Disturbed (SM or later)	Horncore	Coldstream and Catling 1997, 59, no. Tomb 2 SW - 2
Comb	200	SM	Ivory	Coldstream and Catling 1997, 194, no. 200-4, fig. 164, pl.
Mounting	200	SM	Ivory	Coldstream and Catling 1997, 195, no. 292.f12, fig. 164, pl. 278
"Boar" Tusk Helmet Fragments	201	SM	Tooth or Bone?	Coldstream and Catling 1997, 195, no. 201.f13, fig. 164, pls. 278–279
Triangular inlays (eight pieces)	201	SM	Bone	Coldstream and Catling 1997, 195, no. 201.f14, fig. 164, pl. 278
Rectangular inlays	201	SM	Bone	Coldstream and Catling 1997, 195, no. 201.f14, fig. 164, pl. 278
Ivory pieces	201	SM	Ivory	Coldstream and Catling 1997, 195, no. 201.f15
Ivory roundel	219	EPG and LPG-PGB	Ivory	Coldstream and Catling 1997, 218, no. 219.f16, fig. 190, pl. 309
Janiform Statuette	219	EPG and LPG-PGB	Ivory	Coldstream and Catling 1997, 219, no. 219.f27, fig. 190, pl. 309
Sleeve/Handle	219	EPG and LPG-PGB	Ivory	Coldstream and Catling 1997, 219, no. 219.f35, fig. 189, pl. 310
Sleeve/Handle	219	EPG and LPG-PGB	Ivory	Coldstream and Catling 1997, 221, no. 219.f87, fig. 189, pl. 309
Ivory Fragments	219	EPG and LPG-PGB	Ivory	Coldstream and Catling 1997, 224, no. 219.f154
Ray/Shark Vertebra	285	EPG-LO	Bone	Coldstream and Catling 1997, 250, no. 285.f20
Spectacle fibula	285	EPG-LO	Ivory	Coldstream and Catling 1997, 255, no. 285.f22, fig. 169, pl. 284
"Boar tusk"	292	PGB-LO	Tooth	Coldstream and Catling 1997, 272, no. 292.f35, fig. 155, pl. 311
Vessel Representation	292	PGB-LO	Ivory	Coldstream and Catling 1997, 272, no. 292.f49, fig. 192, pl. 311
Handle or Sleeve	292	PGB-LO	Bone	Coldstream and Catling 1997, 272, no. 292.f61, fig. 191, pl. 310
Carved Eye	292	PGB-LO	Bone	Coldstream and Catling 1997, 273, no. 292.f69, fig. 191, pl. 310
Incised Attachment	292	PGB-LO	Bone	Coldstream and Catling 1997, 273, no. 292.f74, fig. 191, pl. 310
Sleeve/Handle	292	PGB-LO	Bone	Coldstream and Catling 1997, 273, no. 292.f79, fig. 191, pl. 309
Pin (Two fragments, possibly non-joining)	107 SW	PGB/EG-LO	Bone?	Coldstream and Catling 1997, 162, no. Tomb 107 SW - 78
Handle or sleeve	45 SW	Disturbed	Bone	Coldstream and Catling 1997, 91, no. Tomb 45 SW - 10, fig. 192
Ray/Shark Vertebra	75 SE	Into LO	Bone	Coldstream and Catling 1997, 119, no. Tomb 75 SE - 28, pl. 311

Plaque	J (Tekke site)	PG?	Bone	Coldstream and Catling 1997, 30, no. J.f11

Table 4.2: Chronology of the sanctuary of Artemis Orthia

Laconian Pottery Sequence at Artemis Orthia	**Droop**	**Lane**	**Boardman**	**Source**
"Geometric" ("Protocorinthian" with both "Geometric" and Laconian I; "Subgeometric")	900–675	800–700	800–650	Droop 1929b, 109; Lane 1933, 101; Boardman 1963, 4
Laconian I	700–635	700–630	650–620	Droop 1929b, 109; Lane 1933, 115; Boardman 1963, 4
Laconian II	635–600	630–590	620–580	Droop 1929b, 109; Lane 1933, 122; Boardman 1963, 4
Sand			570/560	Boardman 1963, 4
Laconian III	600–550	590/580–c.550		Droop 1929b, 109; Lane 1933, 129; Boardman 1963, 4
Laconian IV	550–Later 5th and 4th century	550–525		Droop 1929b, 109; Lane 1933, 150
Laconian V		Not later than 520		Lane 1933, 154

Table 4.3: Carved female figures and shafts at Artemis Orthia

Type	**Geometric, Protocorinthian, and Laconian I**	**Dawkins' 7th Century**	**Laconian III and IV (Dawkins' 6th Century)**	**Laconian IV and V**	**Laconian V**
Carved female figure: Armless figures cut from a complete section of bone	2	7		2	1
Carved female figure: Figures with arms, made from a section of bone split lengthways, so that the figure, convex in front, has no back	2	7	1		1
Carved female figure: Figures that lack arms, but are also made from a section of a bone			11	2	
Bone Shafts		Most Common	Considerable		

Table 4.4: Lila Marangou's grouping of carved female figures

Marangou's Group	**Dawkins Ref.**	**Marangou IDs**	**Marangou Date**
Protome	218–19, pls. 117, 1–6; 118, 1,4; 119, 6; 120, 1–4, 6	88–101	7th century generally, possibly concurrent with or slightly earlier than Female Statuette Group 1. Marangou 1969, 154–59

Female Statuette Group 1	219 , pl. 119, 1, 4, 5	102–4	7th century generally, possibly around the middle of the century Marangou 1969, 159
Female Statuette Group 2	219 , pl. 119, 2,3	105–6	The second half of the 7th century. Marangou 1969, 161
Female Statuette Group 3	119 , pls. 174, 14; 120, 7	107–8	Last Quarter of the 7th century. Marangou 1969, 162

Table 4.5: Rhodian assemblages

Site	**Description and Notes**	**Citation**	**Material**	**Figure**
Kamiros	Square female head with an uneven zig–zag pattern on the back and drill hole at the top. British Museum accession number: 1864,1007.529.	Smith 1908, 179, no. 2, pl. 28, 1	Ivory	4.37
Kamiros	Square female head with a lion intaglio on the back. British Museum accession numbers: 1864,1007.688 and 1864,1007.685	Smith 1908, 179, no. 1, pl. 28, 4	Ivory	4.38
Kamiros	Square female head, with intaglio depicting a sphinx. British Museum accession numbers: 1864,1007.754 and 1864,1007.666	Smith 1908, 179, no. 3, pl. 30, 14; 31, 17	Ivory	4.39 (top)
Kamiros	Fragment of square female head, no design on the back beyond the hair which continues on either side. It has a drill hole beneath the remains of the chin, as well as though the head in the other direction (above the ears). British Museum accession number: 1864,1007.635	Smith 1908, 179, no. 4, pl. 30, 18	Ivory	4.39 (bottom)
Ialysos	Window scene (without woman).	Martelli 2000, 106, fig. 7	Ivory	-
Kamiros	Carving of a woman with a flat back, with a drill hole at the feet; it may be a plaque. British Museum accession number: 1864,1007.631.	Smith 1908, 179, no. 6, pl. 30, 15	Bone	4.41
Kamiros	Carving of a woman in the round with partial burning. British Museum accession number: 1864,1007.632.	Smith 1908, 179, no. 5, pls. 30, 16; 31, 19	Bone	4.42
Kamiros	Carving of a woman with a flat back, which may be unfinished. British Museum accession number: 1864,1007.665.	Smith 1908, 179, no. 7, pl. 30, 7	Bone	4.43
Ialysos	A rectangular carving of a woman framed by her hair. Drill holes going through the head (under the ears).	Martelli 2000, 111, figs. 15–17	Appear to be bone, but not directly observed	4.44
Ialysos	A carving of a nude woman.	Martelli 2000, 111, figs. 18–20	Appear to be bone, but not directly observed	4.45

Ialysos	Figurine/statuette	Martelli 2000, 111, fig. 27–29	Appear to be bone, but not directly observed	4.46
Kamiros	The top portion of a carving showing two women standing shoulder to shoulder, wearing *poloi*. The object is burnt. British Museum accession number: 1864,1007.633.	Smith 1908, 179, no. 9, pl. 30, 13	Bone	4.47
Ialysos	A carving of two women standing shoulder to shoulder, wearing *poloi*. The back of the object is flat.	Martelli 2000, 111, fig. 22–23	Unclear if bone or ivory	4.48
Ialysos	A carving of two women standing shoulder to shoulder, wearing *poloi*. The back of the object is flat, but with a zigzag design. It appears to be pierced at the bottom, and the surface of the figures are markedly worn.	Martelli 2000, 111, fig. 24–25	Unclear if bone or ivory	4.49
Kamiros	A janiform figure, nude and wearing a *polos*. British Museum accession number: 1864,1007.671.	Smith 1908, 179, no. 8, pls. 30, 9; 31, 11	Not directly studied, may be ivory	4.50

Table 4.6: The distribution of circular seals

Sites	**Count**	**Notes and Sources**
The sanctuary of Hera Limenia at Perachora	98	Stubbings 1940, 415–28, nos. A 23–A 123, pls. 175–82
The sanctuary of Artemis Orthia at Sparta	89	Dawkins 1929a, 229–30, pls. 140–47
The sanctuary at Kythnos	15	Varvarinou-Vai 2017, 196, figs. 15–16
The Argive Heraion	15	Norton 1905, 351–52, nos. 1–5, 7–9, 11–18, pl. 139
The sanctuary of Athena Alea at Tegea	7	Dugas 1921, 430–31, nos. 381–86; Voyatzis 1990, 347, no. M2(S), pl. 186
Aetos (Ithaca)	4	Heurtley and Robertson 1948, 115, nos. C13–C14, pl. 48; Anderson and Benton 1953, 347, nos. C.62–C.63, pls. 63–64
Olympia	2	Furtwängler 1890, 188, no. 1194; Kyrieleis 2006, 21, pl. 9, 1–4
The Archaic Artemision at Ephesus	1	Smith 1908, 168, no. 41, pl. 27
The Kastro Hill on Siphnos	1	Brock and Young 1949, 23–24, no. 1, pl. 10, 2–3
The Harbour sanctuary at Emporio (Chios)	1	Boardman 1967a, 237, no. 535, pl. 95
The sanctuary of Athena Lindia (Lindos, Rhodes)	1	Blinkenberg 1931, 129, no. 325

Table 4.7: Circular seals from the sanctuary of Artemis Orthia

Class	**Reported Total**	**Illustrated or Drawn Examples**	**Unpublished and Directly Studied Examples**
Class 2	30	16	1
Class 3	46	17	3
Class 4	-	12	-

Table 4.8: The distribution of other seals

Sites	**Four-Sided Seal**	**Feline Head Seal**	**Little Lion Seal**	**Anthropomorphic Seal**	**Notes**
The sanctuary of Artemis Orthia at Sparta	25	1			**Four-Sided**: Dawkins 1929a, 228, pls. 139, 140; **Feline Head**: Dawkins 1929a, 240, pl. 168, 6
The Argive Heraion	2				Norton 1905, 352, nos. 27–28, pl. 140
The sanctuary of Hera Limenia at Perachora	1				Stubbings 1940, 431, no. A 107, pl. 182
Aetos (Ithaca)	1		1		**Four-Sided**: Heurtley and Robertson 1948, 115, no. C10, pl. 47; **Little Lion**: Anderson and Benton 1953, 346, nos. C.57, pl. 68
The Archaic Artemision at Ephesus		1			Smith 1908, 168, no. 40, pl. 27
The Kamiros well (Rhodes)			2		Smith 1908, 180 nos. 7, 11, pl. 30
The Harbour sanctuary at Emporio (Chios)			1		Boardman 1967a, 237, no. 534, pl. 95
Delos			1		Gallet de Santerre and Tréheux 1947, 207, no. 47, pl. 35
Kato Phana (Chios)			1		Lamb 1935, 153, pl. 33
The sacrificial area north of the sanctuary of Apollo Daphnephoros at Eretria			5	1	**Little Lion**: Huber 2003, 94, nos. O 196–O 200, pl. 129. **Anthropomorphic**: Huber 2003, 95–96, no. O 201, pl. 129
Grave at Lefkandi			1		Lemos 2012, 163, pl. 19
Tachi (Ancient Potniai, Boeotia)			1		Huber and Poplin 2009, 628
Kamylovryssi Paralimnis (Boeotia)			1		Huber and Poplin 2009, 628
Zagora				1	Cambitoglou 1988, 235, no. Inv. 1240, pl. 289

Table 4.9: Carved eye distribution

Sites	**Number**	**Sources**
The Idaean Cave	128+	Sakellarakis 2013, 194, no. EAM 11788/11ε, pl. 114
The Halos Deposit at Delphi	6	Amandry 1939, 93–94, fig. 7
Amnisos	5	Marinatos 1937, 222, 227, fig. 6; Prent 2005, 235
The Samian Heraion	3	Brize 2020, 86–87, no. IV 10, pl. 68, 9
Aegina	2	Furtwängler 1906, 426, no. V. 1, fig. 333
The Khaniale Tekke Tombs	2	Boardman 1967b, 64, 70, no. 73; Hutchinson and Boardman 1954, 227, no. 73, pl. 29
The Knossos North Cemetery	1	Coldstream and Catling 1997, 273, no. 292.f69, pl. 310

Ephesus	1	Hogarth 1908b, 196, pl. 42, 9
The sanctuary of Artemis Orthia	1	Dawkins 1929a, 241, pl. 1770, 6
The sanctuary of Athena Lindia (Lindos, Rhodes)	1	Blinkenberg 1931, 393, no. 1569 D-E, pl. 63

Table 4.10: Miniature double axe distribution

Sites	**Number**	**Sources**
The sanctuary of Artemis Orthia	93	Dawkins 1929a, 238, pl. 163
The sanctuary at Kythnos	17	Varvarinou-Vai 2017, 196
The sanctuary of Athena Alea at Tegea	7	Voyatzis 2014b, 516–17, no. Bo. 1; Voyatzis 1995, 274, fig. 12; Østby, Luce, Nordquist, Tarditi, and Voyatzis 1994, 138, nos. 46, 201, fig. 82
The Archaic Deposits at Tocra	5	Boardman and Hayes 1966, 163, nos. 79–82, pl. 104; Boardman and Hayes 1973, 83, no. F156
The sanctuary of Artemis Hemera at Lousoi	4	Mitsopoulos-Leon 2012, 168, nos. 357–60, pl. 29
The sanctuary of Hera Limenia at Perachora	3	Stubbings 1940, 443, nos. A 316–18, pl. 188
The Menelaion at Sparta	2	Dawkins, Droop, Woodward, Giles, Wace, and Thompson 1908, 147, pl. 9, 9, 10
The Archaic Artemision at Ephesus	2	Smith 1908, 170, figs. 31, 32, nos. 48, 49
Aetos (Ithaca)	2	Anderson and Benton 1953, 116, nos. C32, C33, pl. 47
The Artemision at Thasos	1	Prêtre 2016, 25, no. 63, pl. 3
The Kastro Hill on Siphnos	1	Brock and Young 1949, 25, no. 9, pl. 11
Olynthos	1	Robinson 1941, 132, no. 443
Methone	1	256

Table 4.11: Recumbent animal distribution

Sites	**Number**	**Sources and Notes**
The sanctuary of Artemis Orthia	160	Dawkins 1929a, 230–37, pls. 148–160
Aetos (Ithaca)	14	Heurtley and Robertson 1948, 115, nos. C3–C9, pl. 48; Anderson and Benton 1953, 346–47, nos. C.55–C.61, pls. 63, 68
The sanctuary of Hera Limenia at Perachora	12	Dunbabin 1940, 408–10, nos. A 11 – A 22, pl. 174
The sanctuary at Kythnos	7	Varvarinou-Vai 2017, 196
The sanctuary of Athena Alea at Tegea	3	The publications list the material as either “bone” or “bone or ivory,” however the published images demonstrate they are ivory. Voyatzis 2014b, 517, nos. Bo 2–4 Voyatzis 1990, 347, no. M3(S), pl. 186; Østby, Luce, Nordquist, Tarditi, and Voyatzis 1994, 124
The Archaic Artemision at Ephesus	3	Smith 1908, 163–64, nos. 24–25, pl. 26; Bammer 1992, 190, no. 15, pl. 8
The Kamiros well (Rhodes)	2	Smith 1908, 180, nos. 15–16, pl. 30, 2–3, British Museum accession numbers: 1864,1007.756, 1864,1007.667
The sanctuary of Artemis Hemera at Lousoi	1	Mitsopoulos-Leon 2012, 356, no. 168, pl. 29
The Argive Heraion	1	Norton 1905, 353, no. 87
The Archaic Deposits at Tocra	1	Boardman and Hayes 1973, 83, no. F150
The sanctuary at Mandra on Despotiko	1	Kourayos and Burns 2004, 150
The Kastro Hill on Siphnos	1	Brock and Young 1949, 24, no. 14, pl. 10
The sanctuary at Ialysos	1	Martelli 2000

Table 4.12: Spectacle fibula distribution

Sites	Number	Sources and Notes
The sanctuary at Kythnos	138	Varvarinou-Vai 2017, 193
The sanctuary of Hera Limenia at Perachora	60+	Dunbabin mentions nearly 60 found, but publishes 70 fibulae and fragments. Dunbabin 1940, 433–37, nos. A 124–94, pls. 183–85
The sanctuary of Artemis Orthia	About 28 complete and 10 fragments.	Dawkins 1929a, 224–25, pls. 132, 2, 4–11; 133, b, d Additional unpublished examples from the British Museum (1923,0212.580), Fitzwilliam Museum (GR.137.1923), Ashmolean Museum (ANTN.1478, ANTN.1479, AN1923.110)
Delos	29+	23 examples (intact and fragmented) come from the Heraion. Deonna says that they are all bone. 6 mostly complete examples and a series of fragments came from around the Artemision, many of which appear to be ivory. Deonna 1938, 285–86, nos. B 5428–5449, A783–160, pl. 86
The sanctuary of Athena Lindia (Lindos, Rhodes)	21	Blinkenberg 1931, 90–91 nos. 133 (a–e), 134, pl. 9
Aetos (Ithaca)	11	Dunbabin mentions 11 total from Ithaca but says that only 10 are published Heurtley and Robertson 1948, 116, nos. C 16– C19, pl. 47; Anderson and Benton 1953, 346, nos. C. 46–C. 51; Dunbabin 1940, 434
The Archaic Artemision at Ephesus	10+	Hogarth 1908b, 187, nos. 1–2, 3–9, pl. 32, in addition to these examples is an unpublished fibula in the British Museum (1907,1201.367)
The Delion at Paros	10	Rubensohn 1962, 72, nos. 36–45, pl. 13
Olynthos	9	Robinson 1941, 100–2, nos. 334–42, pl. 20
The Artemision at Thasos	8	Prêtre 2016, 34–36, no. 125–35, pl. 5
Pherai	6	Mentioned by Blinkenberg, objects are housed in the National Museum. Blinkenberg 1926, 265–66, 268–69, nos. XV 1a, 2a, 5a/b, 6a/b
The Kastro Hill on Siphnos	5	Brock and Young 1949, 24–25, nos. 3–7, pl. 11, 7–12
The Harbour sanctuary at Emporio (Chios)	5	Boardman 1967a, 211, nos. 231, 233, 236, 238, 239, pl. 86
The Argive Heraion	4	Norton 1905, 353, pl. 140, 32–35
The Acropolis of Halai	3	Goldman 1940, 427, nos. 16–18, fig. 79
The Dictaean Cave	3	Hogarth 1900, 113, fig. 49
Aegina	1	Unpublished example mentioned by Dunbabin, Aegina Museum 833. Dunbabin 1940, 434
Eleusis	1	Mentioned by Blinkenberg, it is housed in the National Museum (Athens 3722). Blinkenberg 1926, 267, no. XV 4a
Thessaly	1	Mentioned by Dunbabin, it is housed in the Ashmolean museum (AN1924.169). Dunbabin 1940, 434
Oropos (Pithos burial)	1	Mazarakis Ainian 1998, 53, fig. 24
Antissa	1	Lamb 1932, 66, fig. 17
Old Smyrna	1	Cook, Nicholls, and Pyle 1998, 26, no. SF 804, pl. 22
The Knossos North Cemetery	1	Coldstream and Catling 1997, 255, no. f 22, fig. 169
Kato Phana (Chios)	1	Lamb 1935, 154, no. 3
The sanctuary at Mandra on Despotiko	1	Kourayos and Burns 2004, 149, fig. 20
The sanctuary of Artemis Hemera at Lousoi	1	Only one fibula from the sanctuary of Artemis Hemera is a double-disk fibula, however there are also fragments of other fibula (single or double disc) Mitsopoulos-Leon 2012, 168, no. 363, pl. 30; Blinkenberg also publishes one example from Lousoi. Blinkenberg 1926, 265, no. XV IC
Samos	?	Dunbabin reports only “unpublished.” Dunbabin 1940, 434
Paros	?	Dunbabin reports “several small fibulae” and cites Blinkenberg. Dunbabin 1940, 434

Table 4.13: The distribution of truncheon or rod pendants

Sites	**Number**	**Sources**
The Archaic Artemision at Ephesus	17	Hogarth 1908b, 189, pl. 35, 6–14
The sanctuary of Hera Limenia at Perachora	6	Stubbings 1940, 443, nos. A309–A314, pl. 188
The sanctuary of Artemis Orthia	3	Dawkins 1929a, 243, pls. 174, 11; 175, 6, 8
The sanctuary of Athena Lindia (Lindos, Rhodes)	3	Blinkenberg 1931, 102, nos. 215–17, pl. 10
The Kamiros well (Rhodes)	1	Housed at the British Museum, Accession Number (BM 1864,1007.673)

Figures

Figure 4.1: Distribution of worked animal materials in the Greek world.

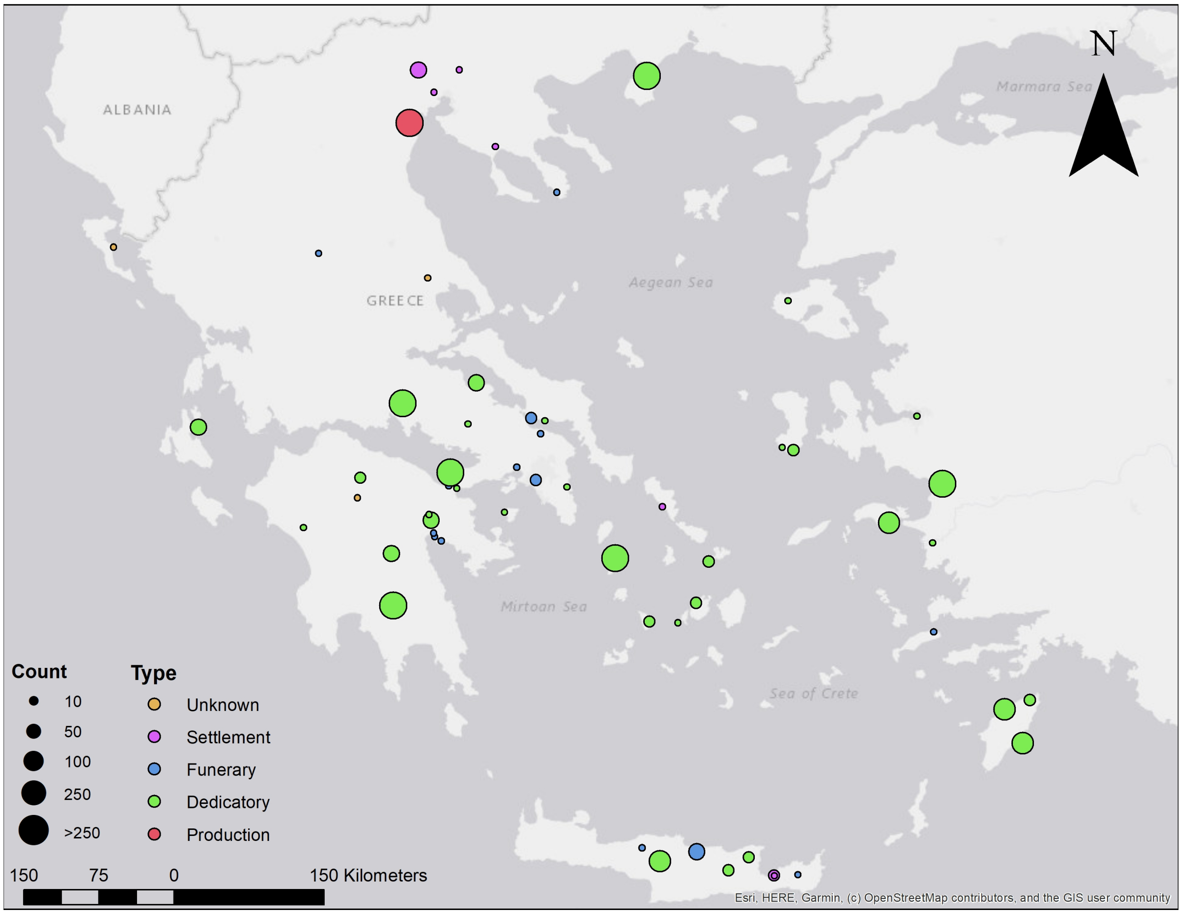


Figure 4.2: Bone or ivory pendant found in the "Tomb of the Rich Athenian Lady." Smithson 1968, 116, no. 81, pl. 32; Papadopoulos and Smithson 2017, 175–76, no. T15-81, fig.2.100.

Figure 4.3: Dipylon statuette, NM 776.

Figure 4.4: Dipylon ivory statuettes, NM 778, NM 779, NM 777, image by Hermann Wagner (D-DAI-ATH-NM 3332).

Figure 4.5: Ivory brooch found in Grave 113 at the Corinthan North Cemetery. Blegen, Palmer, and Young 1964, Grave 113, 62, no. 113-1, pl. 13.

Figure 4.6: A plan of the sanctuary of Artemis Orthia with the locations of worked animal objects. After Dawkins 1929b, 6, 14, figs. 2, 8, pl. 3.

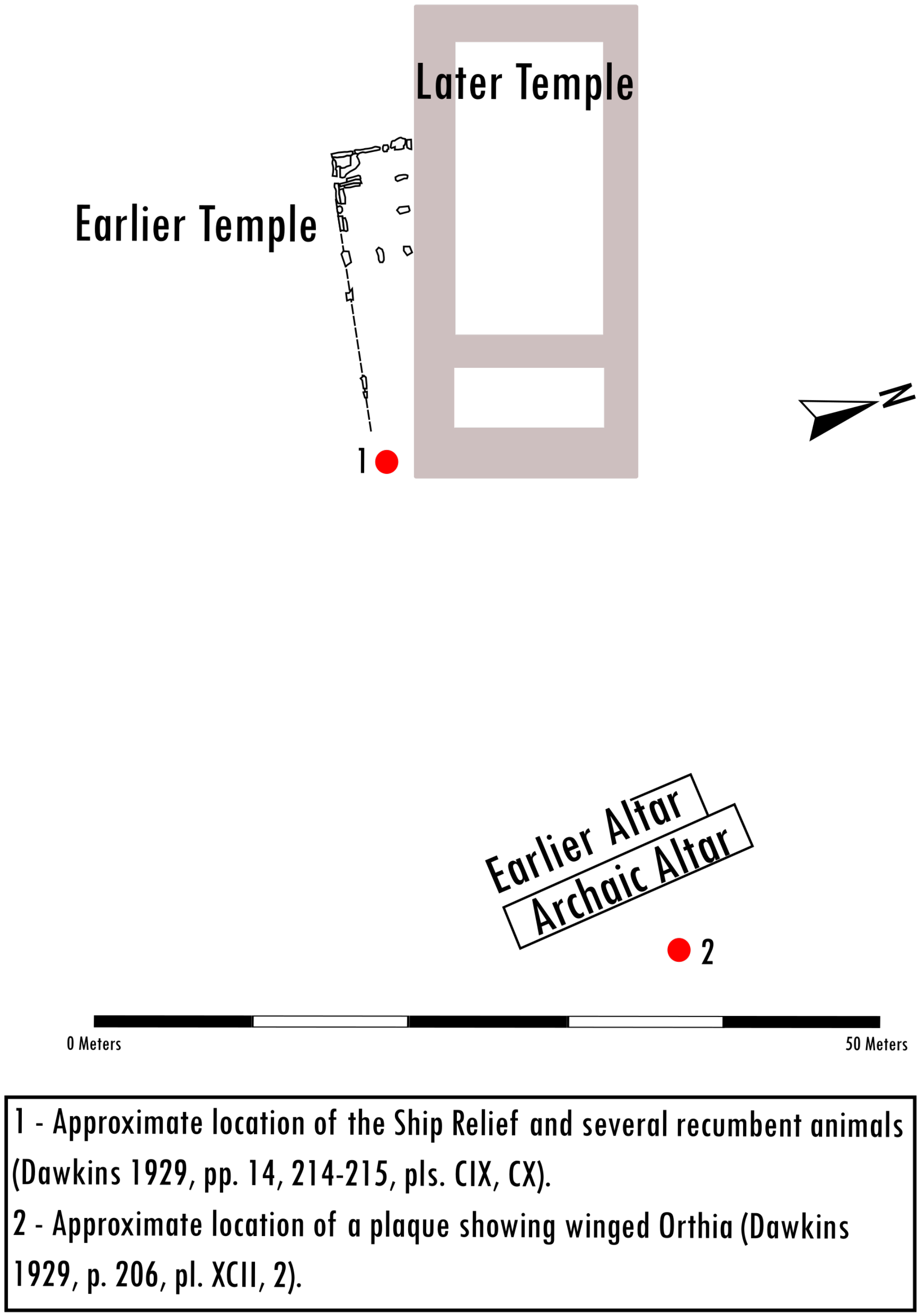
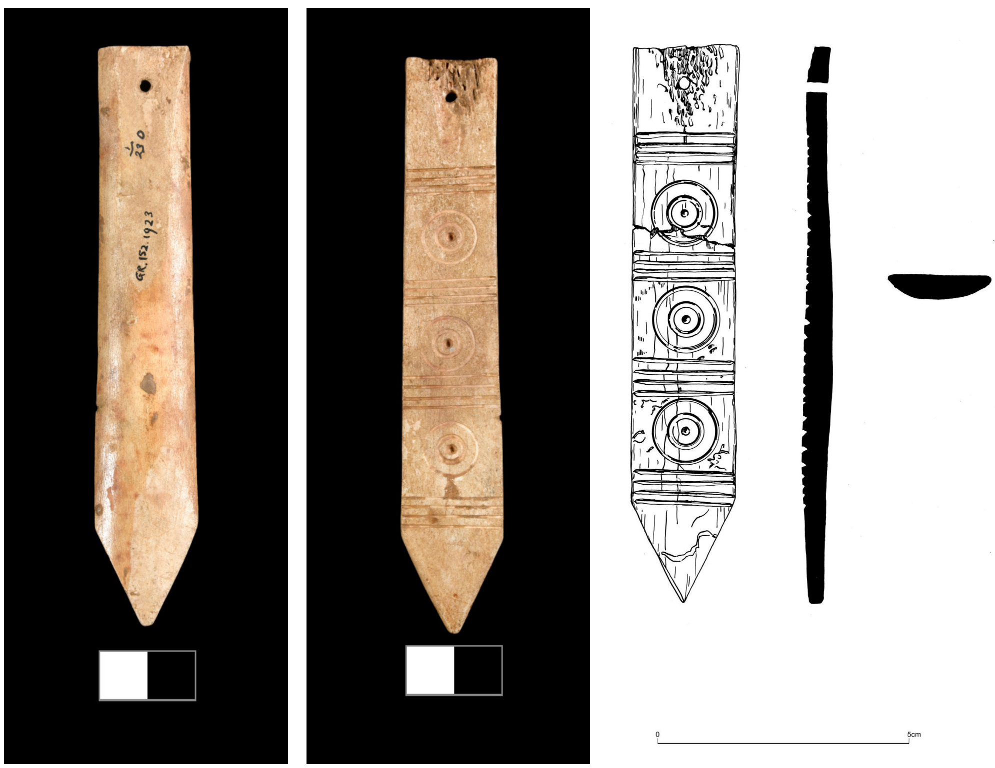


Figure 4.7: Worked bone shafts from the sanctuary of Artemis Orthia: *a*, a partially preserved example from the Ashmolean Museum (accession number: AN1923.84, © Ashmolean Museum, University of Oxford); *b*, an example with blackening from the Ashmolean Museum (accession number: AN1923.83, © Ashmolean Museum, University of Oxford), *c*, an example from the Metropolitan Museum of Art (accession number: 24.195.181).

(a) (b) (c)

Figure 4.8: Carvings of female figures from the sanctuary of Artemis Orthia, image by Hermann Wagner (D-DAI-ATH-NM 3455).

Figure 4.9: Pointed strips from the sanctuary of Artemis Orthia: *a*-*b*, two views of a strip from the Fitzwilliam Museum (accession number: GR.152.1923, © Fitzwilliam Museum, University of Cambridge); *c*, a drawing of a strip from the British Museum (accession number: 1923,0212.613, © The Trustees of the British Museum).



(a) (b) (c)

Figure 4.10: Undecorated strips from the sanctuary of Artemis Orthia: *a*-*b*, the Ashmolean Museum, accession numbers: AN1923.90 and AN1923.98 (© Ashmolean Museum, University of Oxford).

(a)

(b)

Figure 4.11: Rectangular strip from the sanctuary of Artemis Orthia. The British Museum, accession number: 1923,0212.617 (© The Trustees of the British Museum).

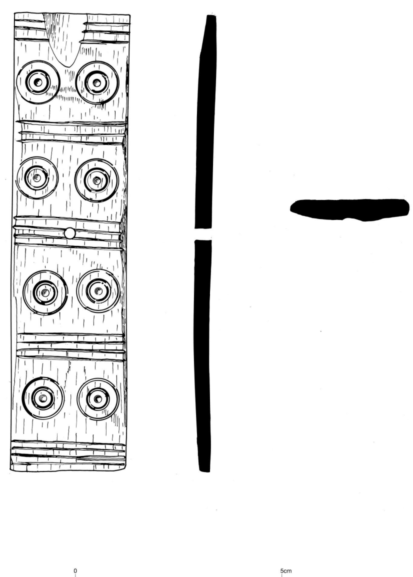
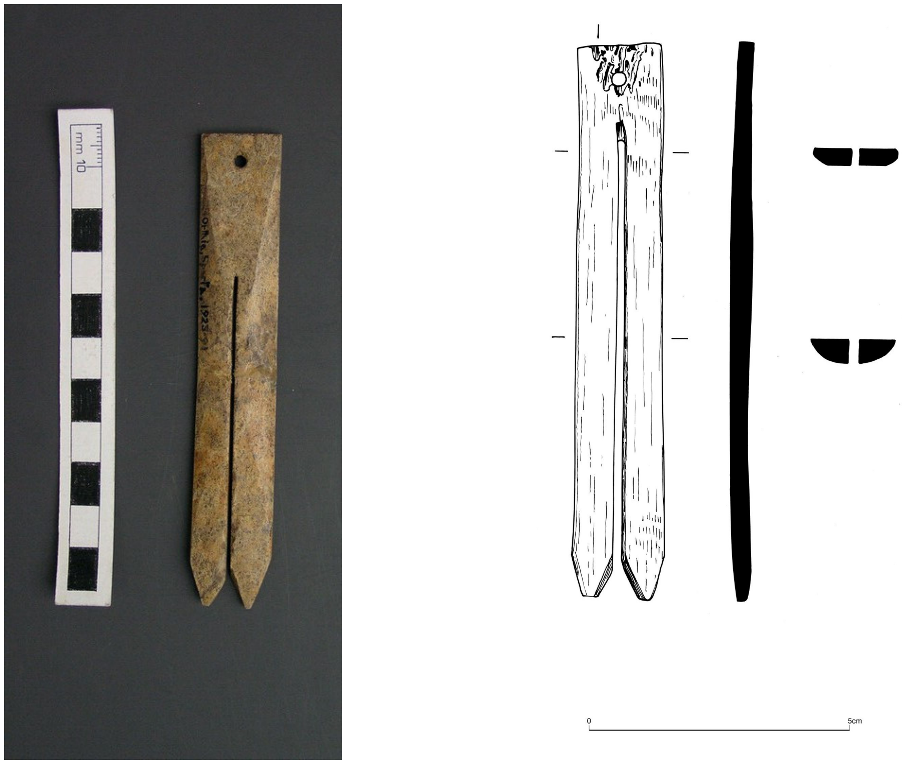


Figure 4.12: Forked object from the sanctuary of Artemis Orthia: *a*, an example from the Ashmolean Museum (accession number: AN1923.91, © Ashmolean Museum, University of Oxford); *b*, a drawing of an example from the British Museum (accession number: 1923,0212.619, © The Trustees of the British Museum).



(a) (b)

Figure 4.13: Weaving tablets from the sanctuary of Artemis Orthia, after Dawkins 1929a, pls. 170, 10–11, 173, 1. Image by Leah Olson.

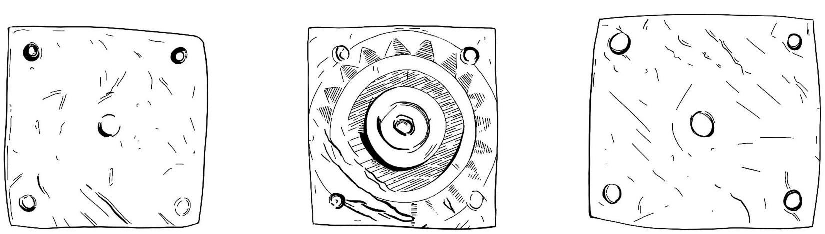
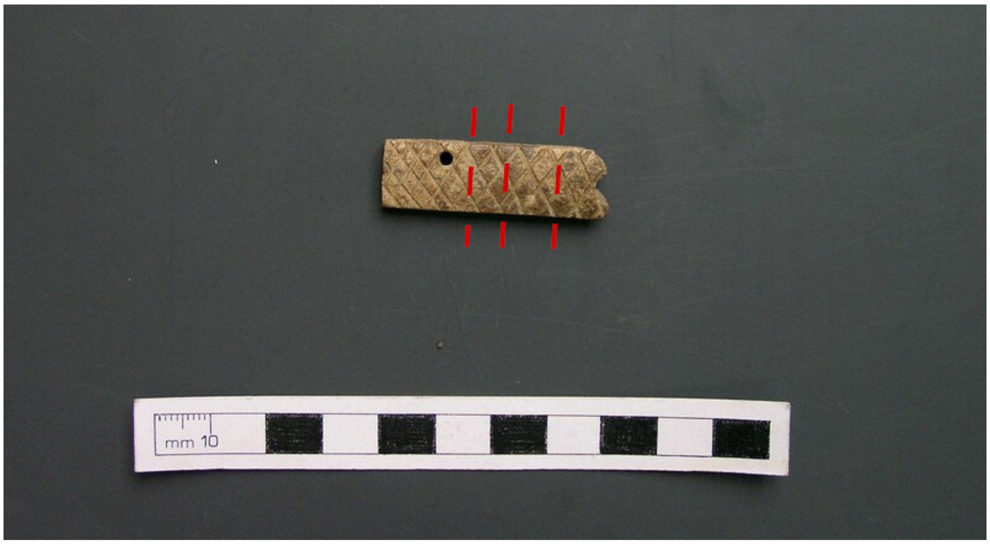
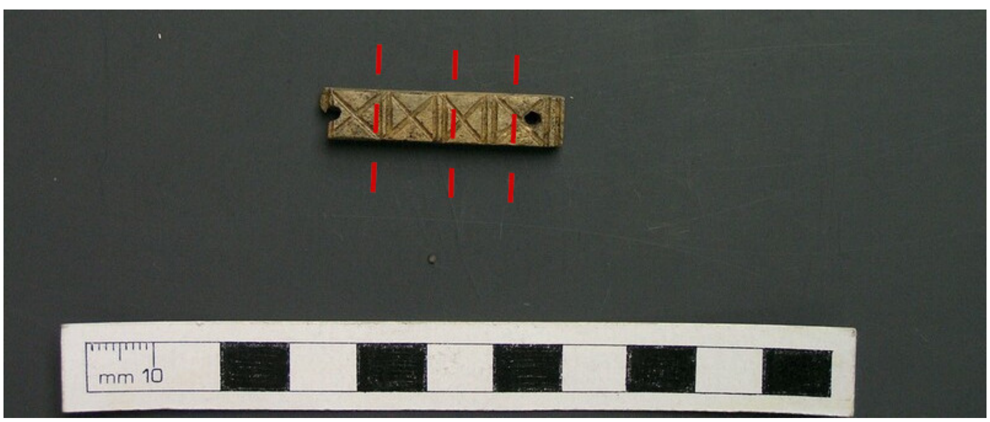


Figure 4.14: 20th-Century weaving tablet from Nepal (leather). The British Museum, accession number: As1992,10.11 (© The Trustees of the British Museum).

Figure 4.15: Possible spacers from the sanctuary of Artemis Orthia: *a*-*b*, examples from the Ashmolean Museum (accession numbers: AN1923.108 and AN1923.109, © Ashmolean Museum, University of Oxford).



(a)



(b)

Figure 4.16: A plan of Aetos with the locations of worked animal objects. After Anderson and Benton 1953, 256–257, figs. 1–2.

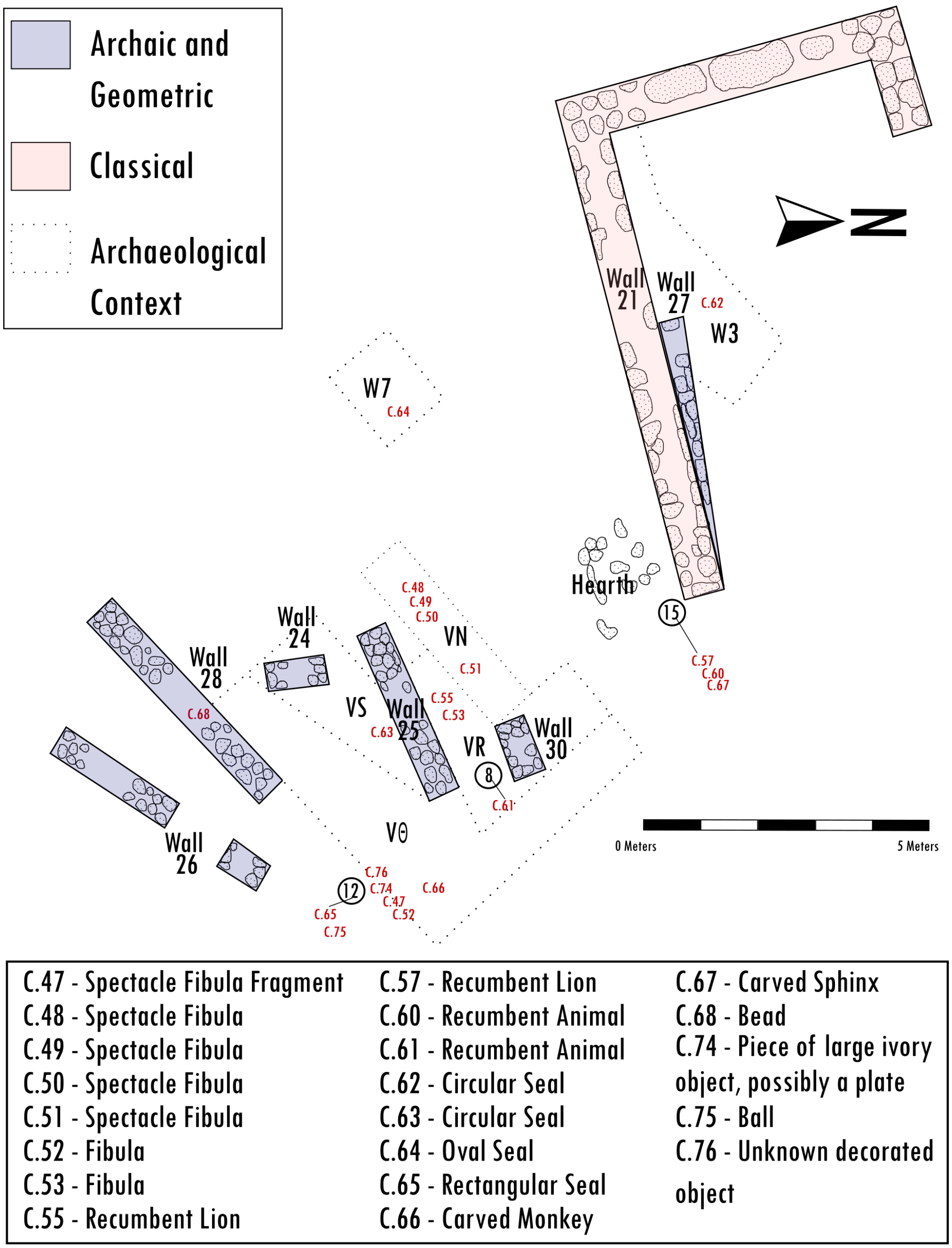


Figure 4.17: A plan of the Artemision at Ephesus with the locations of worked ivories. After Bammer 1992, 195, fig. 1; Kerschner and Prochaska 2011, 74, fig. 1. 1 - Cult Vessel with handle in shape of statuette, 2 - Lower part of a female statuette, 3 - Female statuette, 4 - Female statuette, 5 - Upper part of a female statuette, 6 - Head, 7 - Head, 8 - Head, 9 - Head aryballos, 10 - Relief of a frontal face, 11 - Relief of a frontal face, 12 - Protome of a Griffin, 13 - Head of a Lion, 14 - Ram, 15 - Recumbent Goat, 16 - Relief of an ibex, 17 - Couchant Griffin, 18 - Incised plaque, 19 - Incised plaque, 20 - Incised plaque, 21 - Cover of a cup.

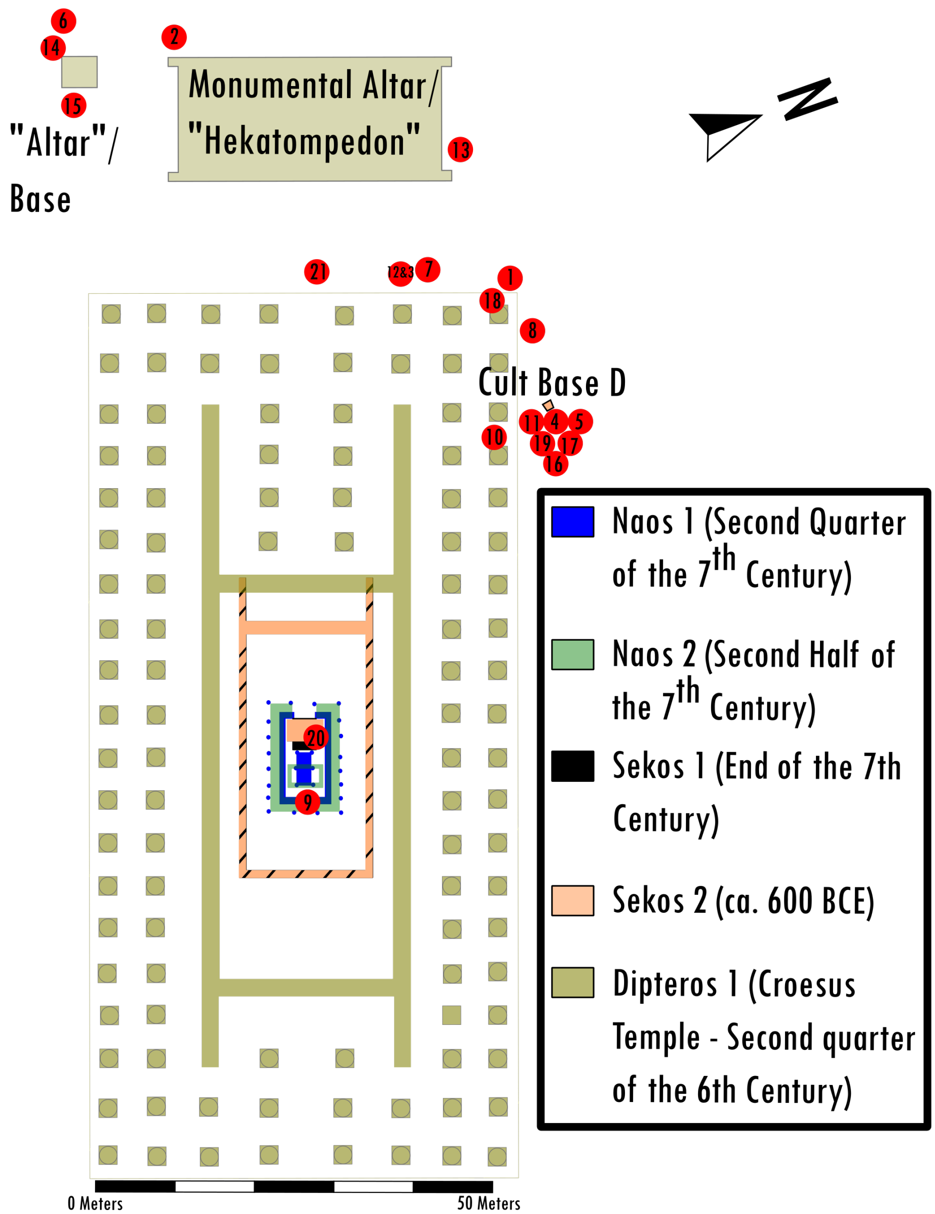
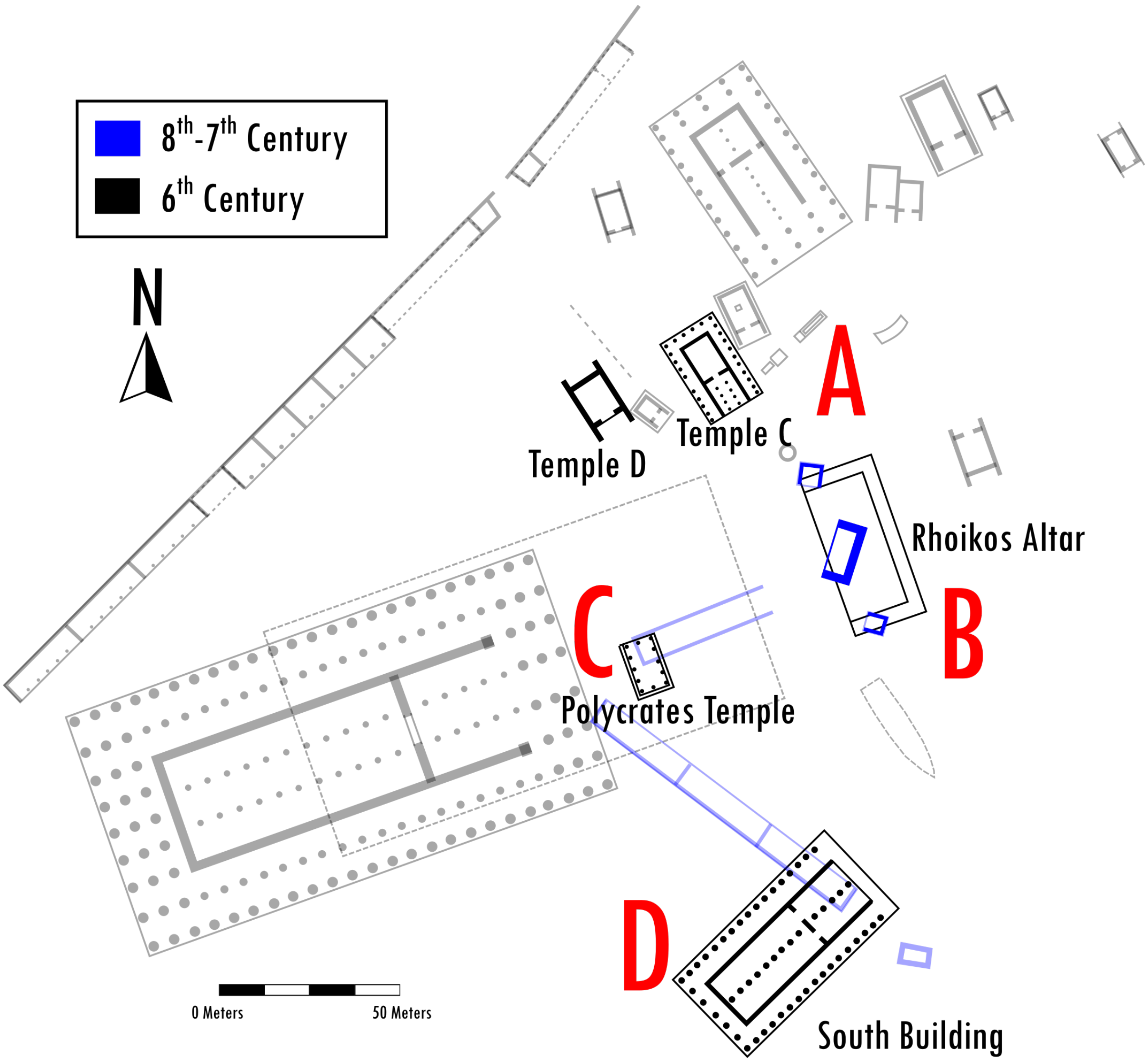


Figure 4.18: Ulna awls: *a*, an example from Macedonia (Bronze–Iron Age) (The British Museum, accession number: 1919,1119.52); *b*, an example from El Argar, Spain (Early–Middle Bronze Age) (The British Museum, accession number: 1889,0704.120, © The Trustees of the British Museum).

(a) (b)

Figure 4.19: A plan of the Samian Heraion with the locations of worked animal objects, after the plan found in Kyrieleis 1981 and adapted from the plan digitized by Tomisti.



A: Kouros head found in 1979 Excavations in area around Temple D (Kyrieleis 1980, 348, fig. 18). Torso of a sphinx found in association with Temple C (Freyer-Schauenburg 1966, 3, no. 1).

B: Medusa relief and rider relief found in the ash layer of the Rhoikos altar. Egyptianizing plaque and a carving of a bearded man found south of the Rhoikos altar. Torso of a female statuette found east of the Rhoikos altar (Freyer-Schauenburg 1966, 5-8, nos. 7, 8, 11, 16, 12).

C: Perseus relief found in closed layer under the stairs of the Polycrates temple (Freyer-Schauenburg 1966, 4, no. 5).

D: The Troilos relief was found west of the South Building. Fragments of a carving of a woman's face were found south of the South Building. A seal with lying felines, a fragment of a statuette, bowl, two combs, a hathor capital, and a scarab found were found in the rubble of the South Building. A statuette of a man and a pyxis were found in the canal west of the south hall (Freyer-Schauenburg 1966, 5-12, nos. 6, 9 , 10, 13, 25, 27, 28, 30, 31, 18, 23).

Figure 4.20: Antler fibula plate from the Artemision at Thasos, image by Philippe Collet (© École française d'Athènes).

Figure 4.21: Distribution of worked antler in the Greek world.

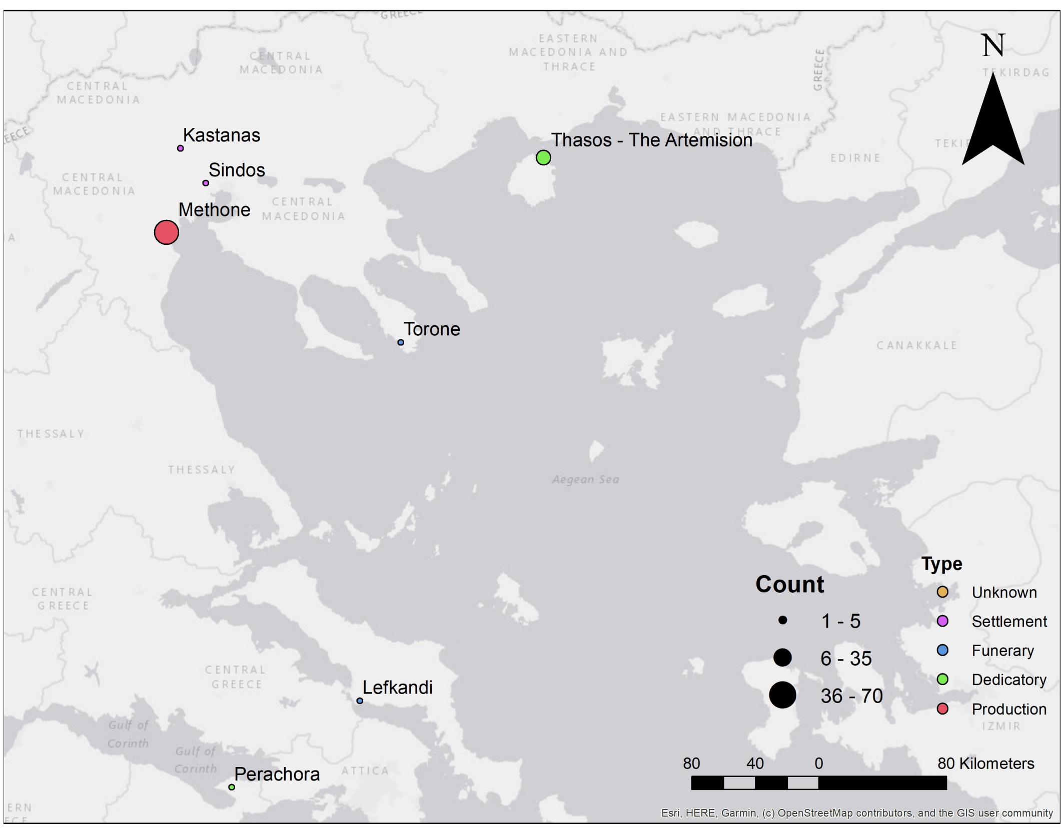


Figure 4.22: Carved hands and feet from the Halos deposit at Delphi, image by Dan Diffendale.

Figure 4.23: Smaller set of carved faces from the Halos deposit at Delphi, image by Dan Diffendale.

Figure 4.24: Ivory relief from the Halos deposit at Delphi, image by Richard Buck.

Figure 4.25: Worked bone shafts from the Kamiros well (Group 1). The British Museum accession numbers, *a-f*: 1864,1007.558, 1864,1007.581, 1864,1007.568, 1864,1007.551, 1864,1007.532, 1864,1007.542 (© The Trustees of the British Museum).

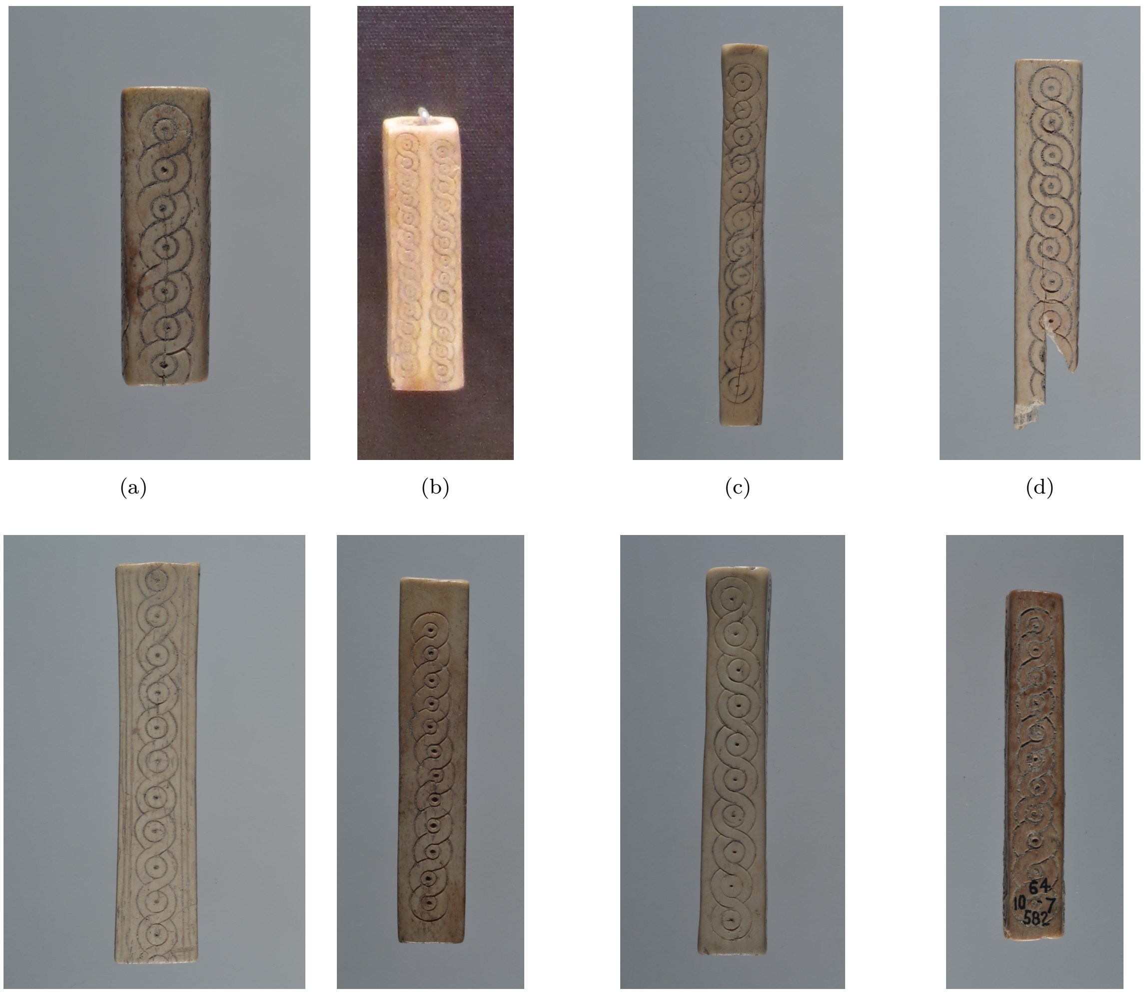
(a) (b) (c)

(d) (e) (f)

Figure 4.26: Details of worked bone shafts from the Kamiros well showing inexperienced compass incision (Group 1). The British Museum accession numbers, *a-c*: 1864,1007.530, 1864,1007.534, 1864,1007.560 (© The Trustees of the British Museum).

(a) (b) (c)

Figure 4.27: Examples of worked bone shafts from the Kamiros well (Group 2). The British Museum accession numbers, *a-h*: 1864,1007.564, 1864,1007.562, 1864,1007.536, 1864,1007.540, 1864,1007.552, 1864,1007.574, 1864,1007.576, 1864,1007.582 (© The Trustees of the British Museum).



(a) (b) (c) (d)

(e) (f) (g) (h)

Figure 4.28: Examples of worked bone shafts from the Kamiros well (Group 3). The British Museum accession numbers, *a-e*: 1864,1007.571, 1864,1007.553, 1864,1007.555, 1864,1007.556, 1864,1007.566 (© The Trustees of the British Museum).

(a)

(b)

(c)

(d)

(e)

Figure 4.29: Examples of worked bone shafts from the Kamiros well (Group 4). The British Museum accession numbers, *a-b*: 1864,1007.535, *c-d*: 1864,1007.579, *e-f*: 1864,1007.575 (© The Trustees of the British Museum).

(a)

(b)

(c)

(d)

(e)

(f)

Figure 4.30: “Animated” examples of worked bone shafts from the Kamiros well. The British Museum accession numbers, *a*-*d*: 1864,1007.573, *e*-*h*: 1864,1007.538 (© The Trustees of the British Museum).

(a) (b) (c) (d)

(e) (f) (g) (h)

Figure 4.31: Other examples of worked bone shafts from the Kamiros well. The British Museum accession numbers, *a*: 1864,1007.585, *b*: 1864,1007.537, *c*: 1864,1007.569, *d*: 1864,1007.616 (© The Trustees of the British Museum).

(a)

(b)

(c)

(d)

Figure 4.32: Schematic of technical choices evident in worked bone shafts from the Kamiros well.

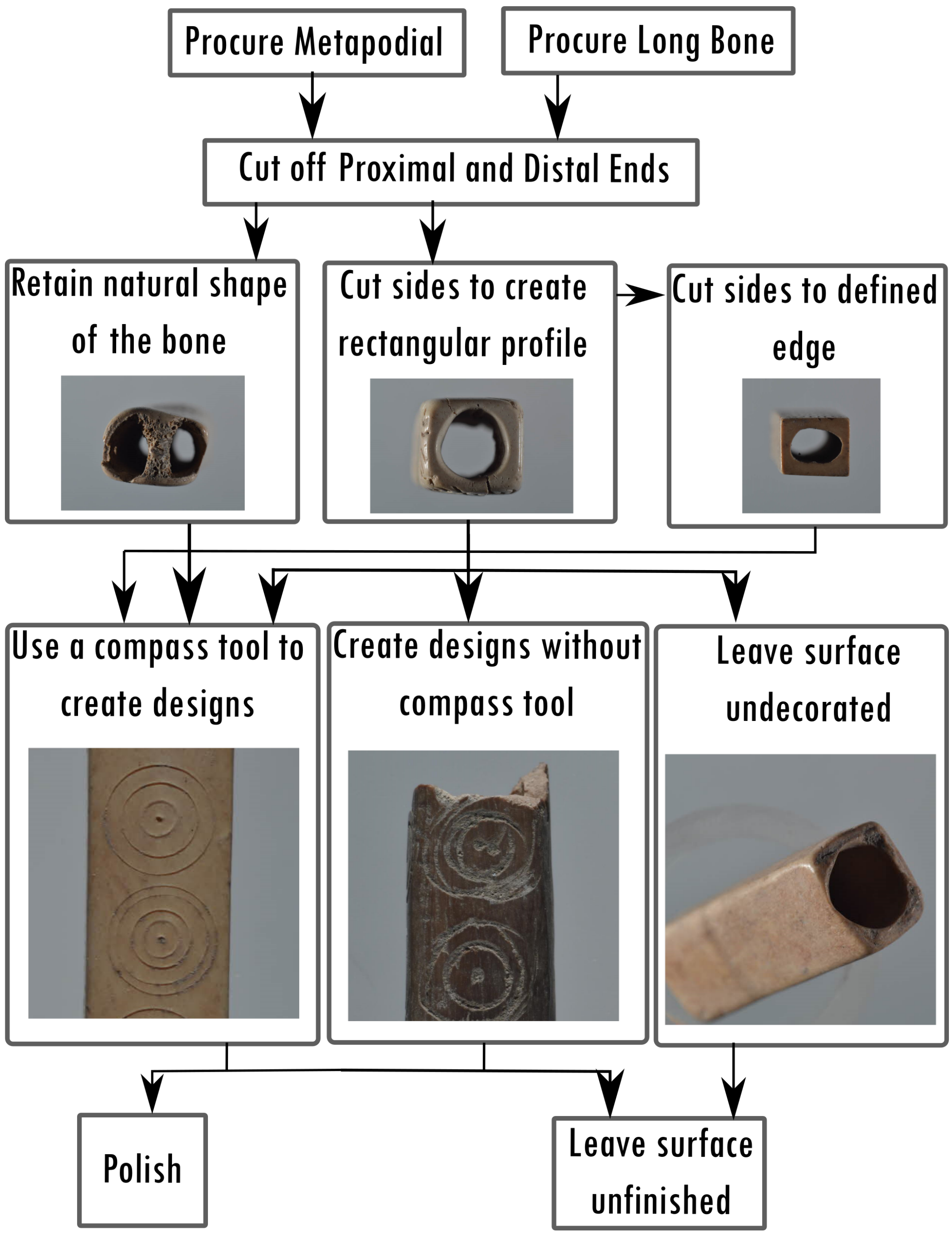
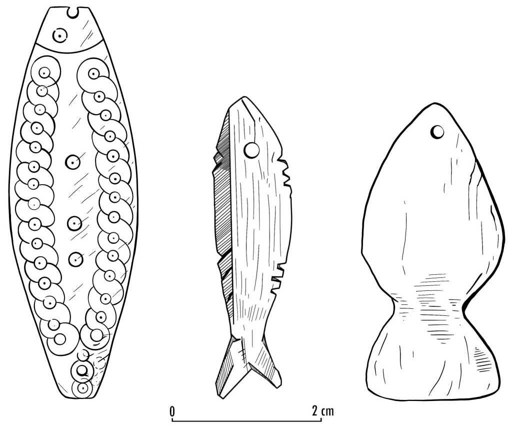
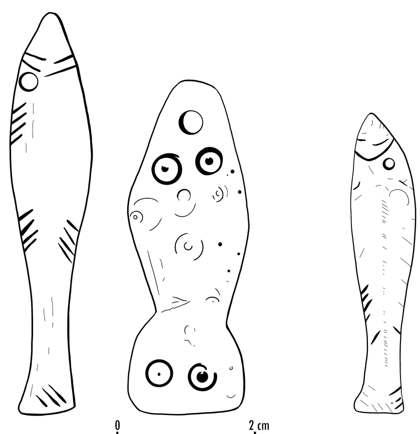


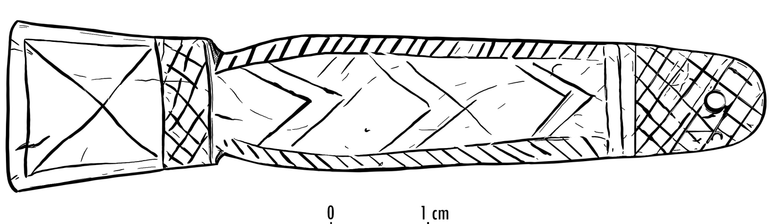
Figure 4.33: Fish pendants: *a*, Lindos, after Blinkenberg 1931, 101–2, nos. 210–12; *b*, The Kamiros Acropolis, after Jacopi 1932, 342, nos. 14596–98; *c*, The Seraglio Cemetery on Kos, after Morricone 1978, 173, fig. 312. Images by Leah Olson.



(a)

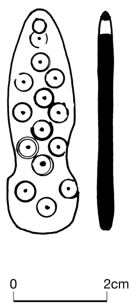


(b)



(c)

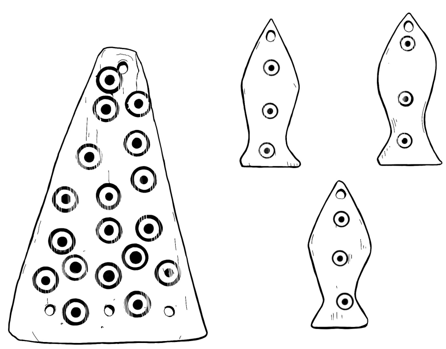
Figure 4.34: Smaller fish pendants: *a-c*, pendants from the Kamiros well (the British Museum, accession numbers: 1864,1007.664, 1864,1007.639, 1864,1007.638, © The Trustees of the British Museum); *d*, pendants from the Seraglio Cemetery on Kos (after Morricone 1978, 255, fig. 550, image by Leah Olson).



(a)

(b)

(c)



(d)

Figure 4.35: “Spearhead” pendants from the Kamiros well: *a-d*, examples from the British Museum (accession numbers: 1864,1007.672, 1864,1007.686, 1864,1007.655, 1864,1007.637, © The Trustees of the British Museum).

(a)

(b)

(c)

(d)

Figure 4.36: Other pendants from Rhodes: *a-b*, examples from the British Museum (accession numbers: 1864,1007.681 and 1864,1007.654, © The Trustees of the British Museum).

(a)

(b)

Figure 4.37: Rectangular female figure from the Kamiros well. The British Museum, accession number: 1864,1007.529 (© The Trustees of the British Museum). Drawing of reverse surface by Leah Olson.

Figure 4.38: Another rectangular female figure from the Kamiros well. The British Museum, accession number: 1864,1007.688 (© The Trustees of the British Museum).

Figure 4.39: Partially preserved rectangular female figure from the Kamiros well. The British Museum, accession number: 1864,1007.754 (© The Trustees of the British Museum).

Figure 4.40: Another partially preserved rectangular female figure from the Kamiros well. The British Museum, accession number: 1864,1007.635 (© The Trustees of the British Museum).

Figure 4.41: Female figurine from the Kamiros well. The British Museum, accession number: 1864,1007.631 (© The Trustees of the British Museum).

Figure 4.42: Partially burnt female figurine from the Kamiros well. The British Museum, accession number: 1864,1007.632 (© The Trustees of the British Museum).

Figure 4.43: Plaque showing a female figure from the Kamiros well. The British Museum, accession number: 1864,1007.665 (© The Trustees of the British Museum).

Figure 4.44: Partially preserved female figure from Ialysos. After Martelli 2000, 111, figs. 15–17, image by Leah Olson.

Figure 4.45: Female figure from Ialysos. After Martelli 2000, 111, figs. 18–20, image by Leah Olson.

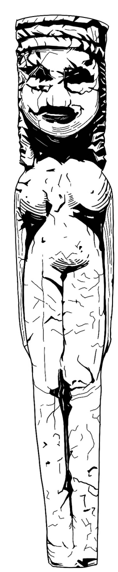


Figure 4.46: Pendant showing a female figure from Ialysos. After Martelli 2000, 111, fig. 27–29, image by Leah Olson.

Figure 4.47: Carving of two female figures from the Kamiros well. The British Museum, accession number: 1864,1007.633 (© The Trustees of the British Museum).

Figure 4.48: Carving of two female figures from Ialysos. After Martelli 2000, 111, fig. 22–23, image by Leah Olson.

Figure 4.49: Another carving of two female figures from Ialysos. After Martelli 2000, 111, fig. 24–25, image by Leah Olson.

Figure 4.50: Janiform figure from the Kamiros well. The British Museum, accession number: 1864,1007.671 (© The Trustees of the British Museum).

Figure 4.51: Circular seals from the Argive Heraion, image by Hermann Wagner (D-DAI-ATH-NM 3513).

Figure 4.52: Circular seals from the sanctuary of Artemis Orthia, image by Gösta Hellner (D-DAI-ATH-Sparta 388).

Figure 4.53: Additional circular seals from the sanctuary of Artemis Orthia, image by Gösta Hellner (D-DAI-ATH-Sparta 390).

Figure 4.54: Four-sided seal from the sanctuary of Artemis Orthia. The Fitzwilliam Museum, accession number: GR.145.1923 (© Fitzwilliam Museum, University of Cambridge).

Figure 4.55: Another four-sided seal from the sanctuary of Artemis Orthia. The British Museum, accession number: 1923,0212.581 (© The Trustees of the British Museum).

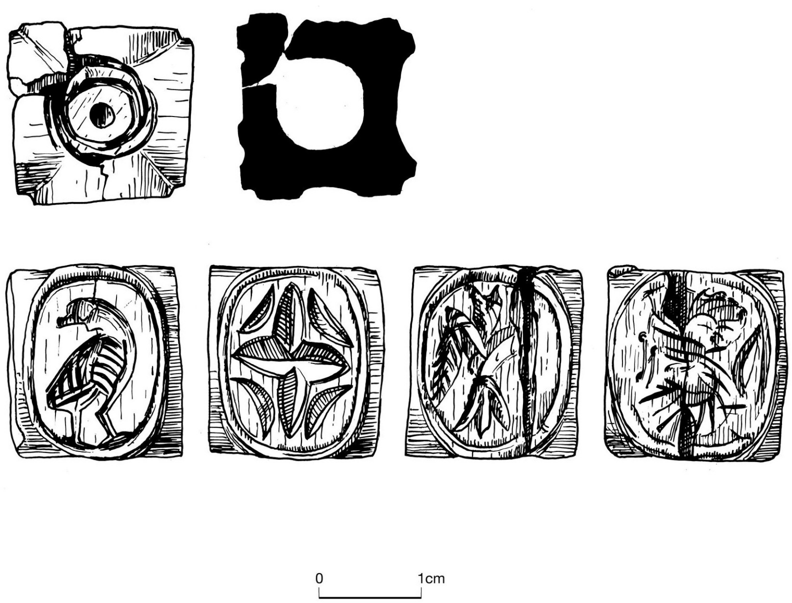


Figure 4.56: "Little Lion Seal" from the Kamiros well. The British Museum, accession number: 1864,1007.634 (© The Trustees of the British Museum).

Figure 4.57: Distribution of "Little Lion Seals."

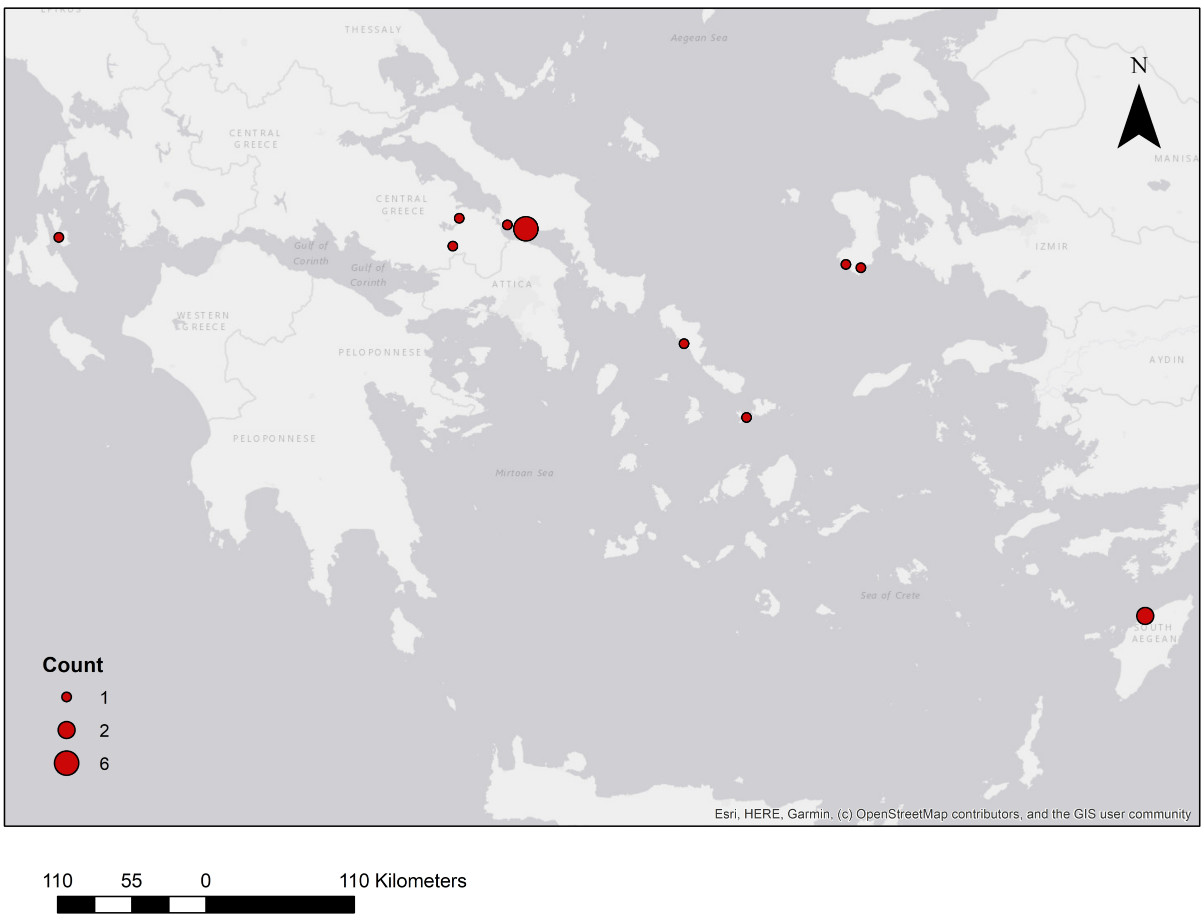
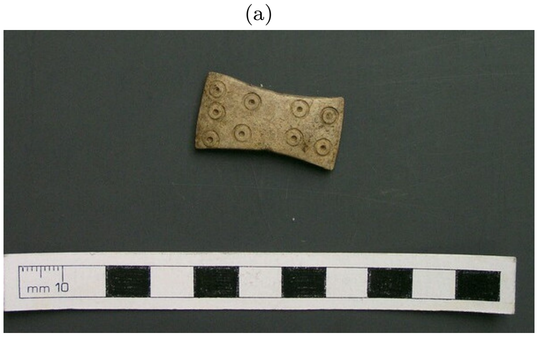


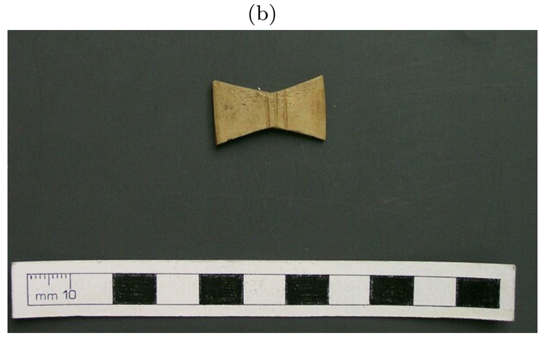
Figure 4.58: Miniature double axes from the sanctuary of Artemis Orthia. *A-D*, examples from the Ashmolean Museum (accession numbers: AN1923.99, AN1923.100, AN1923.101, AN1923.102, © Ashmolean Museum, University of Oxford).

(a)

(b)



(c)



(d)

Figure 4.59: Recumbent animals from the sanctuary of Artemis Orthia, image by Hermann Wagner (D-DAI-ATH-NM 3468).

Figure 4.60: "Beast of Prey" scene from the sanctuary of Artemis Orthia, image by Hermann Wagner (D-DAI-ATH-NM 3453).

Figure 4.61: Distribution of recumbent animals.

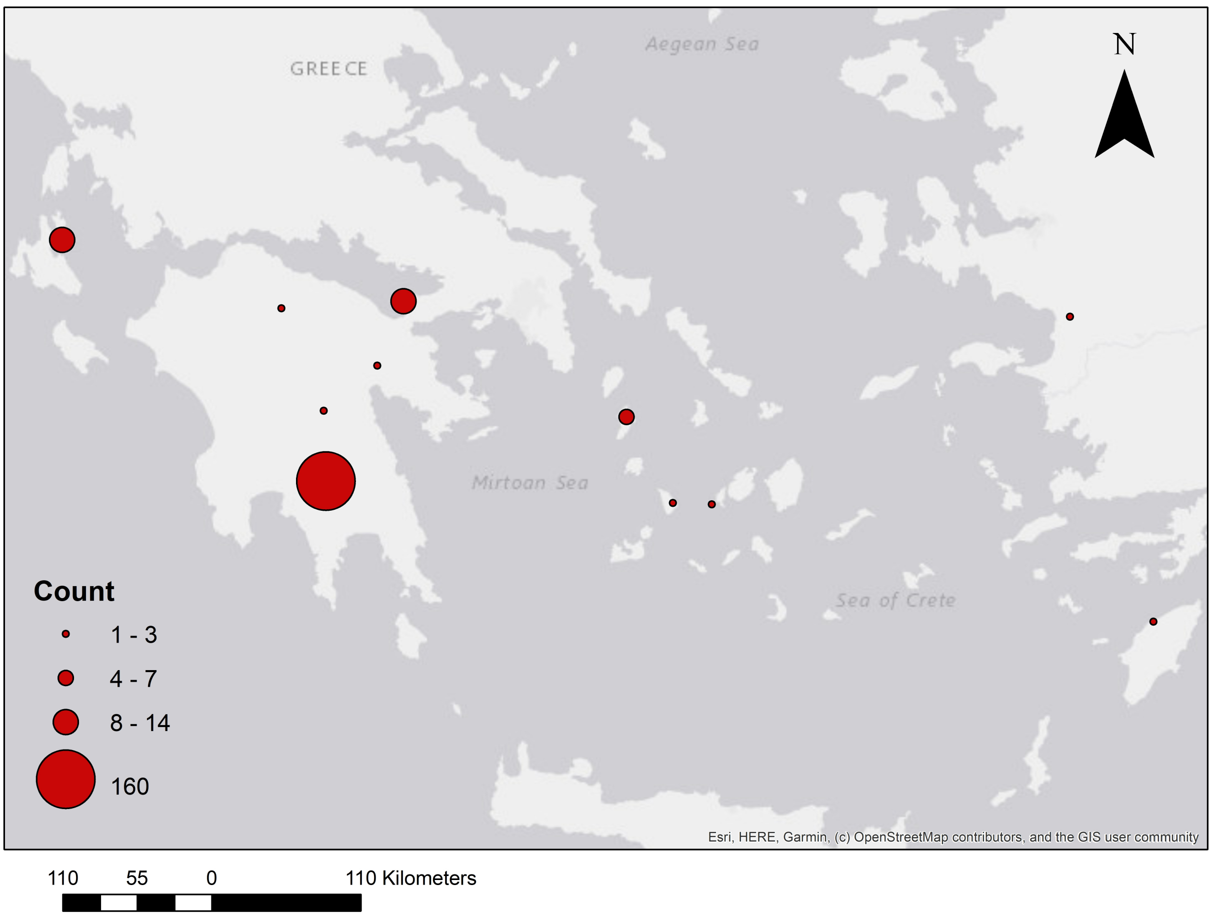


Figure 4.62: Carving of a stone lion on Kea. Photograph by Paul Harwood.

Figure 4.63: Bone spectacle fibula from the Archaic Artemision at Ephesus. British Museum accession number: 1907,1201.366 (© The Trustees of the British Museum).

Figure 4.64: Ivory spectacle fibulae from the Artemision at Thasos (© École française d'Athènes,/Philippe Collet).

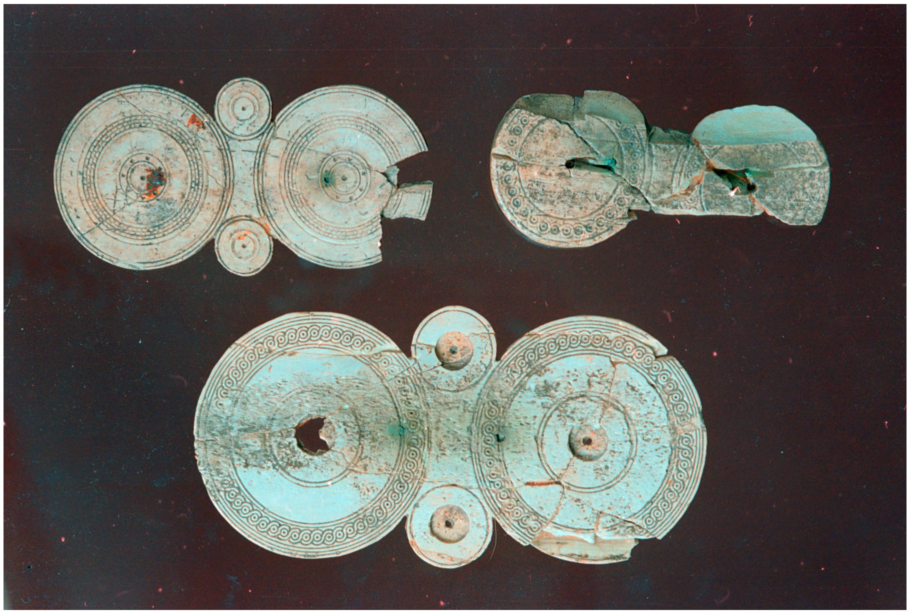
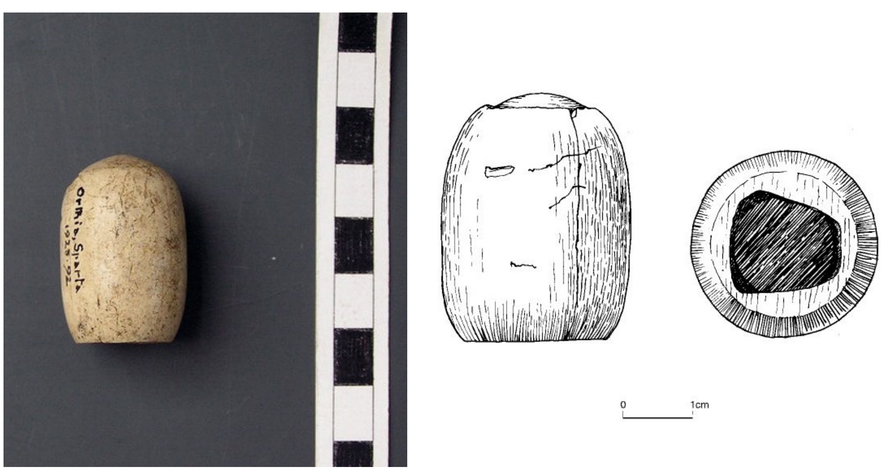
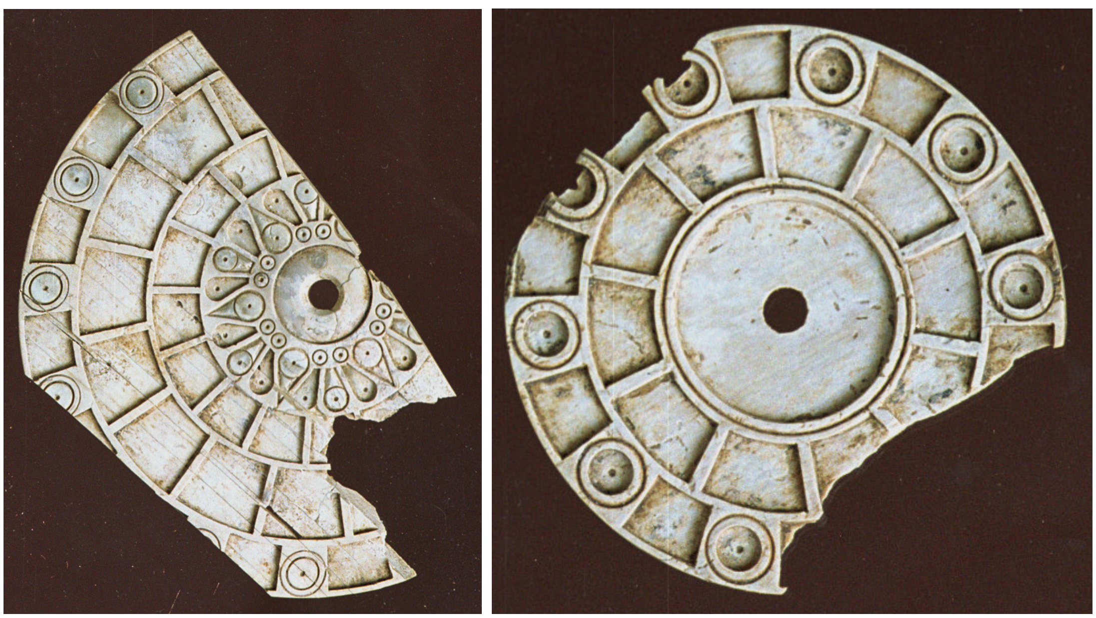


Figure 4.65: "Caps" from the sanctuary of Artemis Orthia: *a*, an example from the Ashmolean Museum (accession number: AN1923.92, © Ashmolean Museum, University of Oxford); *b*, a drawing of a cap from the British Museum (accession number: 1923,0212.620, © The Trustees of the British Museum).



(a) (b)

Figure 4.66: Cloisonné disks from the Artemision at Thasos, images by Philippe Collet (© École française d'Athènes).



CHAPTER 5

Worked Animal Materials at Ancient Methone

5.1 The Site

5.1.1 The Ecological Setting

The site of ancient Methone is located in North Greece on the southern edge of the west coast of the Thermaic Gulf. Today, it is approximately 400 meters from the shoreline, although during antiquity the site would have been directly on the coast. The highly active silting processes of the Haliakmon, Axios, Loudias, and Gallikos rivers have continuously shifted the shoreline farther from Methone, as has been shown by ongoing geomorphological research at the site.[1] The whole of the larger Thessaloniki plain was similarly active over the course of the occupation at Methone; Eric Fouache and his collaborators found that the plain "corresponded to a wide marine bay during the Neolithic times (6000 BP), and later it was characterised by a fast displacement of the shoreline, mainly during Late Bronze Age, Iron Age, and Classical-Archaic periods (2650–2300 BP)."[2] As a result of these processes, the creation of lagoon environments began in the Bronze Age, and by the 8th to 4th centuries BCE, "the alluvial plain continued to prograde and the wider Pella area was characterised by a brackish to limnic environment."[3] These silting processes indicate that Methone, and other sites in the region of the Thessaloniki plain, were situated in a dynamic region undergoing

1 Morris, Papadopoulos, Bessios, Athanassiadou, and Noulas 2020, 665–69.

2 Fouache, Ghilardi, Vouvalidis, Syrides, Styllas, Kunesch, and Stiros 2008.

3 Fouache, Ghilardi, Vouvalidis, Syrides, Styllas, Kunesch, and Stiros 2008, 1171.

ecological change.

It is difficult to make a direct comparison between current and past environments, as modern activities related to agriculture, water management, occupation, and tourism have had a major impact on the surrounding environment. The Greek state diverted the Axios river in the 1930s because it threatened to block the port of Thessaloniki, resulting in a shift of the delta closer to the site of ancient Methone.[4] While the Axios would have been farther from Methone in antiquity, and the Haliakmon delta was closer in the past (as well as the present), the ongoing preservation and ecological research into the Axios River Delta region may provide some indication of the ecological niches that existed somewhere in the vicinity of Methone during its ancient occupation. The Axios River Delta was recognized as protected region in 1975, and then recognized as a national park in 2009 owing to its environmental importance and biodiversity.[5] There are currently freshwater and saltwater fish (33 of the 36 species are indigenous), mammals, reptiles, and 215 species of bird living in the wetlands.[6] Additionally, the Axios Delta contains 15 separate habitat types as defined by the Habitats Directive of the European Union.[7] While the ecological patterns of the present cannot be assumed for the past, it is possible that similar habitats were visited or exploited by individuals living at ancient Methone. The wetland environment produced by the alluvial processes of the deltas may have afforded individuals access to plants, animals, and resources that were unavailable in other nearby ecological niches. Peregrine Horden and Nicolas Purcell argue that the role of wetlands in the Mediterranean is "underestimated," and that wetlands offer "levels of opportunity" for humans living near them.[8] Individuals would have used wetlands as a location for fishing and fowling, as well as for gathering plants and taking

4 Karageorgis et al. 2005, 310.

5 Vareltzidou and Strixner 2009.

6 Smardon 2009, 72.

7 Vareltzidou and Strixner 2009, 7.

8 Horden and Purcell 2000, 186–88.

advantage of the soil for farming.[9] Preliminary zooarchaeological evidence for large birds (likely water fowl) from early Archaic deposits on the West Hill of Methone indicate that individuals may have been hunting within wetland environments. The faunal assemblage also shows evidence for a variety of marine animals including fish, crustaceans, and cephalopods. Additionally, the vertebra of a cartilaginous fish (possibly a shark), and a tail spine from a ray in the order Myliobatiformes were discovered. The zooarchaeological assemblage offers evidence for a particular type of engagement with the landscape, but the range of possibilities of wetland and coastal environments suggests that individuals at Methone could have been frequenting these nearby ecological regions for a variety of purposes.

In addition to its proximity to the shoreline and river delta, Methone is also located only 45 km from the highest point of the Pierian Mountains.[10] The worked and unworked faunal assemblages suggest that those living at Methone were also hunting in these non-coastal environments, as there is evidence for wild boar and bear. Only 0.5% of the wild boar currently occupying Greece are found in wetlands, with the other 99.5% being found in oak, chestnut, or coniferous forests.[11] Similarly, current brown bear populations in Greece are confined to the Pindos and Rhodopi mountains.[12] Bear generally prefer forested areas, and avoid ecotones (transitional areas between habitat types) and subalpine/alpine pasture.[13] While undoubtedly shaped by modern anthropogenic factors, current habitat preferences of both brown bears and boar suggest they would have also avoided the wetlands during the time that Methone was occupied. The deer represented within the faunal assemblage also prefer woodlands (see below). These species likely inhabited the forested areas near the site, which are common to the North Aegean. Pollen studies show in the time following

---

9 Horden and Purcell 2000, 188.

10 The mountain range runs north-south, and its highest point is known as Flambouro (2190 masl). Gerasimidis, Panajiotidis, and Athanasiadis 2008, 640.

11 Tsachalidis and Hadjisterkotis 2009, 155.

12 Karamanlidis, Gabriel Hernando, Krambokoukis, and Gimenez 2015.

13 Mertzanis 1994, 190.

the Neolithic period, northern Greece went through two phases of forest growth in which pine and fir were the dominant tree species.[14] During the Classical period, Macedonia was a notable source of both timber and pitch for the Athenian navy, which prized pine and fir for "ship planking, masts and oars."[15] Methone sits at the crossroads of several different ecological zones, providing a spectrum of resources and opportunities for interaction between humans and the landscape. This varied landscape presents many niches, which may have been culturally constructed in different ways. Moreover, these ecological zones also served as venues for interactions between humans, animals, and the landscape.

5.1.2 The Cultural History of the Site

Methone was occupied from the end of the Neolithic (ca. 5000 BCE) until its destruction by Philip II in 354 BCE.[16] Following the Late Neolithic, excavations have revealed occupational evidence dating to multiple stages of the Bronze Age, the Early Iron Age, as well as the Archaic and Classical periods (see below).[17] The history and long occupation of Methone are closely tied to its favorable and strategic geographic position for trade and cultural interaction, as its location on the Thermaic Gulf afforded it access to larger Aegean and Mediterranean trade networks. Methone would have taken advantage of location through a harbor, evidence of which was found to the north of the site through geophysical survey.[18] Furthermore, the discovery of five Phoenician amphorae within an archaeological context (the *Hypogeion*, see below) dating to the 8th and early 7th centuries BCE, together with another found in the 4th-century BCE destruction deposit of the Agora, provides evidence for extended interaction with Phoenician traders.[19] The large quantity of ivory discovered

---

14 Gerasimidis and Athanasiadis 1995, 113.

15 Borza 1987, 36.

16 Besios and Noulas 2012, 399; Morris, Papadopoulos, Bessios, Athanassiadou, and Noulas 2020, 661.

17 Morris, Papadopoulos, Bessios, Athanassiadou, and Noulas 2020, 661–62.

18 Morris, Papadopoulos, Bessios, Athanassiadou, and Noulas 2020, 667–75.

19 Kasseri 2012; Athanassiadou 2012.

also speaks to Methone's interconnection with trade networks operating outside the Greek world. Similarly, the location of the site on the Haliakmon river offered individuals living at Methone access to the Balkan regions.[20] Based on the problematic Thucydidean chronology for the foundation of Syracuse, the traditional founding date for Methone is 733/732.[21] Plutarch's testimony describes the colonization of Methone by Eretrian settlers expelled from Korkyra, who were subsequently prevented from returning to their home.[22] The Eretrians then decided to settle an area in the north that was believed to be previously occupied by an ancestor of Orpheus named Methon, hence the name Methone; the neighbors of the settlers referred to them as the "men repulsed by slings." Plutarch's account is generally historical in the sense that some phases of the material culture at Methone (but not the earliest) date to the $8^{th}/7^{th}$ centuries BCE; however, there are problems with the historicity of foundation stories and traditional settlement dates.[23]

By the 5^{th} century BCE, Methone was a member of the Athenian League and an integral economic asset to Athens.[24] Despite strained relations between Athens and Macedonia, a series of Athenian decrees was granted to Methone in order to keep trade flowing between the two cities.[25] The relationship between Athens and Methone was a source of concern for the Macedonians, as these decrees cautioned the Macedonian king Perdiccas II as to the Athenian troops stationed at the nearby city Poteidaia.[26] They also granted Methone favorable trade conditions in order to maintain an Athenian supply of timber for its navy.[27]

---

20 Baltic amber found at the site may be evidence for trade with these regions as well.

21 Thuc. 6.3.

22 Plut. *Mor.* 293A–B. See also Tzifopoulos 2012.

23 The date of 733/732 should not be understood as historical, see Hall 2008.

24 *IG* I^3 61.

25 *IG* I^2 67.

26 Mattingly 1961, 154; Tzifopoulos 2012.

27 Borza 1987, 43; Meiggs 1982, 356; Boufalis Forthcoming.

With the rise of Macedon, Philip II turned his attention toward Athenian-controlled territory in Macedonia. In the mid-4th century BCE, Philip II besieged a series of cities, including Methone, in 354. The Athenian response to Philip's actions was to send 3000 troops to Methone, although the city fell to Philip's forces. Athens' military commitment to Methone is another clear sign of the economic importance of the site, a dominant feature of Methone throughout its history. Excavation and survey have shown that ancient Methone was not reoccupied after Philip II destroyed the site.

Archaeological work began on the site under the direction of Matthaios Bessios for the ΙΣΤ′ Ephoria in 2003,[28] and continued in the form of a synergasia between the Ephoria and AMAP from 2014–2017. Excavation by the Ephoria was conducted in multiple areas of the site, including on the East Hill (Plot 274, see fig. 5.1), where they found evidence for an Agora and Stoa dating to the 5th century BCE.[29] In the course of excavations on the East Hill, the Ephoria also discovered an exceptional deposit dating to the Early Iron Age and Archaic periods, specifically the late 8th–early 7th centuries BCE, within an 11–12 m shaft, which the excavators called an *Hypogeion* (literally "underground" or "basement"). The *Hypogeion* is a remarkable deposit as it contained a large corpus of early inscriptions that provide rich evidence for understanding the adoption of the Phoenician alphabet in Greece.[30] Moreover, the *Hypogeion* assemblage also exhibited a structured deposition of workshop remains from several industries, including some of the most concentrated evidence for worked animal object production at Methone. It is also the most abundant faunal deposit at Methone, and one of the largest malacological assemblages discovered in the Aegean.[31] Erosion of the East Hill removed most of the occupation levels that postdate the Early Bronze Age, but sondages in this area established the occupation sequence stretching from the Final Neolithic to the

[28] It was later the KZ Ephoria, now the Pieria Ephoria.

[29] Besios, Athanassiadou, and Noulas 2011, 243–45.

[30] Papadopoulos 2016a.

[31] Livarda, Veropoulidou, Vasileiadou, and Gelabert Forthcoming, 2.

destruction of the site in 354 BCE.[32]

The Ephoria also conducted excavations on the West Hill (Plots 245 and 229), where they found evidence for Bronze Age burials, the earliest of which date to the Early or Middle Bronze Age and continue into the Late Bronze Age.[33] In Plot 245, the Ephoria found evidence for a defensive trench dating to the Early Iron Age, as well as an arrangement of post holes corresponding to an apsidal building.[34] In Plot 229 of the West Hill, the Ephoria also uncovered a series of multi-room Archaic structures the initial occupation of which began in the second half of the 7th century BCE and ended with a destruction event by fire in the 6th century BCE (see fig. 5.2).[35] The AMAP excavations were conducted in two areas of Plot 229 of the West Hill: the northern and southern sectors. The southern sector was adjacent to the previous excavations of the Ephoria, while the northern sector was separated from previous excavations by about 30 meters (see fig. 5.3). In the southern sector, the AMAP team discovered several more Bronze Age tombs adjacent to those excavated by the Ephoria.[36] The AMAP team also detected Early Iron Age occupation in both the northern and southern sectors of the West Hill. In the northern sector, the earliest evidence for occupation was a pithos set into the bedrock of Trench 3, and a posthole at the same elevation in the adjacent Trench 4. These features are associated with an occupation that ended in the 8th century BCE, although significant quantities of earlier ceramics were also found. Morris and her collaborators highlight the similarities between these installations and the Early Iron Age pits found by the Ephoria in Plot 245.[37] In the southern sector, a series of post holes in

32 Besios, Athanassiadou, and Noulas 2011, 241.

33 Morris, Papadopoulos, Bessios, Athanassiadou, and Noulas 2020, 716.

34 Besios, Athanassiadou, Gerofoka, and Tolia-Christakou 2006, 375; Besios, Athanassiadou, and Noulas 2011, 246.

35 Besios and Noulas 2012, 401.

36 Morris, Papadopoulos, Bessios, Athanassiadou, and Noulas 2020, 680–92.

37 Morris, Papadopoulos, Bessios, Athanassiadou, and Noulas 2020, 694; Besios, Athanassiadou, and Noulas 2011, 247.

an apsidal arrangement was discovered. The AMAP team referred to this feature as the "Post-Hole Structure," and it is consistent with other Early Iron Age architecture found by the Ephoria in Plot 245, as well as examples from sites like Eretria (the mother city of Methone), Oropos, and elsewhere.[38] The Post-Hole Structure was destroyed in the early 7th century BCE, and then the West Hill was converted to an industrial area in a leveling phase in the mid-7th century BCE.[39]

Industrial activity beginning in the 7th century BCE and ending in the mid-6th century BCE was also detected in the northern and southern sectors of the West Hill. At least three kilns, as well as debris related to metallurgy and worked animal material production, were found in this area.[40] Morris et al. argue that the artifact distribution did not represent discrete areas of specific industrial activities, but rather it suggests "widespread production and manufacturing, perhaps with major fuel and firing facilities (kilns and hearths) on top of the hill and individual casting and finishing processes spread across surrounding spaces and structures."[41] The industrial evidence in the northern sector was found in conjunction with two phases of architectural remains from both the 7th and 6th centuries BCE, which are thought to be the same as those observed by the Ephoria in the West Hill structures.[42] This destruction event was observed across the West Hill, as well as in archaeological contexts from the East Hill.

The AMAP excavations also detected evidence for the mid-6th century BCE destruction in the early deposits of a large subterranean feature on the West Hill that is similar to the *Hypogeion*. Like the *Hypogeion* of the East Hill, Pit 46/*Hypogeion* 2 was another feature

38 Morris, Papadopoulos, Bessios, Athanassiadou, and Noulas 2020, 692; Mazarakis Ainian 1997, 2007.

39 Morris, Papadopoulos, Bessios, Athanassiadou, and Noulas 2020, 699.

40 Morris, Papadopoulos, Bessios, Athanassiadou, and Noulas 2020, 699.

41 Morris, Papadopoulos, Bessios, Athanassiadou, and Noulas 2020, 699.

42 Morris, Papadopoulos, Bessios, Athanassiadou, and Noulas 2020, 699.

cut into at least 12 meters of bedrock.[43] The context was located immediately south of the Bronze Age burials, and a few meters south of the multi-room structures on the West Hill. The function of Pit 46/*Hypogeion* 2 is somewhat unclear, although like the first *Hypogeion*, it may have served as a storage shaft for part of its use.[44] While excavations did not reach the bottom, the AMAP team identified three phases of deposition. The earliest identified phase occurred in the Archaic, with much of the material dated to the second quarter of the 6th century BCE, and the latest material dated to 520 BCE. The preliminary report notes that this phase is roughly concurrent with the widespread destruction of the 6th century BCE, and they suggest some of the material may represent debris from that event.[45] The second filling phase dates mostly to the late 5th century BCE and was marked by heavier materials like roof tiles. It appears that the filling took place over the course of many dumps, as ceramic joins were often separated by meters of fill.[46] Finally, the last phase, composed of material dating to mainly the 4th century BCE, likely represents a "shallow fill" after the previous levels had settled.[47] Outside of Pit 46/*Hypogeion* 2, very little evidence for Classical occupation was found on the West Hill perhaps due to modern plowing; however, occupation dating to the Classical period north of the West Hill, near the ancient shoreline, was revealed as part of a salvage excavation conducted by the Ephoria in 2017.[48]

Throughout the course of these excavations, exceptional examples of worked animal materials were discovered. Evidence from the concentration of industrial activity on the West Hill, workshop debris in the *Hypogeion* of the East Hill, as well as materials from other contexts, show that craftspeople at Methone worked a variety of objects from bone,

---

43 The feature was 2.2 m (east-west) by 2.3 m (north-south) at the top, and then tapered to 1.9 x 1.7 m at the bottom; see Morris, Papadopoulos, Bessios, Athanassiadou, and Noulas 2020, 702–4.

44 Morris, Papadopoulos, Bessios, Athanassiadou, and Noulas 2020, 711.

45 Morris, Papadopoulos, Bessios, Athanassiadou, and Noulas 2020, 705.

46 Morris, Papadopoulos, Bessios, Athanassiadou, and Noulas 2020, 705.

47 Morris, Papadopoulos, Bessios, Athanassiadou, and Noulas 2020, 706.

48 Morris, Papadopoulos, Bessios, Athanassiadou, and Noulas 2020, 671.

antler, horn, ivory, and other types of animal tooth (see figs. 5.4 and 5.5 and table 5.1). The worked animal object assemblage at Methone represents a wide range of animals:[49] sheep, goat, wild boar, domestic pig, cattle, donkey, red deer, fallow deer, wolf and/or dog, bear, elephant, and an extinct proboscidean. These animals occupy different environments and biological niches; some are wild, while others are domesticated. The production of these animal materials links practices of agropastoralism, hunting, craft production, and other forms of social behaviors. Underpinning these acts is a range of human-animal relationships that are brought together in the hands of the producer. As many of the contexts that were excavated at Methone were industrial in some way, most of the worked animal objects are the byproducts of production. Alongside production waste, the worked assemblage contains some finished products, unfinished objects, and raw materials. Based on the contexts that were excavated, and the nature of the archaeological record on the West Hill, nearly all of the worked animal objects and production waste dates to the Archaic period or Early Iron Age. The few examples of later Classical material found in Pit 46/*Hypogeion* 2 on the West Hill have been noted in Appendix A.

Table 5.1: Worked animal objects by material type at Methone

Material	**Plot 229**	**Plot 245**	**Plot 274**	**Total**
Antler	11	1	57	69
Bone	73	9	114	196
Horncore	18	1	16	35
Ivory	132	14	24	170
Tooth	5	-	10	15
Bone or Antler	2	1	-	3
Bone or Ivory	5	-	1	6
Total	246	26	222	**494**

49 Two pieces of ivory (IDs 85 and 202) may have come from hippopotamus, although it is not certain.

5.2 The Animals and the Materials

Bone, antler, and horncore are all osseous materials, meaning that at the smallest scale, they are composed of mineralized collagen fibrils made up of an intertwined structure of fibrous protein collagen, carbonated apatite, and water.[50] These fibrils are arranged in varying internal structures that make up the shapes of different types of osseous material. One of these materials, skeletal bone, is composed of two major structures: cortical bone and cancellous bone. Cortical bone is strong, dense, and concentrated within the portions of elements that support weight (e.g., the shaft of a femur) as well as on the outside of the bone. This type of bone is composed of osteons, structures made from concentric, circular layers of bone known as lamellae. The centers of the osteons contain the Haversian canal system which carries blood vessels through the bone.[51] Haversian canals are visible to the naked eye and are an important indicator for telling bone apart from other materials. Cancellous bone is different from cortical bone in structure and density. It makes up the interior of the element, as well as larger portions of the articular ends of elements (e.g., the head of the femur). Cancellous bone has a more diffuse and open structure, often described as "spongey." It does not have the same structural integrity as cortical bone and is less likely to preserve.

5.2.1 Bone

Bone is a common source of worked animal objects throughout the ancient world, but it also an incredibly varied material. Due to the differences between all species, the skeletal elements, and the properties of cortical and cancellous bone, it should not be thought of as a single, homogeneous category of raw material. These variations in size, structure, and hardness among bone types present varied challenges to a craftsperson and demand knowledge of the structures that make up specific elements. In many cases, the bone objects

---

[50] Weiner and Wagner 1998, 272.

[51] Weiner and Wagner 1998, 291–92.

discovered at Methone could not be assigned to a specific skeletal element, as producers usually target large portions of cortical bone when creating worked objects, significantly altering the elements in the process. The focus on cortical bone is shown by how frequently producers used the metapodial bones of cattle, deer, sheep, goat, and equids. In these animals, both the hindlimbs and the forelimbs are supported by a single, large metapodial composed of thick cortical bone that is fairly rectangular on the posterior surface. At birth, the metapodial bones begin as two separate elements that fuse early in the animal's life.[52] This process leaves a central sulcus that runs the length of the element and which a producer may use as a way to split the bone longitudinally. The metapodial bones are not meaty, rarely a desirable cut for butchers. The utility of metapodials, as well as their relative availability, make these bones an ideal choice for the creation of worked bone objects.[53] This focus on metapodial bones is not particular to the early Greek world, as there are many examples of objects made from metapodials across different cultures and time periods.[54] The Methone assemblage contains a number of proximal and distal ends of metapodial bones that have been sawed off by producers who were targeting the cortical bone in the center (see below). Most of these examples are from cattle, although some also represent donkey and sheep/goat. The abundance of metapodial production waste suggests that this was a common source for worked bone. Due to the thickness of usable cortical bone, there are many objects in the Methone assemblage that may be made from metapodial bones but have been modified beyond recognition. This is true also of long bones like the femur, tibia, humerus, and radius, the profile of which in cross-section can be less diagnostic than that of the metapodial bones in certain animals.

Much of the worked bone assemblage cannot be clearly assigned to a specific element or

52 Páral, Tichý, and Fabiš 2004.

53 For more on the uses of metapodials, see section 4.5.4.

54 In Greece, Metapodials were used to create tools at Azoria. Stefanakis, West, Haggis, Mook, Fitzsimons, Scarry, and Snyder 2007, 288. For outside of Greece, see: Campana 1989; Maeir, Greenfield, Lev-Tov, and Horwitz 2009.

species, although in some cases producers chose to leave the bone recognizable. Sometimes this is to showcase the natural aspect of the bone: in one example from Methone (ID 299), producers made a pendant from the third phalanx (claw bone) of a bear by drilling a hole in the proximal end and modifying nothing else; it likely still held the keratin nail at the time of its creation. Looking at this object, there is no doubt that it is made from a large animal with formidable claws. A bone object made from the first phalanx (finger bone) of a sheep or a goat (ID 321) also shows producers making slight modifications while leaving most of the structure intact. This object has three large drill holes running in the medial-lateral direction and its purpose is uncertain. The choice to leave it otherwise unmodified may have been a deliberate way to emphasize its animal origins.

5.2.2 Antler

Antler, similar in structure to bone, is an osseous appendage that grows out of the cranium on the members of the Cervidae family. Instead of a hollow cavity filled with marrow, antler has a dense cancellous interior, one of the major features distinguishing it from bone. During certain stages of the cervid's life, its antlers are covered in a characteristic layer of velvet, which acts as an external blood supply and gives the material a distinctive grooved appearance. Toward the end of the antler growth period, the portion of the skull connected to the antler base ossifies, cutting off blood flow to the velvet.[55] After this occurs, deer remove their velvet and shed their antlers. Unlike bone, antler is regrown and shed seasonally, a process linked to the rutting (mating) practices of each species. As a result, the growth and shed periods differ among species. Antler is described as having several parts: the beam, tines, and coronet. The beam is the main shaft of the antler from which tines can develop. Tines are a bifurcation in the beam resulting in an unequal fork shape, and the shorter end is the tine. Tines have specific names depending on the order of their growth;

---

55 MacGregor 1985, 12.

for example, the first is the brow, the second is the bez, and the third is the trez tine.[56] At the base of the antler is a surface that is sealed off during the shedding process. After it is shed, the antler around this surface gives it a crown shape, so it is called the coronet (see fig. 5.6).[57]

Originating from two species, red deer (*Cervus elaphus*) and fallow deer (*Dama dama*), the antler discovered at Methone is unique in the level of detail it shows about the species involved, as well as the material acquisition process. The antler of red deer is more robust, while the antler of fallow deer exhibits a distinct flattened portion known as the palmation.[58] The morphological differences between these types of antler would have likely caused producers at Methone to approach these materials in different ways, and may have favored red deer antler due to its larger size. Multiple objects from both species exhibit unmodified coronets, indicating that these antlers were not forcibly removed from the cranium after the animal was killed; they were naturally shed during the animal's life and then collected.

The majority of the antler came from the *Hypogeion*, which contained examples of the material that ranged from large, unaltered portions to fully worked objects. Objects made from shed antler include a tool with a flattened end (ID 10), one of the antler hammers (ID 8), as well as several pieces of raw material or production waste.[59] For the antler pieces that do not exhibit the coronet, it is impossible to say whether they were shed. As a result, much more of the worked assemblage may be shed than can be determined. The shed antler reveals a human social behavior at Methone that is separate from hunting or agropastoralism and is centered in the creation of worked animal objects; antler is being collected solely for its use as a raw material (see § 5.4.1). While this may have occurred alongside hunting, an analysis of

---

56 Bubenik 1990, 42.

57 Bubenik 1990, 8.

58 Lister 1996.

59 IDs 10 and 28 likely belonged to young red deer. IDs 26 and 37 were from red deer, while IDs 8, 32, 35, and 36 were from fallow deer. ID 69 was likely shed, but its species is unknown.

the *Hypogeion* faunal assemblage indicates that "hunting should have been relatively rare as the percentages of wild animals were particularly low in comparison with the domesticated ones."[60] Cervid remains, especially bone, were also rare within the faunal assemblages from the early Archaic contexts on the West Hill. Antler is fairly rare in these contexts, but it still far outnumbers cervid bone, and nearly always shows signs of anthropogenic modification. While there is a collection bias toward antler (its structure is distinct from bone and so it is easier to identify antler fragments), multiple lines of evidence suggest that hunting was rare, and the collection of shed antler may have been the dominant means of material acquisition.

5.2.3 Horn and Horncore

Unlike antler, horns are grown once during the life of the animal and never shed. Horn has a markedly different structure from antler and bone; the term "horn" refers to the exterior sheath made from keratin that surrounds the horncore, a bony extension of the cranium. The horncore is made up of a thin layer of cortical bone that surrounds a cancellous core,[61] the keratin exterior often extends beyond the length of the horncore. Keratin, a fibrous protein that also makes up hair and nails, is very different from osseous materials and was worked in an entirely separate way. Horn can be molded, worked into thin sheets, and made translucent.[62] Due to the low mineral content, and exposure of the proteins within keratinous tissue, horn is rarely preserved in archaeological contexts.[63] As a result, no examples of horn objects were found at Methone. The evidence for horn production comes from the remains of horncore found across various contexts at the site. Most examples of horncore found at Methone exhibited cut marks at the base of the appendage, suggesting that it was routinely collected as a raw material. Despite the bone-like qualities of horncore, no objects made from

60 Livarda, Veropoulidou, Vasileiadou, and Gelabert Forthcoming, 12.

61 Drake, Donahue, Stansloski, Fox, Wheatley, and Donahue 2016, 41.

62 MacGregor 1985, 67.

63 O'Connor, Solazzo, and Collins 2015, 395.

the horncore itself were discovered, and it is likely that all of the horncore was discarded after the keratin exterior was removed.

Ancient sources and modern research point to similarities in the methods behind horn and ivory production. In Lapatin's analyses of ivory production, he argues that physical and chemical manipulation could have been used to mold and alter the shape of ivory for the creation of chryselephantine statuary.[64] Lapatin cites Pausanias, who explicitly links these two methods: "fire turns the horns of oxen and elephants from curved to straight, and also into other shapes."[65] The association between these two materials also has a Late Bronze Age precedent; Ruth Palmer highlights the overlap between craftspeople working horn and ivory within the Linear B corpus.[66] There is also archaeological evidence for the association between these materials at Pheidias' workshop at Olympia, where excavators found examples of horncore alongside ivory production waste. Some examples of horncore within the assemblage at Olympia are cut at both the proximal and distal ends, leaving a crescent-shaped section with two flat faces.[67] At Methone, there are also two examples (IDs 474 and 499) worked in the same way (see fig. 5.7). While it is unclear how this production pattern relates to the processes of soaking, horn breaking (the process of opening the horn),[68] and keratin removal, the similarities between the material from Methone and Olympia suggest shared methods of horn production across sites and time periods. Patterns in production waste at Methone indicate different aspects of horn breaking that do not have an obvious association with a specific production process. Three examples of horncore (IDs 471, 475, 502) were cut into roughly 3 cm sections through two transverse cuts, both near the distal end of the horn. It is unclear why producers were specifically aiming to create

---

64 Lapatin 1997, 2001.

65 Paus 5.12.2.

66 Palmer 2019.

67 Schiering 1991.

68 MacGregor 1985, 66.

small segments of horn, so perhaps these objects are the result of some preparatory process. Examples of these pieces were found on both the East and West hills, suggesting that it may have been a fairly standard aspect of horn breaking.

5.2.4 Ivory and Other Tooth

Tooth represents the final category of animal materials that were worked at Methone. The teeth of animals are variable between species, and the shape differs among tooth types (e.g., canine, incisor, molar). Additionally, the structure of teeth is different from bone, horn, and antler. The most predominant remains of worked animal teeth come from elephant ivory, a material from the incisor of the animal. In species of African elephants (*Loxodonta africana* and *Loxodonta cyclotis*, see § 3.1.2), both males and females have tusks, whereas female Asian elephants (*Elephas maximus*) only grow small incisors called tushes that rarely show.[69] Elephant incisors are covered by a thin layer of a material called cementum, which is a "soft derivative" of enamel.[70] Elephant incisors have a small amount of enamel on the tips of the incisors, but the tips usually wear away in the early years of the animal's life.[71] Beneath the cementum is dentin, the substance considered ivory and the primary portion of the tooth; producers remove the cementum in order to access the dentin for carving. The base of the tusk contains the pulp cavity, a conical structure within the dentin containing the cells (odontoblasts) responsible for dentin formation.[72] For the individuals working the tusk, the pulp cavity is a hollow space which may be a constraint on carving (see fig. 5.8). The dentin is composed of dentinal tubules embedded in mineralized collagen.[73] These dentinal tubules form laterally aligned sheets called microlaminae or lamellae, which

---

69 Santiapillai and Jackson 1990, v; Sukumar 1989, 165; Raubenheimer 2000.

70 Locke 2008, 423.

71 Virág 2012, 1406.

72 Weissengruber, Egerbacher, and Forstenpointner 2005.

73 Locke 2008, 424.

grow in conical, incremental layers.[74] This structure of dentinal tubules results in one of the most diagnostic features of elephant ivory: Schreger lines. Schreger lines appear as "two systems of alternating light and dark lines which radiate clockwise and anticlockwise, respectively, from the axis of the tusk."[75] Schreger lines often present as a crosshatched pattern and are most easily viewed on a transverse surface (see fig. 5.9). They are one of the most diagnostic features for elephant ivory because elephants and their extinct proboscidean relatives are the only species that develop these lines. Another diagnostic feature of ivory is called "cone-within-cone" splitting, a process in which the incremental lamellar growth layers become detached from one another.[76] "Cone-within-cone" splitting manifests as a series of circular or elliptical cracks which are also highly diagnostic of elephant and proboscidean ivory (see fig. 5.10).

Elephant ivory is prevalent in the Methone assemblage, although the amount compared to other worked materials is likely inflated because small fragments of ivory remain diagnostic, while similarly sized fragments of worked bone may be easily missed. Despite this, the prevalence of ivory in multiple production contexts across the site is compelling evidence for ivory production at Methone during a period when the material has only recently become more widespread in the Greek world (see § 3.4). Most of the ivory found at Methone was production waste, with only a few finished products. A significant number of pieces of ivory production waste come from the outer portion of the tusk, which is made up of the rougher cementum. These cementum pieces are the products of the early processing stages of the material, as this outer layer needs to be removed before carving the dentin. The cementum pieces are generally larger; some examples show preserved lengths of between 4–6 cm. Additionally, one piece shows a width (corresponding to a portion of the circumference of the

74 Virág 2012, 1414. Locke (2008, 423) describes the structure of these tubules within the lamellar sheets as "helicoidal architecture," a "structure achieved when parallel fibers form sheets that stack above one another in such a way that the orientation of the fibers changes in a regular manner from sheet to sheet."

75 Raubenheimer 1999, 59.

76 MacGregor 1985, 17.

tusk) of 5 cm. These large pieces also appear to come from the proximal end of the tusk, which is primarily hollow. The large pieces of cementum indicate that the producers were likely receiving entire tusks, which were subsequently prepared for carving. A considerable amount of ivory waste from these initial steps was preserved at Methone.

Beyond evidence for the initial processing steps, there are also remains from the inner portion of the tusk. ID 190 is a long piece of ivory that originated from around the pulp cavity, with two cut surfaces extending lengthwise down the tusk. Another surface, perpendicular to the other two, exhibits a transverse cut across the tusk. In this piece, a small portion of the inner pulp cavity is preserved by a concave curve. This may represent craftspeople sectioning off more usable portions of dentin from around the hollow pulp cavity. Another piece (ID 193) appears to show a sizable, rectangular portion of ivory from a region of the tusk where the material is more abundant.[77] Like ID 190, ID 193 from the *Hypogeion* also exhibits a portion of the pulp cavity. However, it appears that this rectangular portion came from a central and distal region of the tusk. Unlike ID 190, this piece was not removed to make further ivory carving easier. As an interior section of the tusk, this piece of ivory stands in contrast to most of the other waste from the outside edge of the tusk. Instead, this piece of raw material indicates producers focused on the region of the tusk where usable dentin was most abundant. This object also appears to be unfinished; three of the four long faces appear smoother and more regular, while the fourth exhibits rougher chisel marks and irregularities. Regardless of whether this was a blank that would be subsequently carved, or a "core" from which strips of ivory were removed, producers discarded a large portion of valuable material. This is particularly unusual, as ivory from this part of the tusk would have been some of the easiest to work, and the most desirable.

In addition to the proximal end and central portion of the tusk, there is also evidence for material from between the pulp cavity and the tip of the tusk. Two cross-sections from the West Hill (IDs 187 and 188) show a portion of the full diameter of the tusk: the center

[77] The piece measures 0.098 x 0.013 x 0.01 m.

and the outer border (cementum-dentin junction).[78] The total size of these objects indicates that they are from a narrow portion of the tip of the tusk. These cross-sections are the result of two transverse cuts but show no other signs of modification. While it is unclear what production action would create these cross-sections, they may have been a result of producers neatening an existing cut surface. Craftspeople may have made an initial rough cut at the tip, and then a subsequent cut, resulting in a thin cross-section. Regardless of what act of production led to their creation, these cross-sections show that craftspeople at Methone were working ivory from nearly every part of the tusk.

The other forms of ivory waste seen at Methone are smaller fragments cut off at another stage of the production process. Among these, there are two dominant forms: irregular pieces with one or two transverse cuts, but little other evidence of working, here called "Type A" (see figs. 5.11 and 5.12). Additionally, there are thin triangular pieces that have been cut on multiple sides, and are significantly more worked than the Type A examples; these are called "Type B" (see figs. 5.13 and 5.14). Many of the irregular Type A pieces appear to be near the external edge of the tusk. They have the rounded, natural surface of the cementum-dentin junction, but lack cementum. As these pieces often resemble chips and are created from less precise cuts, it is likely that Type A remains are the result of producers cutting off outer portions of dentin in an early stage of the production process. Producers either removed the cementum right before creating these cuts, or these cuts were part of that preparatory practice (no obvious cementum was preserved, but it may have separated). The length of these pieces varies, suggesting that producers were primarily interested in removing material at this stage in the process.

The Type B pieces are different in that they are thin, triangular, and likely correspond to a later stage of ivory production. Every surface of these pieces has been cut, and they are often the same shape and thickness. These pieces may represent producers removing

[78] Another cross-section which was not as well preserved may also be from the same part of the tusk (ID 186).

excess material around the edges of a nearly finished object. The uniformity of these pieces implies that they were removed from larger pieces of ivory that were also similar to one another. It does not necessarily follow that all these Type B pieces were from the creation of one type of object; producers may have been creating rectangular sections of the same thickness for a variety of products. However, several of these Type B pieces (IDs 134, 135, 136, and 138) have nearly identical crossed-cut marks that meet at an oblique angle and are found at similar locations on the West Hill. The oblique cuts may have been the result of producers attempting to create a circular object out of a rectangular blank and to minimize the amount of discarded ivory. In this scenario, producers would begin with a square or rectangular ivory blank with a circular region inscribed within it. Then they would create two cuts at the corner to remove as much of the edge without cutting into the circular region (see fig. 5.15).

Like the teeth of elephants, the lower canines and incisors of hippopotami were also used as a source of ivory in the ancient world.[79] The canines are curved and triangular in section, with two faces of the tooth covered in enamel and one face covered in cementum.[80] As with carving elephant ivory, producers remove the enamel and cementum, which Krzyszkowska describes as a "drawback" of using the canine.[81] The canine has a pulp cavity at the base and a feature known as the commissure, or region between the pulp cavity and the newly formed dentin, presenting as a crack that runs through the tooth.[82] The incisors are straight, roughly circular in cross-section, and covered in cementum.[83] They also have a pulp cavity at the base, and a feature associated with dentin production called the heartline. The heartline runs through the center of the tooth and is more visible in a longitudinal

[79] Krzyszkowska 1990, 38.

[80] Krzyszkowska 1990, 42.

[81] Krzyszkowska 1990, 42.

[82] Krzyszkowska 1990, 44.

[83] Krzyszkowska 1990, 41.

section. Krzyszkowska says that it may appear as "a line of fine black dots or minute holes" on finished objects.[84] The process of dentin formation and the resulting structure of dentin in hippopotamus and elephant ivory is markedly different. Elephant ivory grows in concentric cones of lamellae which can become detached with time ("cone-within-cone" splitting). Furthermore, the lamellae within elephant ivory are highly regular, appearing as ellipses in section. The lamellae of hippopotamus ivory are generally "wavy and discontinuous," lacking the regularity seen in the elephant ivory.[85] Hippopotamus dentin has smaller, more densely packed tubules, making hippopotamus ivory denser and less prone to decomposition. Additionally, hippopotamus ivory is generally whiter than that of elephant, which may have made it a more desirable material.[86] Two objects found at Methone may be made from hippopotamus ivory. One is a small, rectangular piece of ivory (ID 202) that is likely production waste or possibly unused raw material. Another is a portion of a spectacle fibula (ID 85) with fine decoration. Both pieces are a uniform cream color that is whiter than most of the examples of ivory at the site. They feature wavy lamellae and have no Schreger lines or cone-within-cone splitting. While the diagnostic features of these pieces could indicate a classification as hippopotamus ivory, their small size makes this designation tentative.

Other types of teeth were also worked at Methone, such as examples from canids (dogs/wolves), bears, and the *suidae* family (pigs/boar). The bear and canid teeth were worked in a similar fashion: producers created suspension holes for pendants but performed no other modifications. On one canid tooth (ID 468) the producers could not drill a hole and instead carved out both sides. This shows both the difficulty of working the material of the tooth and may also indicate that these materials were worked by non-specialists outside of workshops. *Suidae* teeth were also a common raw material at Methone, and worked examples were found on both the East and West Hills. The largest *suidae* teeth are lower canines

84 Krzyszkowska 1990, 41.

85 Krzyszkowska 1990, 44.

86 Lafrenz 2003, 16.

from male boars, although this level of classification is not possible for the other fragments that have been more substantially worked.

While most of the raw material within the assemblage is contemporary with the industrial activities at Methone, two pieces of fossilized material (a fragment of horncore and a piece of ivory) come from animals that were long dead before the site was occupied. The horncore has no modifications, and it is highly mineralized. It was found in a much deeper pass than the other worked animal materials in the same square, so it is unclear whether it was intended as a raw material for production— although the presence of fossilized ivory leaves open the possibility that it was a part of the worked assemblage. The fossilized ivory was discovered alongside the other remains of raw materials and production waste in the *Hypogeion*. It has not been visibly modified, and it is the largest piece of ivory in the assemblage. As it is fully mineralized, it is significantly harder than the other materials in the assemblage and likely would have been too difficult to work at the time it was found. Schreger lines are visible on either end, and it maintains some of the natural curvature of the tusk. The interior face is slightly curved which suggests this piece of ivory may have come from the region of the pulp cavity at the proximal end of the tusk. In some instances, the taxonomic classification of ivory (including extinct proboscideans) can be made by using the Schreger angles, although these measurements are most accurate at the region between the cementum and dentin on the outside edge of the tusk.[87] The angles visible in the fossilized piece are around 60°, markedly smaller than in modern species (see § 3.3). Angles of this size found near the cementum-dentin junction are observed in fossilized tusks from several species of mammoth; however, it is unclear whether the Methone example originated from the outer part of the tusk, making a taxonomic designation impossible.[88]

---

87 Espinoza and Mann 1993; Trapani and Fisher 2003; Ábelová 2008.

88 Virág 2012, 1421; Espinoza and Mann 1993, 245.

5.3 Overview of the Objects

The categorization of the objects and production waste favors larger, more encompassing groups based on structural attributes of the objects; this approach does not try to approximate the exact use of animal objects in the past. Some exceptions, however, are objects which have well-established bodies of comparanda such as those commonly found in sanctuaries (e.g., seals, spectacle fibulae, miniature double axes). Even those categories are more descriptive than explanatory; small, circular seals (i.e., objects with intaglio) are common throughout 7th century BCE votive contexts, although how they were actually used is unclear. For the rest of the assemblage, items are either described as singular objects without a specific category (e.g., "phalanx with three drill holes") or they are placed within a broad category. For example, there is a single category of bone cylinders, hafts, or handles within the catalog. It is likely that the smaller decorated objects (e.g., ID 304) within this category may have served a different function than the objects which seem to have been used as handles. However, there is a range of worked animal materials in this style that are similar. Trying to distinguish a decorated handle from a decorated cylindrical object whose original purpose is unclear offers a high potential for incorrect identification and misinterpretation. Instead, objects are approached in a way that offers a flexible interpretation for their use or range of uses. The objects and production waste are organized in this way within Appendix A, which also provides a more in-depth description, as well as comparanda.

The Methone worked assemblage is varied in the choice of animal and raw material, and this diversity also extends to the types of objects that were created at the site. As a production site in the late 8th through 6th centuries BCE, rather than a votive deposit or a funerary context, Methone showcases how objects intended for many disparate venues were created alongside one another. Most of the finished objects found at Methone are generally more utilitarian; many of them are tools themselves that were deposited as workshop debris (e.g., the many antler tools found within the *Hypogeion*) and may have been used in one of the various industrial activities occurring at the site. Other objects may have been made outside of workshops, such as the numerous abraded astragali and rough, ad-hoc points. However, there is evidence that fine goods that may have been intended for dedication was a major component of production at Methone. Their absence in the archaeological record is primarily a function of the types of contexts that were excavated: remains of workshops. Finished products were intended to leave the workshop, and were unlikely to be thrown away alongside production waste. The contrast between the quantity of ivory waste and the paucity of finished ivory products testifies to this depositional pattern.

Some of the objects created at Methone were the same types as those dedicated in sanctuaries beginning in the 7th century BCE. Spectacle fibulae and other forms of decorated disks represent a major class of dedications made at many sanctuaries and were also produced at Methone. These objects are most often made from bone or ivory, and more rarely in antler. A series of such objects were found in the workshop areas of the West Hill, as well as in the *Hypogeion*. A single disk from the West Hill features a neat guilloche border (ID 86), and is one of the finest pieces of worked ivory discovered on site. Comparable examples of single disks in ivory were found at Perachora.[89] Additionally, two fragments of spectacle fibulae in ivory were found in the same area of the West Hill: one example (ID 84) preserves some of the metal catchplate, as well as a fine guilloche pattern around its edge. Only a small portion of the other spectacle fibula fragment (ID 85) remains, but it is also an exceptional example of ivory work. Like the others, this object features a guilloche pattern bounded by incised lines around its edge. There is also an incised floral motif that is partially preserved in the center, and both designs are rendered perfectly. The size of this fragment indicates that it was part of a much larger fibula.

While these fibula plates and disks represent some of the highest quality objects from Methone, there were also examples of similar items that may have been intentionally discarded. One such antler fibula plate from the West Hill (ID 4) workshop contexts is unusual

[89] Stubbings 1940, 437–38, nos. A 195–A 210.

in that one of the disks was cut off, and the piece retains much of the curvature of the original antler. Additionally, the incised designs on the surface appear to have been deliberately abraded away; these abrasions may represent a producer wishing to start over and "erase" previous work. The combination of these factors suggests that this object was discarded, and likely never intended to be a finished piece. Perhaps it was used to practice complicated designs like the guilloche motif; as spectacle fibulae and disks were often made in ivory, antler may have served as a better-suited and more expendable medium for training. The *Hypogeion* featured two other examples of single-disk spectacle fibulae in antler, which may have also been rejected or practice pieces. Both disks from the *Hypogeion* are markedly less fine than examples found on the West Hill. Like the antler fibula plate from the West Hill (ID 4), they were also made from a slightly curved portion of antler. Additionally, the decoration of these disks is poorer than other examples found on site. On both disks, the incised circle/guilloche pattern around the edge is uneven, and the incised lines that bound these designs cut into the motifs. On the back of one of these disks (ID 2), producers incised arcs using a compass that matches the floral design on the front, suggesting that the producers were testing the technique before attempting it. The combined evidence for these objects, even the rejected examples, suggests that Methone produced many spectacle fibulae that then left workshop contexts.

In addition to the fibula disks, the Methone assemblage contained several other objects that are strongly associated with votive offerings. One such object from the *Hypogeion* is an elliptical ivory seal featuring a centaur holding a branch in each hand and with a small bird at its feet. This motif has a close parallel in an example from the Kastro Hill on Siphnos, in which a helmeted centaur also holds a branch in each hand.[90] Small circular seals were discovered in large numbers at the sanctuary of Artemis Orthia and Perachora, and in more modest numbers at the Argive Heraion (see § 4.6.1). The construction of the example from Methone is somewhat unusual for the bone and ivory seals of early Greece: it is elliptical

[90] Brock and Young 1949, 23.

and only decorated on one side, both rare among the published examples.[91] While the large assemblages of seals at the sanctuary of Artemis Orthia and Perachora show similar forms and motifs, there are also many more idiosyncratic examples found across Greece. As it was found in the earliest phase of the *Hypogeion,* it is probably older than the examples found in those sanctuaries. Despite the atypical aspects of the seal, it still indicates that craftspeople at Methone were in dialogue with the larger trends of worked animal material production.

The aulos is another type of object found at both Methone and within votive assemblages (see § 4.6.6). These musical instruments were created in separate segments that had to fit tightly together to achieve the desired sound. The practice of playing the aulos is related to the development of the Greek modes; these modes are dictated by specific notes that the aulos must produce.[92] Achieving the proper tone, frequency, and pitch from a bone flute requires precise manufacture. The Methone assemblage contained two examples of auloi fragments in bone, and other evidence for auloi at Methone comes from bronze omphaloid disks which Papadopoulos argues are terminals for a wind instrument.[93] A portion of an aulos found on the East Hill (ID 257) exhibits a precise carving technique on both the interior and exterior of the object; one end preserves the interior attachment for another segment. An example from the West Hill (ID 258) shows evidence for two tone holes (the open sections of the body of the instrument used to change the pitch of the sound) that are roughly 1 cm in diameter, with twice that distance separating them. The relationship between the size of the tone holes and their distance may indicate an instrument designed to produce a scale based on a distinct interval (e.g., semitone, whole tone).[94] Moreover, the creation of any

91 The elliptical shape is rare, but not without precedent. See example no. A 111 from Perachora (Stubbings 1940).

92 Schlesinger 1939.

93 Papadopoulos 2017, 8.

94 Benade (1960) and Andreopoulou (2008) demonstrate the relationship between tone hole placement and musical intervals for ancient auloi. The wavelengths produced by the aulos are altered by the use of tone holes. When tone holes are unplugged, they shorten the wavelength and increase its frequency. To achieve specific frequencies, the tone holes must be separated by exact distances.

aulos undoubtedly required a highly specialized body of knowledge practiced at Methone. While many examples of auloi were found in votive contexts, textual evidence and their depiction on ceramics testify to the fact that auloi were actually used to perform music in many different settings.[95] As a result, some examples from Methone may be outside of the larger pattern of votive production.

The Methone assemblage also contained a single example of a miniature double axe in bone. While this object is not as technically difficult to produce as other objects in the assemblage, its form is strongly associated with votive contexts. Ninety-three examples of similar axes were found at the sanctuary of Artemis Orthia at Sparta, with others in votive contexts coming from Ephesus, Perachora, the sanctuary of Artemis Hemera in Lousoi, as well as some examples from a votive deposit at the site of Tocra, ancient Taucheira in Libya.[96] The example from Methone is undecorated and slightly larger than the examples found in other votive deposits. The context it came from also contained other evidence for worked animal material production, including a small fragment of ivory and a scrap of worked bone. While its manufacture is fairly neat, it may still have been unfinished. Another example of an object which may have been intended as a votive is a plaque that was found on the West Hill. Owing to its small size, it is unclear whether it is made from bone or ivory.[97] The plaque has a rough guilloche pattern around its edge bounded by incised lines, and its center is undecorated. "Plaque" is a general term, and many similar objects could also function as elements of inlay; consequently, it is difficult to say more about this item. However, the arrangement of the guilloche pattern recalls the ivory plaques of the sanctuary of Artemis Orthia at Sparta, and those examples provide the best parallels for this object.[98]

---

95 Rashke 1985; Landels 1999; Wallace 2003.

96 Dawkins 1929a, 238; Smith 1908, 170; Dunbabin 1940, 443; Mitsopoulos-Leon 2012, 29; Boardman and Hayes 1966, 165.

97 See ID 252 for discussion of the determination of the material.

98 See especially Dawkins 1929a, 206, pl. 92, 1–2.

When taken together, the spectacle fibula fragments, aulos fragments, seal, miniature double axe, and plaque function as representative examples of typical votive offerings made in animal materials found in the sanctuaries of early Greece. Not only are these types of objects found at many different sanctuaries, but also the spectacle fibulae, seals, and miniature double axes tend to be present in large quantities. There are only a few examples of these objects at Methone, but their presence in manufacturing contexts suggests that similar examples were produced in the same location. While the high variability in the Methone assemblage does not imply a singular concentration on any one type of object, the strong focus on votive objects indicates that craftspeople at the site were attuned to the larger trends of dedicatory practice. Methone may well have been one of the locations supplying votive objects for a nearby sanctuary like the one on Thasos. These objects also provide some evidence for the various relationships that may have bound craftsperson and community members, as individuals wishing to make dedications may have commissioned them or provided valuable materials for their creation.

Within the assemblage were also found many examples of adornment objects: bone rings, buttons, pendants, and beads of varying quality. These items could have been created for the purpose of votive offering, but likely had more quotidian uses. Bone rings were fairly common at Methone (IDs 277, 278, 279) and more generally in the Greek world. Their purpose is not always clear, although Kate McK Elderkin argues that many small bone objects may have been used as fastening devices or buttons for clothing.[99] A lozenge-shaped object from the East Hill (ID 316) may have served this purpose. The pendants found at Methone are highly varied in appearance. Some were created from the teeth or claws of animals, the most striking of which is a bear canine, modified only by a suspension hole at its base (ID 470). The only other object made from bear within the assemblage is another pendant (ID 299) made from the animal's third phalanx or claw. Similar pendants (IDs 468 and 469) made from the canines of a dog or wolf were also found. While similar items have

[99] McK Elderkin 1928, 342.

been found within votive contexts, it is possible these objects were never intended to be dedicated. Instead, they may be remnants of more everyday uses of animal materials in early Greece. Some pendant-like objects were more significantly worked: ID 295 is a small example, with many incised lines that create a tapering, conical shape and a suspension hole less than 2 mm in diameter; owing to its size, it may have functioned as an earring. Regardless, it is an incredibly fine example of work and a testament to the skill set of the producers working at Methone.

Craftspeople also made a range of points, rods, and styli which may have served variable purposes. The most identifiable of these are the bone styli used as writing utensils for wax tablets (see fig. 5.16). These styli (IDs 266, 267, 268, 269, 270, 271, 272, 273, 274, 275) were common in the assemblage and are prevalent in the Greek world following the reintroduction of writing in the 8th century BCE. Typically, one end is a rounded point for writing, and the other is spatulate for scraping the wax of the tablets. Other pointed objects like IDs 290 and 292 (partially preserved) are narrow and sharp, with a drill hole in one end. This drill hole may indicate the points were used for sewing or weaving, although they could have a range of other uses, such as for clothing or hair. The *Hypogeion* contained a point of considerable size (nearly 20 cm, but the tip is missing) that is distinct from others found in the assemblage. The point is polished and one end has a narrow section, perhaps to hold a pin head or disk. The quality of its manufacture is higher than the others, and it may have been for personal adornment (e.g., hair pin).

Another component of the worked animal material industry at Methone was the creation of inlays. Animal materials were a common choice for inlay in the early Greek world, attested archaeologically by parts of a couch discovered in a 6th century BCE tomb (no. 3/HW 87) from the South Hill of the Kerameikos. The evidence for the couch included numerous ivory and amber components used to create inlays in the shape of rosettes and star shapes (see § 3.4.3 and 4.2). Additionally, a Submycenaean tomb (Tomb 201) from the Knossos North

Cemetery also contained a series of bone triangles interpreted to be inlays.[100] These may have decorated some object made from a perishable material that did not preserve. Outside the Greek world, Levantine craftspeople often used ivory as components of furniture (see Chapter 3). In addition to archaeological evidence, there is also a Homeric reference to inlay. In one of only a few mentions of ivory, Homer describes how Odysseus decorated his bed: "I made smooth the timbers of my bed, until I had it done, inlaying it with gold and silver and ivory."[101] Multiple objects from Methone suggest that they were intended to be components of inlays, including a thin bone strip with repeated incised designs (ID 284), and two undecorated bone strips (IDs 251 and 306). ID 306 has partially preserved holes on either end, presumably to affix the piece to something else. Additionally, another rectangular strip of bone with cut channels may have been intended for inlay (ID 287), and it has a piece of comparandum from Ephesus.[102] In addition to seemingly finished materials, there is also ivory production waste in the shape of thin rectangular strips (IDs 192 and 248) which may have been the result of craftspeople creating inlays.

Among the most numerous worked animal objects found within the Methone assemblage are modified astragali. The astragali found at Methone come from a range of species: sheep/goat, cattle, and pig, all worked in different ways. The most common means of modification was to abrade the posterior and anterior surfaces of the bone, creating more even surfaces for the astragalus being thrown in a game or divination act (see § 4.6.10). Examples were also found where only one of the posterior or anterior faces was abraded; in some instances, a medial or lateral face was abraded as well (see fig. 5.17). While many of the worked astragali required little skill to produce, there are also examples with drill holes and two metal-filled examples, likely crafted by skilled hands. At Methone, there is evidence that astragali were used for various purposes, as an impression of the bone was found at the

[100] Coldstream and Catling 1997, 195. (see § 4.2.4).

[101] Hom. *Od.* 23.200.

[102] Hogarth 1908a, 196, no. xl. 20.

base of tripod leg found on the West Hill (ΜΕΘ 7191).[103] This range of uses and meanings may suggest that different individuals (perhaps adults, as well as children) were responsible for working the astragali within the Methone assemblage.

In addition to the fine and quotidian objects, there is a wealth of evidence for the construction of items likely used in industrial activities. The *Hypogeion* contained a series of tools made from antler, including hammers. The hammers (IDs 6, 7, 8, and a comparable example from the West Hill, ID 9) were made from large sections of antler, usually from the coronet or the triangular intersection of the beam and bez/trez tine. They exhibit large drill holes (nearly 2 cm in diameter) through their centers, likely so they can be affixed to something like a wooden handle. Due to the properties of antler as a material, these objects would have been useful in manufacturing activities at the workshops of Methone. Based on experimentation, MacGregor found that antler possesses much higher bending strength than bone. He writes, "antler is a significantly tougher material than bone, with a markedly better capacity to absorb shocks and sudden impact loads."[104] The amount of unworked or partially worked antler found stockpiled within the *Hypogeion* speaks to its importance at a site like Methone, where industrial activities were so prevalent. These hammers show clear signs of wear from use— one, for example, is visibly polished around the edges where it was likely held. Another hammer (ID 7) has tiny indentations that were likely the result of the hammer being used to drive small nails. Additionally, there are large portions of antler that were altered to use as scrapers. ID 10 is a portion of shed antler beam that was worked to a small (roughly 1 cm across) tapered end. Similarly, ID 22 is a portion of antler tine with a flat scraper edge. Both examples may have been improvised for specialized needs, as only the flat ends show signs of modification, with the tools otherwise unaltered.

A series of small points (IDs 259, 260, 261, 262, 263, 264, 265) in bone and antler is

[103] This practice is paralleled in Hellenistic loomweights from Halai, which were also impressed with different surfaces of the astragalus. O'Neill, Yielding, Near, Coleman, Wren, and Quinn 1999, 312, nos. 24–26, fig. 21.

[104] MacGregor 1985, 29.

another likely example of a utilitarian or industrial product. These points are all roughly conical in shape, and most have a small hole in their base. It is unclear how they were used (i.e., whether they were attached to something larger) and some of them appear broken or blunted (IDs 260 and 261). They do not have any good comparanda outside of Methone, perhaps reflecting the creation of an object that is specifically designed for industrial activities, and less likely to be present in the archaeological assemblages of non-industrial contexts. While these points are fairly regular, there are a variety of tools like points and scrapers the creation of which appears to be more ad hoc or unplanned. This designation is undoubtedly problematic and imparts modern ideas about how objects or tools "should" look. That being said, there are a number of bone objects that have only been worked to a limited extent. These tools often appear to be the result of modifying a broken shaft fragment to create a point (IDs 446, 451) or a scraper edge (IDs 445 and 448).

In addition to serving as a medium for discrete tools, bone and antler were also used for handles, sleeves, or hafts of other tools. Direct evidence for this practice comes from ID 311, a bone handle that was found still attached to an iron blade. This handle was relatively flat and rectangular, made from a large rib (likely cattle) that had been split open. A similar bone object (ID 312) from the East Hill may also be a handle; it was cut to a flat rectangle and was pierced with a series of bronze nails. While producers created these handles from multiple pieces of bone, other examples take advantage of the natural cylindrical shape of bone and antler. Antler has the potential disadvantage of having no natural hollow (it is composed of entirely cancellous bone in cross-section), but there are many examples of antler handles, hafts, or sleeves in the Methone assemblage. One example in antler (ID 21) exhibits a hollow interior, a tapered end, and a small hole dug into the shaft, all of which may have been related to the use of this object as a handle. The inner diameter interior of this object is fairly large, so it may have been used as a grip for a large tool like a hand axe. Other examples of antler tines thought to be handles, sleeves, or hafts exhibit portions of the cancellous interior that were partially carved out. ID 16 is the best example, as it preserves a small portion of metal within the carved-out interior. Other objects, like ID 13, have a pronounced section of hollowed-out cancellous bone, presumably the area where the handle was attached to an object.

The handles, hafts, or sleeves found concentrated in the *Hypogeion,* were rarely found in direct association with metal tools. Additionally, the areas where the tools would have been attached exhibit little (if any) metal staining. Moreover, some of these handles or hafts show signs of use wear: ID 13 shows strong polish at its end, while IDs 17 and 21 show polish and several marks in the antler resulting from use rather than production (i.e., nicks and dents from dropping the tool). ID 18 also shows strong polish from use, and it appears to have been reworked. The object is rather short for a handle (0.058 m), and has several hack marks at the end. As a result, the remaining surface does not look capable of holding a tool. Producers may have either reworked this handle to use again, or hacked it considerably to extricate the tool it held. The state of these handles (heavy wear, occasional metal staining) suggests that they had been used considerably before being removed from the tools they held and then discarded. As the *Hypogeion* contained a considerable amount of workshop refuse, it may indicate that antler handles were regularly used and discarded in workshops around the site.

5.4 Interpretations of Worked Objects Made from Wild Animals

A portion of the worked objects created at Methone originated from wild animals including bear and boar. As these animals were hunted, they had special importance in the Greek world. In the Bronze Age, boar hunt imagery was part of a larger program of "ruler iconography", which Margaretha Kramer-Hajos suggests was used to "symbolize high status, whether social, political, ritual, or military (or any combination of these)."[105] Additionally, Massimo Cultraro views the Mycenaean aristocracy's choice of boar hunting as a "symbolic

[105] Kramer-Hajos 2016, 85.

model" for domination and a powerful aspect of ruler propaganda.[106] During the Mycenaean era, boar hunting also served as a way to collect tusks for the creation of helmets. These helmets are attested within archaeological, iconographic, and textual records. As these helmets were created from dozens of tusks, representing at least half as many boars, they are an impressive statement about the prowess and abilities of the hunter. The archaeological evidence for these helmets underscores their connection to elite members of society, as they are found in a number of Late Mycenaean "warrior-graves."[107] C.E. Morris argues that the helmet itself symbolizes an "interlinked spectrum of referents," including ideas of warfare, territory, masculinity, and the relationship between humans and animals.[108] She also suggests that Mycenaeans employed the aggressive or weapon-like aspects of the boar when using the tusk as part of a defensive object, embracing the symbolic and functional properties of the tusk simultaneously; she writes: "by the use of the tusks Man symbolically appropriated the power of the animal."[109]

Following the end of the Bronze Age, the boar tusk helmet no longer had a clear symbolic role in Greek society at large, although a reference in the *Iliad* to a boar tusk helmet suggests that some memory of the object as a feature of Bronze Age society persisted into the Iron Age.[110] Boar tusk helmets might have endured as heirlooms or were discovered in earlier tombs after the end of the Bronze Age.[111] However, they do not appear to have been made following the end of the Bronze Age, which Oliver Dickinson suggests might reflect "a scarcity of the material as well as a loss of skill."[112] The boar tusk helmet is most strongly

[106] Cultraro 2004.

[107] Whitley 2002; Papadopoulos and Kontorli-Papadopoulou 2001.

[108] Morris 1990, 155; see also Morgan 1995, 173 for a discussion of Morris' analysis.

[109] Morris 1990, 155.

[110] Hom. *Il.* 10.261–5.

[111] Raaflaub 1998, 175.

[112] Dickinson 2006, 157.

associated with the Mycenaean period, although there are examples of worked boar tusk in archaeological contexts that postdate the Bronze Age. In addition to Methone, worked boar tusk also comes from the Kamiros well[113] and Lindos.[114] Additionally, unworked boar tusks were found at the sanctuary of Athena Alea at Tegea,[115] as well as at Kalydon.[116]

With the possible exception of the Knossos examples, there is little evidence for the creation of helmet plates after the Bronze Age.[117] The instability following the end of the Bronze Age may have disrupted the transmission of knowledge surrounding the creation of such objects, and the dissolution of the Mycenaean elite may have also altered the role of boar imagery and boar tusk objects within society at the start of the Iron Age. However, certain objects made from boar tusk (or the canines of *suidae* more generally) at Methone closely resemble Bronze Age helmet plates. IDs 466 and 467 are both fragments of flat, enamel-covered sections of lower canines with remnants of drill holes in the center of the tooth. Both objects preserve the curvature of the teeth and were worked to create a flat surface; their best comparanda is undoubtedly examples from the Mycenaean era. Additionally, ID 465 is another flat section of tooth, with a drill hole in the center. This object also exhibits marks indicating where it was sawed from the rest of the tooth; like IDs 466 and 467 it appears comparable to helmet plates of the Bronze Age.[118] These objects represent the possibility that the creation of sections of boar tusk (possibly for a helmet) continued into the Iron Age at Methone.

While the specific uses and conceptions of boar tusk may have changed, the symbolic appeal of the material likely remained similar for individuals in the Iron Age. The lower

---

113 The British Museum accession number: 1864,1007.659.

114 Blinkenberg 1931, 101, nos. 206, 207.

115 Dugas 1921, 429.

116 Dyggve and Poulsen 1948, 344.

117 Boar tusk helmet plates were reportedly discovered in a Submycenaean tomb in the Knossos North Cemetery; however, the photos of the helmet plates resemble worked bone (see § 4.2.4).

118 Krzyszkowska 2007, 436–40, nos. MM 17766, MM 17725, MM 9815, MM 17690, MM 17777.

canines protrude from the animal's mouth, making boar tusk a conspicuous aspect of a dangerous, wild animal. The objects made from boar tusk attempt to retain the shape of the tooth, in order to highlight its animal origin. For example, sections of *suidae* tooth from Lindos were minimally altered to create pendants, suggesting that the material itself was the focus of the object. Other examples of worked *suidae* teeth suggest multiple approaches to a material that may have been used for a variety of purposes. ID 456 is an example of a boar tusk object from Methone that was minimally altered. A producer cut the object at the proximal and distal ends to create a section, and drilled a hole in the center. This object is similar to a tusk from the Kamiros well which was also pierced and exhibits bronze staining within the drill hole (see fig. 5.18). As these objects preserve the original curvature of the tooth, they do not seem to be traditional inlays; instead, these tusks were likely mounted. Another section of *suidae* tooth (ID 460) was pierced with iron studs and likely heat treated; it has an unusual appearance, and does not provide any indication of its use. Other examples of boar tusk at Methone were cut, polished, and potentially heat treated, but otherwise unmodified. While craftspeople at Methone appear to have many different production approaches toward *suidae* tooth, many of the objects seem to highlight the tusk as something connected to a wild animal.

Two of the worked objects created from the remains of hunted animals within the assemblage suggest that worked animal materials expressed symbolic ideas and could have been deployed in ritual settings. These objects, a bear tooth and bear claw pendant, are also conspicuous expressions of the traits of a wild animal. When viewed in conjunction with rituals related to bears from other parts of the Greek world, these objects present a range of possible symbolic uses. Archaeological and textual evidence for a ritual related to bears at the sanctuaries of Artemis at Brauron and Mounichia describes how girls will "act the she bear" for Artemis.[119] Paula Perlman cites an Athenian *dictum* describing the ritual at Mounichia, in which the Athenian Embaros must sacrifice his daughter to Artemis, but

[119] Ar. *Lys.* 641–47, for commentary on the reading of this text and its scholia, see Perlman 1983.

instead hides his daughter in the adyton and sacrifices a goat dressed in a girl's clothing.[120] Perlman argues that this dictum describes the foundation story of these ritual acts, which consisted of a young girl entering either a cave-built shrine or the later adyton, and "like the hibernating she-bear, [she was] transformed, at least ritually, from maiden to mother."[121] In addition to the textual evidence, krater fragments dating to the end of the 5th century BCE from Brauron show a series of ritual acts thought to be related to the ritual. In one example, a man and a woman appear to be wearing bear masks (see fig. 5.19).[122] Even as a non-literal depiction, these kraters may represent individuals taking on metaphorical aspects of the bear in the midst of some sort of transformation; they may also depict actual bear masks, made from animal materials.

While it is unclear what it means to "act the bear," there seems to be some degree of metamorphosis involved. A religious ritual may have provided individuals at Brauron and Mounichia temporary ontological flexibility with respect to human and bear bodies. The examples from Brauron are not the only examples of human-bear hybrids, as an offering from the sanctuary of Alea Athena at Tegea depicts a statue of a bear-headed human figure.[123] Individuals could have used types of animal objects to construct and reconstruct their own bodies into something more bear-like. In Conneller's analysis of frontlets (hollowed out deer crania with antlers still attached)[124] from Star Carr, she argues that individuals used the objects as a way to employ aspects of the deer.[125] As a result, the frontlets did not function as masks or disguises, but rather partible aspects of the deer body, which could be used to become a deer. Conneller, offering a bear as an example, writes that "a sorcerer who

120 Perlman 1989, 125; *Paroemiogr.* I 402. Ἔμβαρός εἰμι.

121 Perlman 1989, 126.

122 Kahil 1977, 93, see fig. 7 and pl. 20, 2–3.

123 Dugas 1921, 429.

124 The frontlets are pierced with two holes to attach to a person's head.

125 Conneller 2004.

transforms into a bear does not do so as a disguise, but in order to harness bear 'effects' in order to undertake suitably bear-like activities."[126] Rather than provide a disguise, the bear "masks" depicted on the pottery from Brauron may show how animal materials were used to transform individuals temporarily into bears. For the individuals participating in these rituals, the metamorphosis between human and bear may be somewhat comparable to the Yukaghirs or Torres Strait Islanders (see § 2.2.1). The evidence from Brauron suggests that there might be some aspect of relational ontological thought occurring during ritual practice in early Greece.

The bear appears to have had a number of meanings related to both Artemis, motherhood, and transformation in the ancient Greek world. Elinor Bevan cites Artemis' act of transforming Kallisto into a bear after the nymph became a mother. She also highlights Atalanta, who similarly took an oath to Artemis, as having been suckled by a bear as a child.[127] Bevan argues that dedications of representations of bear, as well as bear teeth, may have served as "appropriate offerings" to Artemis.[128] These offerings appeal not only to Artemis as a hunter, but as a divine being able to transform humans into bears. While there is no direct connection between the worked animal objects from Methone and the ritual practices related to the worship of Artemis, ritual animal transformation may be indicative of more general practices that would have been understood within the Greek world. The two worked bear objects from Methone are both highly conspicuous; the large canine tooth and claw pendants broadcast their bear qualities. As parts of a bear body, these objects may have been used by their wearers to channel qualities of the animal, like what appears to be depicted on the pottery from Brauron.

Other pendants made from the teeth of dogs or wolves were also found at Methone, and

---

[126] Conneller 2004, 43.

[127] Bevan 1987, 19.

[128] Bevan 1987, 21.

a similar pendant of either a canid or bear was also found at the Knossos North Cemetery.[129] Kastanas also produced an Early Iron Age example of a pendant made from the tooth of a dog.[130] A number of bear teeth were found at the sanctuary of Artemis Hemera at Lousoi,[131] as well as at Ephesus.[132] Pendants made from animal teeth are often interpreted as hunting trophies or amulets, but can have a range of meanings.[133] At the sanctuary of Artemis Orthia, there are examples of bone pendants that have been made to look like animal claws or teeth.[134] Additionally, one example of a bone pendant from the Kamiros well resembles a bear tooth (see fig. 5.20).[135] As an animal material, bone may have acted as an acceptable substitute for the actual part it was imitating. As these "imitation" objects were found within votive contexts, their use may have gone beyond decoration or adornment. Instead, their organic qualities may have allowed them to stand in, or be transformed, into actual animal teeth or claws.

5.4.1 Antler Collection at Methone

In addition to objects made from the bodies of dead animals (e.g., boar tooth), Methone presents evidence for a practice that involved the collection of antler that were shed by still-living deer. The specific social aspects surrounding this activity may be lost to the present, but the activities of hunting and collection reflected in the archaeological assemblage are remains of diverse cultural acts, experienced by humans and animals within a shared space or natureculture (see § 2.2.1). The collection of shed antler at Methone required that individuals

---

129 Coldstream and Catling (1997, 272, Tomb 292.f35) claim that the example from the Knossos North Cemetery is a boar's tusk, but the photograph and measurements suggests it belongs to a canid or bear.

130 Hochstetter 1987, 80, no. 76/122. pl. 14,13.

131 Reichel and Wilhelm 1901, 37.

132 Bammer 1992, 187.

133 See Brea, Mazzieri, and Micheli 2010, 136 and Jonuks and Rannamäe 2017 for discussion of their interpretation.

134 Dawkins 1929a, 226, pl. 135, 1 a–b.

135 The British Museum, accession number: 1864,1007.680.

understood the landscape and the animals that lived on it. Individuals at Methone had to have a knowledge of two different species of deer whose habitats and seasonal behaviors differ, and which shed their antlers at separate times during the year. The shedding process is tied to the hormonal changes that also control the rutting (mating) period. The fallow deer and red deer rut in the fall, and the former sheds its antler in May and the latter in March or April.[136] Shed antler only remains on the landscape for a short period of time as it is a source of food and nutrients for a variety of animals (see fig. 5.21).[137]

Red deer seem to have fairly adaptable behaviors, as they are located throughout Europe, North Africa, and parts of Asia; they also select habitats "as diverse as the Siberian taiga, the Southern Tibetan plateau, mountain forests, moorland and the Mediterranean scrubwood."[138] A study of red deer on Sardinia found that they favored tall scrubwood and riparian (interface between river/stream and land) vegetation.[139] Additionally, the deer altered their habitat selection processes depending on whether people were present.[140] Like red deer, fallow deer also have a high degree of flexibility in terms of habitat selection, which is strongly mediated by the social and sexual organization of the species.[141] These studies show that each species displays both flexibility and specific preferences in relation to its habitat. These preferences may be mediated by the presence of humans or large-scale processes of anthropogenic landscape modification and climate change. Furthermore, the heterogeneity of the Mediterranean assures that habitat preferences of deer are highly variable between

136 Goss 1983, 6–9.

137 Gambín, Ceacero, Garcia, Landete-Castillejos, and Gallego 2017; Choyke 2013, 3.

138 Lovari, Cuccus, Murgia, Murgia, Soi, and Plantamura 2007, 179.

139 Lovari, Cuccus, Murgia, Murgia, Soi, and Plantamura 2007, 187.

140 Lovari, Cuccus, Murgia, Murgia, Soi, and Plantamura 2007, 184.

141 Apollonio, Focardi, Toso, and Nacci (1998, 230) writes that in one study, "males come into female areas early in autumn to breed; from this time on adult groups of mixed sex may be observed until early winter. Rutting groups then break up and the animals re-establish single-sex herds."

regions.[142]

Individuals at Methone would have needed to know what time of the year they were most likely to find shed antlers and which habitats each species occupied when it began the shedding process. Additionally, the deer in the region were practicing habitat selection based on a variety of factors that may have been influenced by humans (e.g., proximity to settlements, the anthropogenic creation of farmland). This engagement between humans and deer at Methone shows how animal behaviors exert influence and agency over the individuals collecting antler and producers making worked animal objects. Individuals collecting antler must join the habitats of the deer within a time frame dictated by the animals. Humans insert themselves within these processes of mating and seasonality. They imitate the behaviors of the deer by retracing their steps in an attempt to find antler. The deer may have been cognizant of humans within their spaces, and altered their behaviors as a result. This dynamic is captured by Haraway's notion of "becoming with," in which meaning and self-definition are created within the interspecies encounter. She writes that "all the actors become who they are *in the dance of relating*, not from scratch, not ex-nihilo, but full of the patterns in their sometimes-joined, sometimes-separate heritages both before and lateral to *this* encounter."[143] Humans must adopt a deer perspective and enter into their spaces to collect antler; collecting antler becomes a defining facet of the relationship between the two species. Like the "sometimes-joined" aspect of Haraway's "dance of relating," antler collection punctuates the relationship between humans and deer as a specific, seasonal moment in time. Taking place during certain seasons and only in some locations, antler collection has the potential to reflect distinct spatial and temporal aspects of the landscape. The process of antler collection is rich with potential for self-definition, redefinition, and transformation of the boundaries between human and deer.

For the producers using it as a material, antler may have carried meanings related to the

[142] Horden and Purcell 2000, 13; Apollonio, Focardi, Toso, and Nacci 1998, 225.

[143] Haraway 2008, 25.

behaviors of deer. Within the Methone assemblage, antler was used for many tools handles or hammers, partially owing to the practical advantages of the material. However, the choice of antler may also have a complementary explanation resulting from the behaviors of deer. In many species of deer, stags (male deer) use their antler as a weapon during fights over control of hinds (female deer). These fights can result in the death, permanent injury, or blindness of the stags.[144] Individuals may have observed deer striking one another, or with their antlers locked. The choices surrounding antler as a material may have had its roots in these animal behaviors. Conneller argues this idea for the antler points at Star Carr; she sees the antlers as "affects" of the animal behavior.[145] Individuals using antler tools can harness aggressive traits that were expressed during the animal's life. Antler, as a raw material, may have been socially constructed as metonymic for combative deer behaviors. Shed antler is an inherently partible material, an element of the deer that is separated from the rest of its body. As a material, it may have been viewed as an active extension of the still-living deer. Such a view of the material opens up a vista of possible meanings for the individual harnessing antler tools. Using an antler hammer may afford the craftsperson the strength of the deer or provide the individual the chance to take on deer "affects."

5.4.2 Fossil Ivory at Methone: Monsters and Natural History

A single piece of fossilized ivory (ID 87) found within the *Hypogeion* speaks to a different type of relationship with the natural world, one which underlies a larger aspect of the Greek worldview: a concern for natural history. The fossilized ivory (ID 87) found within the *Hypogeion* suggests that individuals at Methone were seeking out a local source of ivory, and possessed an understanding and knowledge of local fossil beds. While it is possible the fossil ivory at Methone represents a "chance find," its inclusion alongside other pieces of ivory production waste implies craftspeople were seeking out this material for production.

144 Clutton-Brock, Albon, Gibson, and Guinness 1979, 215.

145 Conneller 2012, 62.

As these same individuals were also exploiting wild animal resources in several different ecological niches, it is hardly surprising that local knowledge included the locations of fossil beds. Textual references that postdate the Methone material suggest that individuals in the ancient world were aware of fossilized ivory in the environments where elephants or mammoths no longer lived. Theophrastus notes a kind of ivory that has been ορυκτός or "dug up,"[146] accurately describing the ivory as having a variegated white and dark appearance. Additionally, in Pliny The Elder's *Natural History*, he explicitly links fossilized ivory to Theophrastus' description: "Theophrastus, again, and Mucianus express the opinion that there are certain stones that give birth to other stones. Theophrastus states also that fossil ivory coloured black and white is found."[147] In the same work, Pliny describes elephants' behavior in relation to their tusks: "when these fall off owing to some accident or to age they bury them in the ground."[148] Despite its inaccuracy, Earle Radcliffe Caley and John F. C. Richards, as well as Mayor, all argue that this story is an explanatory mechanism for the discovery of fossilized ivory.[149]

These textual accounts resonate with the discovery of fossilized ivory within the Methone assemblage. Northern Greece and the region around Methone have an abundance of extinct proboscidean remains. Evidence for the straight-tusked elephant (*Palaeoloxodon antiquus*) is common across northern Greece and is commonly found in river deposits of the Haliakmon. Remains have been found at Vathylakkos (Axios), Allatini, Trilophos, and Epanomi, sites that are all near Methone.[150] Farther north and west at Flórina, two other proboscidean

146 Theophr. *De lapidibus* 37–38.

147 Pliny specifically uses the phrase "ebur fossile," meaning ivory which has produced from the earth. "Theophrastus et ebur fossile candido et nigro colore inveniri et ossa e terra nasci invenirique lapides osseos." Plin. *HN*, 36.134. J.M. Jordan (2016, 109–10) examines this passage within a larger discussion of a "persistent scholarly confusion over pre-modern conceptions of fossils." He argues that modern scholarship falsely implies that the ancient sources believed fossils were spontaneously generated.

148 Plin. *HN*, 8.7.

149 Caley and Richards 1956; Mayor 2000.

150 Tsoukala, Mol, Pappa, Vlachos, Logchem, Vaxevanopoulos, and Reumer 2011; Doukas and Athanassiou

species have been discovered: the steppe mammoth (*Mammuthus trogontherii*) and the southern mammoth (*Archidiskodon meridionalis*).[151]

The evidence for the use of fossils in the ancient world suggests that they had ritual significance and may have been viewed as part of a mythohistorical understanding of the deep past. Mayor argues that individuals in the ancient world would have frequently encountered bones of extinct animals and that many of the creatures populating mythology are "evidence for a native natural history."[152] She argues that the later textual references to transfers of hero bones may have involved large fossils of extinct animals that were viewed as the remnants of past heroes and venerated as relics. Citing George Huxley,[153] Mayor also suggests that an "Ancient Bone Rush" coincided with the intensification of hero cult practices during the 8th century BCE.[154] In addition to hero cults, evidence from the Samian Heraion shows that individuals were also dedicating fossils, as well as bones of other exotic animals (see § 4.3.7).

By the Archaic period, there was a demand for hero bones, such as those of Theseus on Skyros, which became tools of political self-definition.[155] There are a series of bone transfers known from literary sources that describe cities receiving the bones of heroes, the most famous of these being the transfer of the bones of Orestes from Tegea to Sparta.[156] While both the historicity and chronology of these events are somewhat in doubt, their inclusion in the later literature reflects a real concern for these bones.[157] Mayor sees a link among the interest in hero cults, hero bones and fossil hunting, writing that "chance fossil finds now

2003; Dermitzakis, Symeonidis, De Boer, and Sondaar 1982.

151 Velitzelos and Schneider 1973.

152 Mayor 2000, 4.

153 Huxley 1979.

154 Price 1973, See; Coldstream 1976; Morris 1988; Antonaccio 1994.

155 See Podlecki 1971; Higbie 1997.

156 Huxley 1979; McCauley 1998; Phillips 2003; Malkin 2003; Zaccarini 2015.

157 McCauley (1998) believes that many of the credible bone transfers occur in the 5th century BCE.

spurred deliberate bone hunting. Every city sought the 'peculiar glamour'—the religious anointment and political power—conferred by heroes' remains. The impressive bones were a vital physical link to the glorious past."[158]

In one of the stories surrounding hero bones, Pausanias recounts how the large shoulder-blade of Pelops was lost and then found again. He writes:

> So it is said that they sent for Philoctetes to the camp, and from Pisa was brought to them a bone of Pelops—a shoulder-blade. As they were returning home, the ship carrying the bone of Pelops was wrecked off Euboea in the storm. Many years later than the capture of Troy, Damarmenus, a fisherman from Eretria, cast a net into the sea and drew up the bone. Marvelling at its size he kept it hidden in the sand. At last he went to Delphi, to inquire whose the bone was, and what he ought to do with it.[159]

Mayor argues that Pausanias' account of the "ivory" shoulder blade of the warrior Pelops is an indirect reference to these encounters between humans and fossils.[160] Mayor suggests that the shoulder blade may actually have been the scapula of an extinct proboscidean likely polished, giving it an ivory-like quality.[161] However, it is also possible that the story of Damarmenus coming upon a large bone represents individuals making sense of the discoveries of the remains of marine mammals. Archaeological evidence suggests that these sorts of encounters were not unknown in the ancient world; Papadopoulos and Ruscillo detail the discovery of a portion of a whale scapula found in an Early Geometric Well (K 12:2) in the Athenian Agora.[162] The bone had a large rectangular hole cut into it and was

158 Mayor 2000, 111–12.

159 Paus 5.13.4–6.

160 Mayor (2000, 115–16) also highlights Pausanias' description of large bones believed to belong to Ajax (1.35.3–5), which washed up on the shores of Rhoeteum. According to Philostratus (*Her* 1.2), Hadrian ordered bones "of a person eleven cubits tall" restored to the tomb of Ajax.

161 Mayor 2000, 105.

162 As the bone belonged to a juvenile individual, species identification was complicated. Papadopoulos and Ruscillo (2002, 193) write: "Through a comparison with modern specimens, the bone most closely resembles the glenoid of an immature fin whale (*Balaenoptera physalus*, Linn. 1758) [...], a baleen whale of the suborder Mysticet."

covered with "fine cut marks;" the authors suggest it may have been used as a surface for leatherwork.[163] Based on the taphonomic condition of the scapula, the authors posit that the bone belonged to a whale that had been beached and decomposed.[164] The discovery of the scapula or "shoulder blade" of a whale that had likely washed ashore at some point, and was subsequently used as a working surface, ties the mythic imagination of Pausanias to the realities of environmental exploitation. Following Huxley, Papadopoulos and Ruscillo explicitly reference Pausanias' story in relation to the Agora whale bone.[165] These stories suggest an ethos of early natural historical thought that precedes Aristotle's observations of animals and other biological phenomena. Some of the best evidence for this awareness as well as careful study of the environment comes from the depictions of marine animals on a Caeretan hydria in the Stavros S. Niarchos Collection dating to the last three decades of the 6$^{\text{th}}$ century BCE.[166] In his analysis of the Caeretan hydria, Papadopoulos describes the artist of the scene as "a vase painter who borders on a natural historian."[167] Based on the incredibly life-like detail captured by the painter of the hydria, Papadopoulos makes several specific identifications (in some cases to the level of species) of the animals depicted, including the Mediterranean Monk Seal (*Monachus monachus*), octopus (*Octopus defilippi*), and the rare oarfish (*Regalecus glesne*). This oarfish, rather than just a general depiction of a *ketos,* possesses specific features such as a red crest and dorsal fin. Papadopoulos identifies the oarfish of the Caeretan hydria as possibly the only depiction of the species known from the ancient world.[168]

In addition to the Caeretan hydria, a Corinthian krater from the mid-6$^{\text{th}}$ century BCE

[163] Papadopoulos and Ruscillo 2002, 197.

[164] Papadopoulos and Ruscillo 2002, 197.

[165] Huxley 1975, 45, 1979, 147; Papadopoulos and Ruscillo 2002, 205.

[166] Papadopoulos 2016b, 71.

[167] Papadopoulos 2016b, 78.

[168] Papadopoulos 2016b, 81.

in the Museum of Fine Arts, Boston appears to show another instance of an artist closely studying their natural surroundings. This krater shows a strange depiction of the "Monster of Troy," which Mayor identifies as an amalgam of naturalistic features that might be found on the fossilized skull (e.g., large eye sockets and a realistic mandible) of an extinct animal (see fig. 5.22).[169] The skull is rendered in the middle of a dark, nondescript portion of the vase that Mayor interprets as a cliff-side. Within this scene, the painter has melded mythology, imagination, and naturalism. Whether the fossilized skull would have been understandable to those who saw the vase is unknowable, but its depiction suggests the artist's conception of a natural past linked to the shared mythology of ancient Greece. The depictions of an actual *ketos* like the oarfish and the composite "Monster of Troy" are both attestations of a growing concern with observation of the natural world. Moreover, they are attempts by the artists to enculturate aspects of nature into their world view, i.e., the creation of naturecultures.

The fossilized ivory at Methone may provide a link between worked animal object production and the ways in which individuals viewed fossils within ritual and mythic frameworks of hero cult and sanctuary dedication. The fossilized ivory deposited alongside elephant ivory in the *Hypogeion* suggests that producers at Methone understood it as a medium for production, but they may have also seen the ivory as something distinct from the other materials. While antler and bone have definite animal correlates, fossilized ivory has much more obscure origins; producers at Methone may have viewed this fossilized ivory as a remnant of an ancient past. As in the process of antler collection, searching for fossilized ivory necessitates a local knowledge of the landscape. Again, the specific cultural ideas attached to fossil beds and fossil hunting are lost. However, these sites may have been loci for the creation of ideas about the past, what Mayor calls a "native natural history."[170] Places like fossil beds may have preserved crania, large recognizable long bones, and other stark reminders of extinct species. As naturecultures, these fossils beds may have been imbued with notions of time,

[169] Mayor 2000, 159.

[170] Mayor 2000, 4.

history, and mythology.

5.5 Production Techniques at Methone

Much of the material within in the Methone assemblage leaves behind evidence for recognizable production techniques, such as cutting, polishing, or drilling. These actions are captured in both finished objects, as well as waste products. While many techniques are evident within the production debris, others are less likely to be visible in the discarded waste. As finished objects leave workshop contexts, complex techniques that leave little trace may be unrecognized within the production waste. As a result, the remains of the production process may misrepresent the full breadth of techniques used at the site. Regardless, the study of archaeologically visible aspects of technique and technical skills offers insight into the tool kits and technical behaviors (e.g., gestures and skills) of producers that are not always discernible when looking at finished objects. Tool marks are a testament to how producers handled animal materials and the dialogue between their bodies, their knowledge, and the remains of animals. Additionally, the remains of cut marks, abrasion, and drill holes all testify to the different ways by which individuals kinetically interacted with animal materials as elements of the human-animal relationship enacted during craft production (see 2.3.1). Within the Methone assemblage, a worked bone object (ID 322) thought to be a spindle whorl captures the idea of producers and materials working together. The object was made from the head of an unfused femur of a juvenile cow. As it was not fully fused, it would have been easy to detach from the rest of the bone. An unfused femoral head was a logical choice for the creation of a spindle whorl, as it already resembles the object: it is hemispherical in shape with a concavity at its base. The femur head has a natural cavity (fovea) that acts as the attachment point for a ligament, which was used by the producer of this object to situate the central drill hole. In the case of ID 322, the producer altered little to create a spindle whorl, and the natural grooves of the material undoubtedly guided the producer's hand to create the object.

Another example of the exchange between the craftsperson's intent and the material is evident in a small carving of a bird found within the Classical levels of Pit 46/*Hypogeion* 2 (ID 287). The bird is shown with its wings outstretched and raised in a realistic depiction of flying. However, a head-on view of the bird reveals the influence of the shape of the material. Carved from bone, the raised wings disguise the roundness of the natural lines of the material. The carving demonstrates how the curves of the bone guided the hands of the craftsperson. The final product is recognizably a bird, yet undoubtedly a compromise between human intention and material. Both the spindle whorl and the bone bird are the morphogenetic results of the producer and the animal material in dialogue together.

5.5.1 Cutting Techniques

The use of a distinct tool to cut into osseous materials was a dominant method for altering the shape of animal materials at Methone. When there was less concern for precision, producers approached materials with tools capable of chopping or hacking motions, similar to technical practices employed in butchery. In an ethnographic study of cooked bones in East Africa, Diane Gifford-Gonzalez categorizes chop or hack marks as either "relatively shallow and narrow marks with roughly V-shaped cross-sections lacking internal striations parallel to the long axis of the mark" or another type that is "deeper, broader, and longer, sometimes associated with impact damage, also lacking parallel striations within the mark."[171] Drawing on the work of Gifford-Gonzalez, Karen Lupo and her collaborators write that chop marks "[leave] planar surfaces or shear faces." Lupo et al. also define a cleave mark, which is comparable to a hack or a chop, but occurs when a blade strikes the bone "at a perpendicular angle."[172] The authors note that these marks often leave crushed bone fragments, a phenomenon first described by Richard Potts and Pat Shipman.[173] Because this practice is most

171 Gifford-Gonzalez 1989, 200.

172 Lupo, Fancher, and Schmitt 2013, 431.

173 Lupo, Fancher, and Schmitt 2013, 431; Potts and Shipman 1981, 577.

common in butchered bone, objects with hack marks may look more like dietary waste than the remains of production. In the Methone assemblage, clear examples of this technique can be seen on pieces of antler (IDs 14, 18, 39, 60), horncore (IDs 472, 494), and bone (ID 441). Hack marks within the assemblage may signal the actions of non-craftspeople, especially in relation to more common materials like horn or bone. An ambiguous example within the Methone assemblage is a metapodial with a cleave mark near the proximal end, but with the shaft still attached (ID 442). While this bone was not used as raw material, it was found in a context with other elements of production waste, and it is somewhat comparable to the neater examples of cut metapodial ends. This type of bone is heavily associated with production waste, but this imprecise technique is mostly atypical of craftspeople at Methone. A similar pattern exists on many examples of horncore, which often have multiple messy cuts. Chop marks on bone or horncore suggest that prior to craftspeople working the material, non-craftspeople may have initially collected it.

Other approaches to removing large amounts of harder materials (e.g., antler tines and portions of cementum from the elephant tusk) are also evident in the Methone assemblage. Significantly wide cut marks are present on several objects, suggesting the use of a large saw or knife reserved for harder materials or work carried out during early processing stages. Two pieces of cementum, one from the West Hill (ID 182) and one from the *Hypogeion* (ID 171), both exhibit this rectangular cut. A similar, although slightly thinner type of cut is also present on a heavily worked forking section of antler found in the upper layers of the *Hypogeion* (ID 33, see fig. 5.23). Additionally, a donkey metapodial found on the East Hill (ID 427) also exhibits these wide, rectangular cut marks. The even, rectangular profile of the cut marks may indicate that the saw blade was used more like a grinding tool, removing material through abrasion. In his study of tool use on animal bones, Haskel Greenfield characterizes a similar type of cutting mark as from a "dulled flat-edged metal blade."[174] There is evidence for such saw within the Greek world as well; Doniert Evely suggests that

[174] Greenfield 2006, 152, 1999, 803.

toothless saws, with the aid of abrasive powder, could have been used by Minoan ivory carvers.[175]

In addition to the wider rectangular cut marks, there is abundant evidence for the use of saws with teeth, manifested through a series of striations on the cut surface. Modern forensic analysis characterizes these striations as exhibiting either low variability (nearly all in the same direction) or high variability (striations are not parallel to one another, and running in separate directions). Additionally, the striation breadth (distance between striations) may differ between tools.[176] Changes in striation direction are the result of craftspeople changing the angle of the cut. Analysis of the directionality and patterning of cut mark striations indicates the different ways producers handled the materials at Methone. The large block of ivory found within the *Hypogeion* (ID 193) illustrates how changes in cut mark striations can reveal aspects of the production process. On one face of the object, the striations begin parallel to the block, with a short breadth between them. This indicates that the craftsperson was making rapid, even cuts through the material. However, after about a centimeter, the striation breadth widens before the striations shift roughly 45°. As the broadening striations coincided with the new angle of the cut, it seems that the ivory was becoming too difficult to cut straight down, and the craftsperson changed the orientation of the saw. Throughout most of the middle section of the ivory block, the cut mark striations are fairly variable; two different striation angles are visible in this section, indicating that the craftsperson may have been trying to cut it from two different directions. A few centimeters from the bottom, the angle of the striations changes again and becomes less variable. At the very bottom, there is another angle change, again parallel to the length of the object. Two of the other block faces (see figs. 5.24 and 5.25) show few changes in the angle of striation, suggesting the craftsperson did not have to change the angle of the cut, whereas the fourth long face

---

175 Evely 1992, 8. There is other Bronze Age precedent for toothless saws, as examples of such tools used for masonry were found at Agia Triada. Shaw 1973; Evely 1993, 26–39.

176 Symes, Chapman, Rainwater, Cabo, and Myster 2010, 28.

shows a different cutting pattern, indicative of a flat tool (see below). A similar pattern also appears on the semi-cylindrical antler section from the *Hypogeion* (ID 34); it exhibits unidirectional striations for most of its length, but the striations change direction in a small section of the material. These patterns indicate that craftspeople cut the objects in one direction until they were forced to move either the saw or the object.

Many of the objects within the assemblage exhibit cut mark striations that are uniform in breadth and angle, suggesting that craftspeople at Methone had the skills to make these cuts without having to adjust their bodies or the material. Some of the best examples of such cuts (low striation variability) are present on metapodial ends, especially those from the West Hill workshop contexts. IDs 437, 438, and 444 are all nearly identical examples of metapodial ends from the West Hill, and each is cut close to the proximal end in an effort to maximize material from the shaft. Each of the cut surfaces exhibits uniform saw-mark striations, reflecting a practiced skill that was born out of repetition. These striations indicate a strongly repetitive sawing motion, highly suggestive of practiced individuals. Metapodial bone preparation was a likely starting point for many objects within the assemblage, and among the most rudimentary and essential skills for a craftsperson of worked bone. These nearly perfect cut metapodials illustrate how a fundamental skill might have been shared and disseminated within the social environment of production at Methone.

In addition to evidence of sawing, there are also indications of the use of flat tools for scraping the surface. By using such a tool, producers can strip material more freely, without having to cut through an object. These actions were likely performed by tools specifically made for scraping, such as a chisel. However, it is also possible that knives used for cutting through bone were repurposed for scraping. Based on the framework for the study of tool marks on bone defined by Sandra Olsen, and later by Rozalia Christidou, as well as Emanuela Cristiani and Francesca Alhaique, scraping is marked by several criteria, reprinted below:[177]

[177] Christidou 2008, 750; Olsen 1988; Cristiani and Alhaique 2005.

- Sets of long straight striations, parallel or intersecting.
- Flat aspect of the surface on which the linear marks develop.
- Abrupt change in the direction of the linear marks.
- Absence of superimposition between traces.
- Chattering.

Several objects at Methone exhibit one or more of these features on cut surfaces. One distinct piece of evidence for the use of flat scraping tools comes in the form of a clear pattern left on the surface of the material known as chattering, or chatter-marks. Chatter-marks occur when the craftsperson, using excessive pressure, approaches the surface of the material at a too-steep angle, while lacking sufficient lubrication between the surface and the tool. The result is that the tool is driven across the surface of the material while the material vibrates from the excessive force; the tool strikes the material as it is vibrating, creating a regular pattern of banded lines across the surface.[178] In Mark Newcomer's study of bone tools from Ksar Akil (Lebanon), he found chatter-marks on every one of the objects that were in good condition. As a result, he argues that these markings are associated with flint tools.[179] However, Douglas Campana points out that the chatter phenomenon is well known in modern metal working, and chatter-marks made by metal tools have been demonstrated by others as well.[180] Within the Methone assemblage, clear chatter-marks are present on at least three objects:[181] the larger fibula plate from the *Hypogeion* (ID 2, see fig. 5.26), a flat bone object with incised circles from the West Hill (ID 309, see fig. 5.27), and an antler

[178] Newcomer 1974, 149; Campana 1989, 113; Olsen 1979, 345; Luik, Ots, and Maldre 2011, 258; Luik and Maldre 2007, 28; Luik 2011, 38–40.

[179] Newcomer 1974, 149.

[180] Christidou 2008.

[181] There may also be chatter-marks on an irregular piece of ivory with a flat surface, ID 220.

tool (haft or handle) from the *Hypogeion* (ID 21, see fig. 5.28). The chatter-marks on the fibula plate and on the flat object from the West Hill were likely the result of a craftsperson moving a tool across the material in an effort to create a flat surface. Both objects are similar in form, the chattering indicating a common production step shared by each: the use of a scraping tool to even the surface. Producers of such objects likely used a tool like a chisel to create a uniform section of cortical bone, removing the natural curvature of the material or previous cut marks made by the craftsperson. While the antler object is dissimilar from the other two (it is rounded),[182] the chatter-marks resulted from a similar process, a side-effect of considerable surface modification of ID 21.

The Methone assemblage exhibited evidence for another means of separating portions of raw material known as the groove and snap technique. Using this technique, producers make a series of partial cuts or grooves and then apply force to snap the material along those cuts. This method of working osseous materials is common across cultures, and it has been studied within an assemblage of Mesolithic and Upper Paleolithic antler points at Star Carr.[183] Similarly, other studies of worked bone and antler in Paleolithic Europe have highlighted this technique, including Gravettian examples from Russia and France,[184] as well as a similar technique ("*débitage par tronçonnage*") seen in reindeer antler from the Badegoulian culture in France.[185] Outside Europe, the technique also has been identified within cultural groups from the Americas, including examples from Dorset,[186] Inuit,[187] Cal-

[182] Chatter-marks on a rounded surface are not uncommon, as Luik and Maldre (2007, 25, see fig. 28) note them on rounded objects.

[183] Clark and Thompson 1954.

[184] Goutas 2009.

[185] Badegoulian culture is contemporary with the Last Glacial Maximum, ca. 23,000–20,500 cal BP (Averbouh and Pétillon 2011).

[186] LeMoine and Darwent 1998; Wells, Renouf, and Rast 2014.

[187] Morrison 1986; Betts 2007.

ifornian,[188] Mississippian,[189] and Maya contexts.[190] At Methone, a version of the groove and snap technique is visible on a few objects, including a piece of production waste (ID 415) that shows three even cuts. These cuts do not go all the way through the bone, rather they leave behind a triangular portion of material. The craftsperson used these cuts to weaken the bone, and snap the rest; a small spur of bone remains between the triangular cuts. A similar use of this technique can be seen on two boar canines (IDs 455 and 459), which also have cuts that form a triangular region of broken material (see fig. 5.29). This technique was also used on one of the short points (ID 263), but the raised portion of broken bone is more elliptical than triangular. Less precise versions of this technique may also appear on some of the antler tools and handles, such as on ID 30.[191] In addition to these methods of separating large portions of material, craftspeople at Methone also used cutting techniques intended for finer work, as seen in the cross cut marks on the ivory waste (IDs 134, 135, 136, and 138). In these examples, the width of the cut is smaller than those of the wide cuts seen on antler tines and cementum. There is a considerable difference between the cut marks on an exterior piece of cementum and ivory (ID 171), and those on the pieces with cross cut marks (IDs 134, 135, 136, and 138). These pieces indicate that ivory workers at Methone had a selection of tools of different sizes used at different times in the production process.

5.5.2 Incision and Drilling Techniques

Much of the other fine work seen in the assemblage is the result of producers using an incising tool to remove a small amount of material to create a line or curve. At Methone, producers used a compass or some tool of a fixed distance to create patterns from incised arcs. These patterns are visible on the spectacle fibula plaque featuring a floral design in

---

188 Erlandson, Kennett, Culleton, Goebel, Nelson, and Skinner 2014.

189 Davis, Kidder, and Barondess 1983.

190 Emery 2008.

191 Many of these objects often show large cut marks at one end, suggesting material completely cut off, rather than grooved and broken.

the center (ID 2). The producer began by incising a circle in the center of the fibula plaque, then using the same compass, drew an arc, utilizing the edge of the original circle as its center. The producer repeated the process, incising partial arcs within the original circle. By incising six intersecting arcs of the same radius, the producer created a flower shape with six petals (see fig. 5.30). A circular indentation shows where the compass was pressed into the bone at the center of the circle and at the edge of two petals. One of the arcs is slightly uneven and may have been done by hand. This floral motif was also used on two other spectacle fibula plaques: ID 4 and ID 85, as well as on a scrap of bone (ID 85). In ID 284, producers were using the compass to create a similar pattern of a repeated motif of intersecting arcs. This motif was created by incising two ends of a semicircle, but leaving the center of the arc untouched. Producers then repeated this process, selecting the edge of one of the previously incised arcs as a new center point for the following semicircle. Next, producers used a smaller compass and drew arcs at the existing center points, replicating the process on a smaller scale within the existing pattern (see figs. 5.31 and 5.32). Incised lines were also used as guides for more complex designs. On the fibula plates (IDs 2 and 3), a shallow incised line runs through the center of the guilloche pattern. Craftspeople used this line to ensure the center of the guilloche motif was regular, and equidistant from the center. In some instances, this technique was probably obscured by polishing the finished object; however, the incised guide line can be seen in a similar example from Thasos.[192]

A similar incision technique known as scribing is a technique craftspeople use to creates circles with a dot in the center (i.e., the ring-and-dot motif). This is achieved by use of a tool with a center bit and two equidistant points that are aligned;[193] examples of such tools were found at Staré Město in the Czech Republic[194] and Aquincum, Hungary.[195] The producer

[192] Prêtre 2016, 35, n. 131, pl. 4.

[193] St. Clair 2003, 65.

[194] Hruby 1957, 189.

[195] Biró, Choyke, Vass, and Vecsey 2012, 55–58.

places this tool against the material and turns it to create a shallow ring-and-dot pattern. With the outline established, the producer continues to apply force and cut the motif deeper. This technique appears on 11 objects in the Methone assemblage as either just the ring-and-dot motif, or as an element of a guilloche pattern.[196] The ring-and-dot motif is a widespread decorative element on worked animal materials in Early Greece. The pattern appears widely in the Aegean and Near East, as well as in other parts of the world throughout different periods.[197] Scribing offers the advantages of a neat decorative design easily replicated and adapted to other motifs. Scribing techniques form the basis for the guilloche pattern that appears in Greek and Near Eastern art during the Iron Age. Craftspeople created this motif by using a scribing tool to incise a full circle, and then using a larger compass or scribing tool to create partial circles. These connect with the complete inner circles to create an interlocking pattern.

Along with cutting or incising tools, craftspeople at Methone also employed tools to create holes and remove sections of material. Roughly 15%[198] of the assemblage exhibits evidence for the use of a drill. As animal materials are fairly hard, producers would have likely turned these drills by means of a bow.[199] The drill holes range from less than a millimeter to a centimeter, demonstrating that a variety of sizes were used (see fig. 5.33). The majority of the drill holes are standard in appearance and differ from one another in size only; however, some pieces of production waste indicate that at least three separate types of drills were in use at Methone. In the most common drilling technique, craftspeople produced a hole and removed material. In a second form of drilling, a tool was used to extract circular portions of the material. Antler (IDs 51, 52, 53) and bone pieces (IDs 423 and 424) were found with a series of circular recessions in tight groups that appear to have been made with a tubular

[196] IDs 2, 3, 4, 80, 84, 85, 86, 252, 302, 304, 313.

[197] Hruby 1957; MacGregor 1985; St. Clair 2003.

[198] Eighty-two of 532 objects.

[199] Evely 1992, 7; Rostoker 1986, 93.

drill. In a study of ivory production waste from Neo-Palatial Crete, Evely describes tubular drills as a part of the carver's tool kit which leaves "distinct grooved bases."[200] The drill holes in the Methone assemblage match Evely's description, as they show a grooved base left behind after the material was removed. By drilling multiple sections close to one another, producers were maximizing the amount of material they could remove. These cylindrical sections of material may have been fashioned into rings, but the rings in the assemblage are a larger size than the drill holes. Comparable examples of this production waste are known from medieval Strasbourg, as well as a modern 18th-century military installation at Belgrade.[201]

Methone shows evidence of another specialized drill used to create space for inlays. An ivory piece (ID 212) exhibits a circular area created with a drill. The center of the area exhibits a slight recession, representing the point where the center of the drill pressed down into the material. Radiating around this recession is a series of faint concentric circles, the result of the edge of the drill removing material. ID 212 exhibits a markedly even recessed area, suggesting the drill was specially designed to remove material in this way.[202] This drilling technique is seen outside of the Methone assemblage on objects that are inlaid with other materials, including among the carved eyes (see § 4.6.2) and cloisonné disks (see § 4.6.9) found across sanctuaries in the Greek world. Additionally, many of the ivory objects thought to be representations of astragali from Ephesus exhibit a comparable drill hole, meant for an amber inlay (see § 4.3.6).[203]

The Methone assemblage also produced only limited evidence for the use of the lathe, a technique that was likely similar to using a drill.[204] Only a single object in the Methone

---

200 Evely 1992, 7, 12, fig. 1b.

201 Maire 1998; Vesna Bikić 2016.

202 The modern Forstner drill bit produces a nearly identical pattern (Ebert 1997).

203 Hogarth 1908a, 190, pl. 36.

204 Evidence for the use of the lathe is seen within the assemblages from Ephesus, especially among the

assemblage indicates this technology—a tapered bead (ID 280) shows fine concentric lines that are straight and even, seemingly formed when a cutting tool came into contact with the rotating object. The use of a lathe is more likely to be recognized in final products, as small waste fragments produced by the tool are unlikely to preserve. These few instances of evidence for specialized tools illustrate how many production techniques may be absent or underrepresented, in production contexts.

5.5.3 Abrasion and Heat Treatment

As an alternative to cutting or incising, craftspeople also used abrasion to alter the shape and surface of animal materials at Methone. Abrading material reduces its shape or changes its quality through extended contact with some other, rougher or coarser, material. Signs of abrasion can be the result of a deliberate technique to alter the shape or appearance of animal material, as well as a side effect of extended use. As objects repeatedly come into contact with other surfaces, including human hands, they are slowly altered. These alterations may inadvertently polish the object, making it look like a deliberate choice. Consequently, it is not always obvious whether signs of abrasion are a decision made by craftspeople, or the result of use. Campana defines two manufacturing techniques that use abrasion: cross-grinding and axial grinding. Cross-grinding involves rubbing the raw material across an abrasive stone "at or nearly perpendicular to the axis of the bone fragment," while axial grinding is the action of abrading an object "parallel to its length."[205] Abrasion is evident throughout the assemblage, most commonly as a method to modify astragali. The majority of the worked astragali were shaped by a mild form of cross-grinding, but at least one example from Methone (ID 365) appears to have been cut rather than abraded.[206] In

"truncheon-shape" pendants, see Hogarth 1908a, 189; Thasos also contains evidence for the lathe, see Prêtre 2016, 28.

[205] Campana 1989, 32.

[206] This technique was also apparent among some of the examples at Corycian Cave (see § 4.4), although abrasion was the dominant technique.

addition to abrasion techniques that remove larger amounts of material through grinding, there are also instances of polish, another form of abrasion. While many objects within the assemblage may have acquired incidental polish as a byproduct of use, some examples appear to be the result of deliberate choices by producers. Polishing animal materials renders their exteriors glossy, giving them an attractive, uniform surface. The technique is visible on multiple objects, including one of the aulos fragments (ID 257), a rod (ID 291), a bridle piece (ID 1), and others. Deliberate polish may be another example of a technique that is relatively underrepresented in the assemblage, as it represents a later or final step for objects that were more likely to have left the workshop.

While most of the previous techniques have strong comparanda in other Greek assemblages, Methone also appears to have a unique production process not attested at other sites: a distinctly different production technique involved changing the appearance of the material using heat. When animal materials are exposed to heat, they undergo structural and chemical changes that can alter their appearance. Depending on the temperature and heating environment, bone and ivory can turn various shades of black, white, gray, and blue.[207] Often these changes are unintended effects of taphonomy rather than the choice of the producer, although the prevalence of metallurgy, glass production, and kiln use shows that workshops at Methone regularly practiced temperature management. Several objects at Methone suggest that producers were applying these techniques to worked animal materials in order to create objects with a unique appearance. A long point (ID 291), as well as a cylindrical section of bone with small drill holes (ID 300) both have an even, cloudy gray color. The color of the bone is only moderately changed and uniform throughout, suggesting controlled heating. The long point was also polished, resulting in a lustrous and unusual appearance. Additionally, two pieces of *suidae* canine (IDs 454 and 460) both show changes resulting from heat exposure as well. The appearance of these objects differs from the others,

[207] Shipman, Foster, and Schoeninger 1984; Baer, Indictor, Frantz, and Appelbaum 1971; Ellingham, Thompson, Islam, and Taylor 2015.

as they are composed of separate organic structures (enamel and dentin). One of the objects (ID 454) is a *suidae* canine covered in enamel, the proximal and distal ends of which were cut off. The other object (ID 460) is a smaller section of canine that has been pierced with several metal studs. Both objects are highly polished and slightly glassy, with variegated light amber coloration. While these changes could be the result of some accidental process, they each have interesting and uniform appearances, suggesting a deliberate choice made by producers.

Heat treatment as a means of softening materials may have been a more prevalent technique used at Methone. Widespread horncore recovered during excavations indicates that the horn exterior was a common material at Methone. Working horn necessitates the use of heat to soften and mold the material, a technique that may have been used for ivory as well (see above).[208] In addition to horn and ivory, craftspeople at Methone also may have used heat or chemical treatment to alter antler. When antler is boiled, a stone or metal tool can be inserted into the interior cancellous portion of the material. After it cools, the antler expands, and the tool is locked into place.[209] Boiling bone or antler in water, as well as soaking it in sour milk or diced sorrel, have all been demonstrated to soften these materials as well.[210] Boiling bone to remove grease or other organic aspects of the material may have also been a standard element of production, indicating another requirement for controlled heat.[211] Kilns found in association with the workshop spaces of the West Hill (see below) may have even aided these techniques. While soaking or boiling animal materials may have been a standard part of their production, these techniques leave little to recognize within the archaeological record.

---

[208] MacGregor 1985, 66; Lapatin 1997, 2001, 74–78.

[209] MacGregor 1985, 63–64.

[210] Żurowski 1974; Osipowicz 2007, 3.

[211] Stern 2007, 18; Campbell, Li, He, and Jing 2011, 1288; Hrnčiarik 2017, 20–22.

5.5.4 Discussion

The Methone assemblage shows evidence for a wide variety of techniques, including several types of sawing, drilling, abrasion, and incision. With a number of seemingly "idiosyncratic" approaches to the material, as well as the absence of evidence for known techniques like the use of a lathe, an assemblage as large as the one at Methone is still subject to the inherent incompleteness of the archaeological record. The diversity of the assemblage suggests that an already varied collection of objects only captures some of what was being produced at the site. The variety adds to the emerging picture of industrial activity at Methone that is not rigidly specialized, but adaptive to the needs of those in the region. While some evidence for standardization of ivory practices exists (i.e., the prevalence of Type A and Type B production waste, see above), these practices still allowed for a diverse array of objects. Underlying this concept of chronological change are the murky cultural dynamics of colonization at the site. To what extent the assemblage represents more indigenous northern ideas, recently transported Eretrian practices, or some combination of the two, remains unclear. However, attitudes toward animals and their bodies are an integral aspect of cultural practice, and may influence how animal materials are treated.

The striking continuities in technique, such as the neat saw marks on metapodials or the oblique crossed cuts on ivory waste, suggests that communities of producers at Methone were bound by shared technical practices. The even saw-mark striations across many of the metapodial ends indicate there were learned methods of holding the bone, positioning the saw, and moving the body, that were shared among craftspeople at the site; this body knowledge (see § 2.3) was cultivated within a social environment of production. The indications for practice and training within the assemblage hint at the methods of knowledge transmission. One of the fibula plates from the *Hypogeion* (ID 2) shows an individual (or perhaps multiple individuals) developing these kinesthetic aspects of body knowledge. This fibula plate reveals a series of mistakes, such as arcs made with a compass that were drawn incorrectly and incised lines that cut through other motifs. Additionally, the surface of the plate shows chatter-marks, a sign that the producer moved a scraping tool across the flat surface at the wrong angle or with too much force. The back of this object also shows the producer continuously incising an arc with a compass, the same technique used within the motifs that decorate the object. This object is a testament to an individual developing specific skills by practicing them, presumably learning from previous mistakes. The chatter-marks would have been a powerful type of kinesthetic feedback, a physical reminder to change the positioning of the body, adjust force, or feel the surface of the material to assess its need for lubrication. Other items from the West Hill production contexts, including a small scrap of bone with an incised floral motif (ID 320) and an antler fibula plate may also be the remnants of individuals practicing techniques (see below).

5.6 The Organization of Production at Methone

Much of the worked animal material found at Methone cannot be linked to a primary deposit or any architecture, so inferences made about the organization of production at the site are tenuous. Moreover, production debris from worked animal materials can go unnoticed or be confused with the waste stream resulting from dietary practices. However, certain archaeological contexts like the deep deposits found in the *Hypogeion* of the East Hill and Pit 46/*Hypogeion* 2 of the West Hill, were presumably filled with materials from their surroundings. The richness of these deposits, combined with their chronological information, allows for a general understanding of production activities in different areas of the site. The overwhelmingly industrial aspect of the material culture recovered at Methone strongly implies that many of the finds, even if recovered in secondary fills, were the result of craft production. Materials like ivory act as a reliable signature for the presence of worked animal material production, as it is totally divorced from dietary waste streams, and small pieces are easily recognizable. The evidence from Methone shows ivory production waste within nearly every major area of excavation at the site: a concentration of ivory found in the *Hypogeion* and in adjacent areas on the East Hill, as well as a rich assemblage found by the Ephoria in association with architecture on the West Hill. The AMAP team also recovered pieces in the northern and southern sectors on the West Hill; the Ephoria also found ivory waste in Plot 245. In most of these areas, including the workshops of the West Hill, ivory was found in association with other worked animal materials, suggesting that different animal materials were worked together throughout the site. Evidence from the *Hypogeion*, West Hill structures, and Pit 46/*Hypogeion* 2 gives some of the best evidence for the distribution, character, and chronology of the production of worked animal materials at Methone. These assemblages offer insight into the production of worked animal materials from the 7th through the 5th centuries BCE.

5.6.1 Destruction of Post-Hole Structure/Leveling Phase

The occupation and destruction of the apsidal building on the West Hill provides insight into the beginnings of industrial activities after a leveling phase on the West Hill. The structure found by the AMAP team was constructed in the 9th–8th centuries BCE, and its ceramic assemblage was strongly patterned within the interior space of the structure. Morris et al. write that the ceramic distribution "indicates different uses of the north and south ends of the structure, with largely closed vessels (jugs and hydriai) in the north end, and open and cooking shapes in the south. Drinking vessels were found near the center of the interior."[212] In addition to the more domestic aspects of the assemblage, some evidence for industrial activities was also found.[213] The Post-Hole Structure was subsequently destroyed in the 7th century BCE, and then leveled over in a process that altered much of the West Hill.

There is little evidence for worked animal materials associated with the earliest phases of the Post-Hole Structure, except for a rectangular, bead-like ivory object (ID 81) found

[212] Morris, Papadopoulos, Bessios, Athanassiadou, and Noulas 2020, 696.

[213] Morris, Papadopoulos, Bessios, Athanassiadou, and Noulas 2020, 699.

in a pit associated with the use-life of the building.[214] Several instances of production waste and worked animal objects were associated with the destruction of the building, including two pieces of ivory production waste (IDs 192 and 183), a spindle whorl made from a femur of a cow (ID 322), a burnt bone bead (ID 282), and an indistinct piece of worked bone with two drill holes (ID 324). Additionally, there are also instances of worked objects in the units that were below the mid-7th century leveling phase. While objects from these units are stratigraphically separated from the leveling phase, it is unclear whether they should be associated with the final stages of the Post-Hole Structure or the activities leading up to the leveling phase. Regardless, a single unit (Trench 1, 106.4) produced a series of objects that are strongly indicative of the production of worked animal materials, including a piece of bone with fine incised lines (ID 417), a small fragment of ivory (ID 242), a partially worked metapodial (ID 442),[215] and a miniature bone axe (ID 256, see above). The limited evidence for worked animal material production during the use-life of the Post-Hole Structure is at least suggestive of some production activity preceding the leveling phase and increased focus on industry that occurred in the mid-7th century BCE.

5.6.2 The ***Hypogeion***

The *Hypogeion* was a large deposit of at least 11.5 m dug into the bedrock of the East Hill.[216] During the excavation of the *Hypogeion*, Besios identified many separate phases of deposition. He assigns the first three phases to between the 8th and 7th centuries BCE, and much of it can be more specifically dated to the Late Geometric II period (traditionally assigned a date range of 720–690 BCE) on the basis of local and imported pottery.[217] This date is well established by a series of Corinthian kotylai dated to between 720–705 BCE, as

[214] Sneed 2018, 15.

[215] As the bone does not exhibit clear cut marks, it is unclear whether this is actually production waste.

[216] Besios 2012, 54.

[217] Besios, Tzifopoulos, and Kotsonas 2012; Papadopoulos 2016a; Clay, Malkin, and Tzifopoulos 2017.

well as Attic imports, indicating an Attic LG IIb date (730–700 BCE).[218] The chronology of the later phases is less secure, and their contents may be more mixed. The later phases are separated by Wall 14, a feature that cuts through phase III and begins phase IV.[219] The fifth and final phase was marked by Corinthian pottery dated to the last quarter of the 7th century BCE.[220]

Like the objects associated with the destruction of the Post-Hole Structure, worked animal materials from the first phase of the *Hypogeion* are some of the earliest examples from the site. The deposition of the animal materials within the *Hypogeion* was strongly patterned, with different types found clustered together. Ivory is rare (but not absent) in the earliest levels, and is concentrated in the contexts belonging to the latest period. The antler objects also exhibit depositional patterning, as the material in the earliest levels is markedly different from the later ones: antler found in the earliest levels is generally rougher, and less substantially worked. The earlier levels include larger portions of antler thought to be stockpiled raw material, as well as all of the antler hammers found in this deposit. These early contexts also showed a mixture of fallow and red deer antler. In the latest phases of the *Hypogeion*, producers at Methone appear to be working antler in different ways. These contexts showed evidence for producers treating antler as more of a reductive technology, in which material is removed from a core; objects from these phases show that producers carved out semi-cylindrical sections of Red Deer antler. ID 33 is a remnant of that process, in which producers removed many different sections for other uses. Found in an archaeological unit immediately above ID 33, ID 34 represents one of the semi-cylindrical sections that went unused. Comparable examples of worked red deer antler come from an Archaic production context from the site of Argilos, also in the north Aegean.[221] In addition, the bridle piece

[218] Besios 2012, 59–60.

[219] Besios 2012, 54–56.

[220] Besios 2012, 57.

[221] Gkotsinas and Gardeisen Forthcoming.

(ID 1), and the two fibula plates (IDs 2 and 3, also found in some of the latest units) represent an approach to antler as a carving material, in which the natural shape is fundamentally altered. The older antler objects primarily relied on the existing structure of the materials: tools followed the shape of the beam and tine. Antler was primarily shaped by hacking off large portions, rather than removing smaller amounts of material.

The majority of the worked *suidae* teeth (IDs 454, 455, 457, 460, 464) were also found grouped together in a few early units from the *Hypogeion*. Two of these *suidae* teeth, showing evidence for heat treatment, were found in adjacent passes.[222] Two bone objects, likely subjected to the same treatment, were found in nearby units. These objects represent clustering of both material type (*suidae* teeth) and production technique (heat treatment). Despite evidence for the production for worked animal materials across the site, this technique appears only within the *Hypogeion*. The preservation of this technique highlights how the *Hypogeion* may be reflecting specific workshops, whose techniques were not necessarily used across the whole site. There are also specific production techniques present on other parts of the East Hill (e.g., the use of a tubular drill), but were not preserved within the *Hypogeion* assemblage.

The grouping of material seen in the *Hypogeion* is likely patterned by multiple factors, including the rapid nature of the filling event that comprises the first three phases of the feature. Diachronic changes occurring across the site may also account for some of the concentrations of materials. For example, the availability of ivory increases after the 7th century BCE (see § 3.4.1), so it is not surprising that the material is far more common in the later phases. Additionally, the stark differences between antler in the early and later levels may suggest a cultural change toward the material. Yet there is also the possibility that the short-lived nature of the fill event only captured certain elements of the workshop materials and waste. Additionally, multiple workshops may have deposited materials at slightly different times, leading to the close grouping of materials, even within a single phase.

[222] IDs 454 and 460, for more on the technique, see above.

If this is the case, disentangling diachronic changes (e.g., increased availability to ivory, a cultural shift in the approach to antler) from synchronic variation specific to the context (i.e., the *Hypogeion* represents only a limited sample of all of the worked animal materials at Methone) remains a challenging aspect of the interpretation of this assemblage.

5.6.3 West Hill Structures

The Ephoria excavated three structures (Building A, Building B, Building Γ) on the West Hill, which were preserved in a series of substantial limestone wall socles. Buildings A and B were substantial in size and featured multiple rooms, whereas only a portion of Building Γ was uncovered. The initial phase of these buildings began in the second half of the 7th century BCE, followed by a destruction phase in the second half of the 6th century BCE.[223] A rich collection of ceramics was found within this destruction deposit, including amphorae from the regions of Attica, Corinth, Laconia, Lesbos, Chios, Samos, and Miletus.[224] In their interpretation of the use of these buildings, Besios and Konstantinos Noulas argue that they belong to an "artisanal quarter,"[225] basing their conclusion on the industrial nature of the finds, as well as the presence of two kilns within Building A.[226] The concentration of animal materials excavated in association with Building A demonstrates that the creation of worked animal objects was one of the crafts being practiced in these structures.

The West Hill assemblage indicates that Building A was a workshop space used to produce objects made from worked animal materials, including ivory. Ivory production waste is strongly concentrated within or immediately adjacent to this structure: 55 pieces[227]

[223] Besios and Noulas 2012, 401.

[224] Besios and Noulas 2012.

[225] Besios and Noulas 2012, 407.

[226] Besios and Noulas 2012, 401.

[227] IDs 214, 213, 151, 152, 153, 217, 218, 219, 101, 212, 102, 103, 99, 135, 149, 95, 174, 234, 94, 143, 134, 88, 235, 202, 237, 142, 133, 236, 93, 140, 90, 204, 145, 224, 223, 136, 175, 222, 221, 220, 205, 139, 225, 97, 98, 138, 137, 209, 208, 207, 206, 229.

and 12 much smaller fragments were found.[228] Additionally, there are a large number of ivory fragments that were found in this part of the West Hill, but they are not associated with any particular quadrant. As a result, these pieces cannot be assigned to Building A, but it is possible they originate from the area. Beyond the quantity of production waste, the assemblage also provides evidence for a variety of distinct production techniques. For example, the material from Building A shows evidence for a drill that cuts a circular recessed area (ID 212, see above), as well as a transverse section of ivory with two drill holes (ID 210). Most of the clearly differentiated Type A and B ivory waste (see above) also comes from this area, suggesting that the two stages of ivory manufacture were performed in these buildings as well. Moreover, all Type B pieces with oblique crossed cuts (see above) are associated with Building A. In addition to the production waste, there were three examples of complete or mostly complete ivory objects, including the cross-guard (ID 78), a circular ivory disk with a guilloche pattern (ID 86), and a partially preserved spectacle fibula (ID 84). Discounting the pieces from the West Hill without precise spatial information, the objects recovered in association with Building A make up more than half of the entire ivory assemblage at the site.

In addition to the production of ivory objects, there is also strong evidence for worked bone and antler production at Building A. Metapodial ends, remnants of bone commonly used for the creation of objects (see above), were found concentrated in several eastern quadrants associated with Building A (IDs 432, 433, 434, 436) and one instance related to the nearby Building Γ (ID 435). Several partially or fully finished bone objects were also found, including an ovicaprid phalanx with three drill holes (ID 333), several astragali (IDs 364, 365, 368, 369), a bone strip with neat incised decoration (ID 287), and a cylindrical bone object with incised circles (ID 304). In addition to the bone objects, there was also a pendant made from the canine of a dog or wolf (ID 469), and pieces of worked *suidae* teeth. Some of the worked *suidae* teeth are clearly production waste, such as a piece cut from the

[228] IDs 249 and 250.

proximal end of a canine (ID 462). However, the other two pieces associated with Building A may be incomplete objects, finished objects that are partially preserved, or production waste; these include a flat section with a drill hole (ID 467), and a small piece with a bronze nail (ID 463). Antler in Building A is not quite as well represented as other materials, but what was found is still indicative of a workshop context. One of the objects was a tine that was sawed off at the proximal end, and like the examples in the *Hypogeion*, may represent a haft or handle.

One of the other antler objects found in Building A is a square section cut from the beam (ID 50); this object likely represents a blank or pre-form. Its size is comparable to the antler fibula plates found in the *Hypogeion*, so it may have been intended for use in creating a fibula plate. This idea is further supported by the unfinished or abandoned antler fibula plate antler found in Building A (see above). The antler fibula plates and square section, in conjunction with the ivory spectacle fibula fragments, and the large concentration of Type B waste, all suggest that this area was used to create disks and spectacle fibulae. A small worked bone object (ID 320) found in a Building A context, which exhibits the same floral design drawn with a compass seen on many of the spectacle fibulae, may be further evidence that these objects were created in the building. The bone is irregular, with only two uneven cuts. While there is a possibility it represents a piece of inlay, the floral design is off-center. More likely, producers used a leftover scrap of bone to practice the complicated motif, as they did on the back of one of the antler fibula plates from the *Hypogeion* (ID 2).

While excavations revealed a large portion of Building A, only a small part of Building Γ (immediately to the south) was revealed. The objects associated with Building Γ are similar to that of Building A, including an exceptionally fine fragment of a spectacle fibula, one of two objects which may be made from hippopotamus ivory (the other is a small scrap also found on the West Hill). Other objects associated with Building Γ include a metapodial fragment and a scrap of cementum. While excavation in association with this structure was limited, the objects found are similar to those related to Building A. The industrial activities of the West Hill may have created a wide distribution of this production debris, explaining why these objects were found in association with Building Γ. However, it is also possible that workshops were not devoted to any single practice at all times. Unlike the permanent installations needed for ceramic production, the toolkit for worked animal materials is far more portable. Perhaps over the course of the 7th century BCE, both Buildings A and Γ were used for the production of worked animal materials. These buildings likely had other industrial uses as well, as indicated by the two kilns found in Building A. While the kilns may have been used in the heat treatment of worked animal materials, their primary function was probably in support of other industrial applications. As a result, the widespread worked animal material production waste may be the result of producers practicing this craft intermittently, and within different parts of the site.

5.6.4 Pit 46/*Hypogeion* 2

Unlike the original *Hypogeion* and the West Hill buildings, Pit 46/*Hypogeion* 2 was not a particularly rich assemblage of animal materials. However, its position on the West Hill near buildings A, B, and Γ offers insight into depositional patterns in this area during the Archaic period and later. The earliest phase coincides with the mid-6th century BCE destruction, and several ceramics show traces of burning (ΜΕΘ 7951, ΜΕΘ 8102, ΜΕΘ 8097, ΜΕΘ 8132). Furthermore, ceramic analysts Trevor Van Damme and Marianna Nikolaidou state that "three vessels with joins between the pits and Archaic levels surrounding pit 46 provide invaluable evidence that the material was debris from the localized area."[229] The worked animal materials recovered from the first phase of this assemblage are similar to those found associated with the West Hill buildings, including a cut metapodial end (ID 444) and several pieces of ivory (IDs 168, 169, 179, 184, 244, 245, 506, 508). The taphonomy of some of the ivory suggests exposure for an extended period of time before it was deposited. The large root marks on IDs 179 and 244, and the generally poor preservation of ID 245, distinguish

[229] Van Damme and Nikolaidou 2017, 16.

these pieces from nearly every other instance of ivory in the assemblage. Their suggests they may have been exposed, or disrupted by the destruction before being deposited in Pit 46/*Hypogeion* 2.

The later Classical phases revealed much less evidence for worked animal material production. Most of the examples found in these levels were worked astragali, and a single piece of ivory production waste was found as well. The stark differences within the Classical levels may reflect changes in the use of the West Hill. If production moved elsewhere, or if the general absence of Classical materials on the West Hill reflects a shift in occupation, it may be that production waste from worked animal materials during the Classical period was deposited in other places. However, the lack of worked animal materials within the Classical levels of Pit 46/ *Hypogeion* 2 may also indicate the importance of these industries waned in later periods.

5.6.5 Discussion

While there is great variety in the forms and materials seen at Methone, there are also strong similarities within the assemblage. Even though the *Hypogeion* is spatially separated from the contexts on the West Hill, continuities between finds and production waste in both areas (e.g., nearly identical antler hammers were found in the *Hypogeion* and northern sector of the West Hill, Type B ivory production waste was found on both the East and West Hills, including Plot 245.) suggest fairly uniform production processes across the site. While these similarities are partially a result of shared production practices, the dynamics of site formation on the West Hill may also explain some of the homogeneity within the assemblage. One such factor was a destruction event dating to the mid-6th century BCE, recognized in the archaeological record of the East and West Hills. Ceramic evidence from the West Hill indicates that materials were scattered across the hill as a result of this event. A ceramic join between trench 4 in the northern sector and trench 1 in the southern sector (ΜΕΘ 7228) was found within contexts dating to this event, indicating how far material was moved at as a result. The archaic deposit in Pit 46/*Hypogeion* 2 may, at least in part, testify to the scale of material being moved during this time. With so much production waste concentrated around the West Hill buildings, the destruction event may have made production waste or workshop materials from one area appear to have a much wider spatial distribution than their initial deposition. Furthermore, the erosion of the East Hill has likely removed any traces of workshop spaces that may have existed there. So, it is possible that much of what was deposited in the *Hypogeion* came from West Hill production contexts, which would explain the similarities between the assemblages from these two locations. These site formation processes which moved material around the site cannot entirely explain all of the intra-assemblage patterns and similarities.

In addition to site formation processes, the apparent omnipresence of worked animal materials throughout the site may be a result of discontinuous organization of production; the scatter of worked animal materials suggests a palimpsest of impermanent production activities. While the concentration of production waste around the West Hill strongly indicates a workshop space emphasizing the production of ivory and other animal materials, it only may have served this purpose for certain times. The various types of industrial waste found in the vicinity of these workshop spaces further support an organization of production that is not focused on a singular material. The craftspeople working animal materials may have also practiced metallurgy or wood carving; their choice of industry at any given time was likely dependent on a host of external factors, such as demand and material availability. Other workshop spaces across the West Hill, and perhaps on the East Hill, may have been occupied by producers engaged in a number of different crafts (e.g., glass production and metallurgy). This mixture of technical practices also may have generated innovation, such as the heat treatment seen in objects within the *Hypogeion*. In an environment where metallurgy or ceramic production was also occurring, individuals working animal materials may have thought to appropriate techniques from other industries. Building A may have been such an environment, as it contained three kilns and also housed worked animal object production and other industries.

The distribution of the evidence, along with the diverse nature of production at the site, gives some indication of the practical requirements for creating worked animal objects at Methone. While the time needed to create worked animal objects would have varied depending on both the specific material and technique, nearly all animal materials require a degree of preparation. Craftspeople may have boiled bone in order to remove the grease (see § 5.5.3), indicating an investment of time and effort before any carving began. Similarly, ivory production waste from Methone shows that craftspeople were removing large portions of the outer layer of cementum from elephant tusks before accessing the dentin within. The wider saw marks observed on some of these pieces show that craftspeople used a more robust tool for this step, perhaps indicating that the initial stages required extra force and effort. The requirements of these preparatory actions suggest that the subsequent stages of worked animal object production may have taken place in separate physical locations. Boiling bone would have produced heat and odors, so it may have been better suited in an area of the site where other heat-based production activities (e.g., metallurgy) were occurring; antler and horn may have also been boiled, and these actions could have taken place together. Similarly, the large size of unprepared ivory tusks may have necessitated that the initial preparatory steps took place outdoors. Subsequent production actions would have also required craftspeople consider their production space, as osseous materials tend create sharp flakes and splinters; fragments of bone (ID 417) and ivory (ID 242) of such a size were found in association with the Post-Hole structure.[230] While its unclear whether there was an effort to shield domestic spaces from these actions, the considerable area used for craft production at Methone during certain periods suggests that it could have been a consideration. Finally, craftspeople were also responsible for incising detailed patterns onto the surface of bone, antler, and ivory. These actions may have required adequate light and a stable working surface, requirements which may have necessitated a specific production area

[230] These fragments were recovered from flotation samples.

(perhaps inside of the structures on the West Hill). The creation of worked animal objects at Methone was likely a multi-step process, occurring over several areas of the site.

All of these requirements would have been mediated by the degree to which craftspeople at Methone were dedicated to a single industry. This level of investment is a conceptual issue at the heart of the specialization debate in the study of craft production. The pioneering work of Elizabeth Brumfield and Timothy Earle, and that of Cathy Costin, led to the creation of schema for thinking about specialization.[231] Costin's work characterized production along several parameters: context (degree of elite sponsorship), concentration, scale, and intensity.[232] In the time since Costin's 1991 publication, she and other scholars have offered elaboration, criticism, and redefinition of many of these concepts.[233] One element of this debate that is especially relevant to the organization of production at Methone is the challenge of defining the relationship between specialization and "subsistence" behaviors. Rowan Flad and Zachary Hruby envision a "concentric or hierarchical" set of perspectives that address this relationship: "complete product specialization" and "complete producer specialization." They write that "'complete product specialization' indicates production for non-kin consumption with absolutely *no dependence* on the exchange of these products for satisfying subsistence needs, while 'complete producer specialization' involves the *complete dependence* on the exchange of products. The middle part of the continuum indicates varying degrees of dependence on the production for subsistence."[234] Flad and Hruby's ideas about specialization are strongly rooted in the social and political context of production, as they argue that these perspectives "fall along a continuum between those that emphasize 'production for exchange' in a broad sense and those that emphasize division of labor within a

---

231 Brumfiel and Earle 1987; Costin 1991.

232 Costin 1991, 9.

233 Clark and Parry 1990; Clark 1995; Hendon 1996; Costin 1998; Clark 2007.

234 Flad and Hruby 2007, 5.

community."[235] Costin is critical of their approach on several grounds; she argues that the relationship between product specialization and producer specialization is ambiguously defined. Furthermore, she problematizes the ideas of subsistence and dependence, arguing that these concepts are still fundamentally defined in a social context (i.e., they lack empirical correlates within the archaeological record). Costin highlights how the idea of remuneration, a fundamental part of the relationship between specialization and subsistence, may be intangible in many of the social/economic bonds of the ancient world. She writes that "production in the context of slavery, mandatory tribute, or obligatory production for use within the extended kin group might not result in an observable flow of material or monetary compensation for the producer."[236]

Contrary to these ideas of specialization, John Clark finds the attempts to define the concept as inappropriate for non-modern societies; he writes that these models "presume or impose postulates of neoclassical economics on prehistoric peoples," and argues that "assumptions of supply and demand, property, price, and the like are appropriate for ancient peoples to an unknown degree. Their appropriateness should be research questions rather than a priori postulates."[237] Within the scholarship, Clark sees too much concern with the creation of operable typologies that divide specialized from non-specialized production, without enough attention to the theory that informs the relationship between these categories and "real-world phenomena."[238] Clark instead advocates for a Maussian approach that investigates "distinctions between persons and things, types of circulated objects (alienable or not), and connections between persons and objects."[239] Clark's criticism of the focus on specialization reveals the necessity of attempting to understand the function of worked an-

[235] Flad and Hruby 2007, 6.

[236] Costin 2007, 149.

[237] Clark 2007, 21.

[238] Clark 2007, 22.

[239] Clark 2007, 22.

imal materials in early Greek society (see § 4.1). While Clark's criticisms of specialization help to foreground the social context of these objects, Flad and Hruby, and Costin also draw attention to the many variables necessary for understanding the organization of this craft.

Based on the distribution and deposition patterns of production materials at Methone, it seems likely that producers of worked animal materials were engaged in multiple crafts. Moreover, certain worked animal objects (e.g., antler hammers) may have been a prerequisite for the creation of other objects. The production of worked animal objects may have been irregular, as producers of ivory objects also would have been dependent on potentially unreliable long-distance trade (see Chapter 3). All of these factors muddy the relationship between worked animal objects and the idea of a producer meeting "subsistence" needs. Under the producer specialization perspective outlined by Flad and Hruby, a craftsperson at Methone occasionally would have created worked animal objects in exchange for subsistence goods. However, the relationship between craftspeople, votive offerings, and the individuals or communities who mobilized them also allows for the perspective of "product specialization." In this conception, producers are not directly trading these goods to meet their subsistence needs. Instead, craftspeople may have been maintained by the community in exchange for their skills.

Neither of these perspectives indicates to what extent individuals were "specialized" at Methone, and that question is likely better considered within the social context of early Greece (see Chapter 4). Additionally, Flad and Hruby's model may be unsuited to the worked animal object industry at Methone, as the worked animal materials encompass a wide variety of objects that served different groups of individuals (e.g., other craftspeople, individuals or communities looking to dedicate objects). The source of these raw materials was also strongly varied, as a material such as horn was much more readily available than ivory. As a result, differences in relationships between producers and providers of raw materials may allow for a range of forms of remuneration within a community. Craftspeople and local agropastoralists may have had an economic and social relationship that was markedly different from that of long-distance traders or elite individuals providing ivory. Moreover, Methone almost certainly encompasses multiple forms of production units (i.e., domestic and non-domestic contexts of production).[240] The worked animal objects found in association with the apsidal structure on the West Hill were likely created in a different type of production unit than the objects created in the later West Hill workshops. These structures had their own form of social organization, which may have allowed for different relationships of apprenticeship and skill acquisition. Additionally, some of the objects in the assemblage may have been made in domestic production units outside these workshops. The organization of production, as well as the distribution of waste at the site, does not indicate that the creation of worked animal objects was overly prescribed or routinized; there is evidence for quotidian and high-value objects from the same areas. This apparent contradiction is more likely a testament to the richness of the Methone assemblage, as it demonstrates a variety of forms of production. It also shows that craftspeople created a range of objects to suit the needs of fellow craftspeople and others in their community. Such an assemblage includes objects that may be underrepresented in funerary or votive archaeological contexts, the locations where the vast majority of worked animal objects from the Early Iron Age and Archaic period were excavated.

[240] Costin 2001, 296–97.

Figures

Figure 5.1: Google Earth view of ancient Methone, with modern land plots superimposed. Excavated plots are shown in bold. Satellite base image Google Earth; annotations S. Martin-McAuliffe, E. McNicholas, and M. Chykerda. Figure 4 from Morris, Papadopoulos, Bessios, Athanassiadou, and Noulas 2020, image courtesy of the authors.

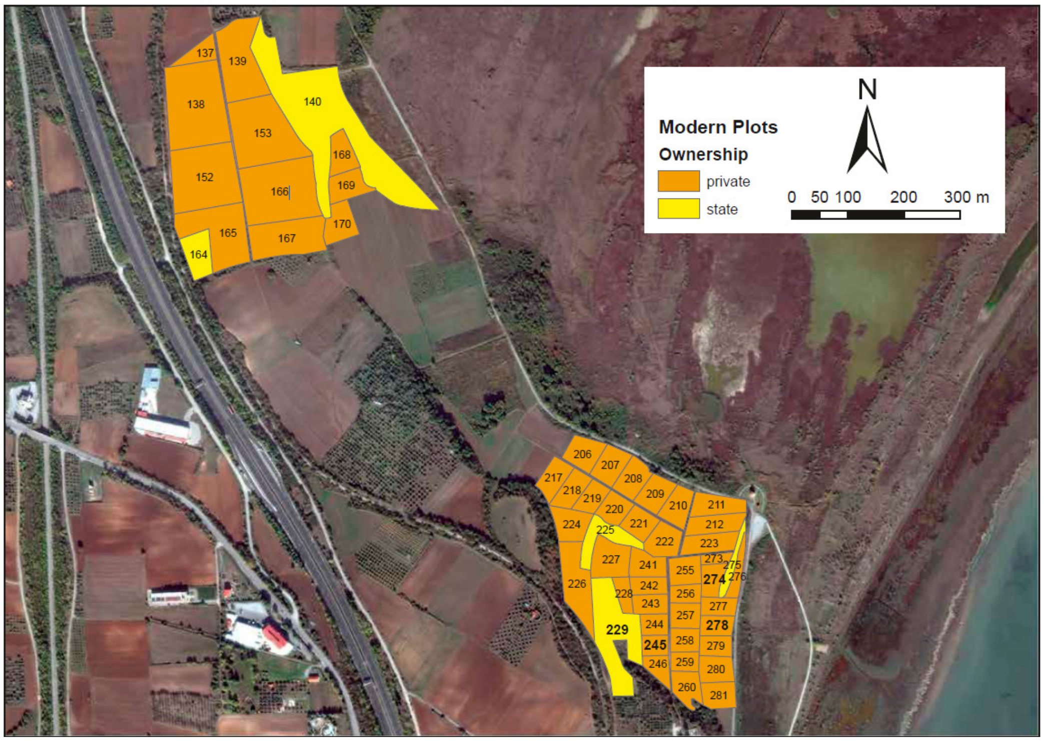


Figure 5.2: Plan of Archaic workshops, and kilns on the West Hill. I. Moschos and T. Ross, after Besios and Noulas 2012, 400, plan 1.

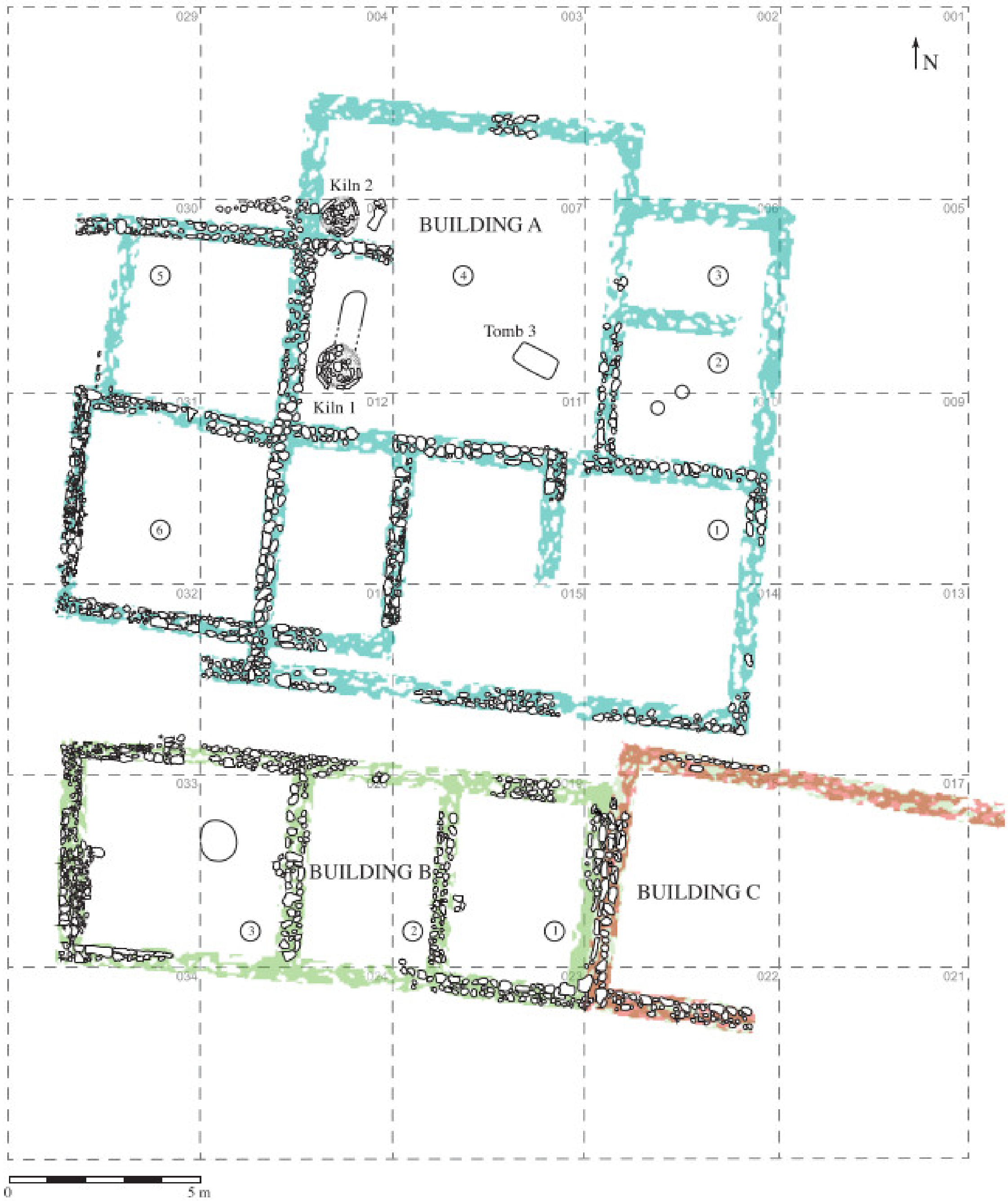


Figure 5.3: The West Hill, with the location of the Ephorate trenches (2007–2014) and trenches 1–6 (AMAP 2014–2017) in Plot 229. Image by M. Chykerda. Figure 21 from Morris, Papadopoulos, Bessios, Athanassiadou, and Noulas 2020, image courtesy of the authors.

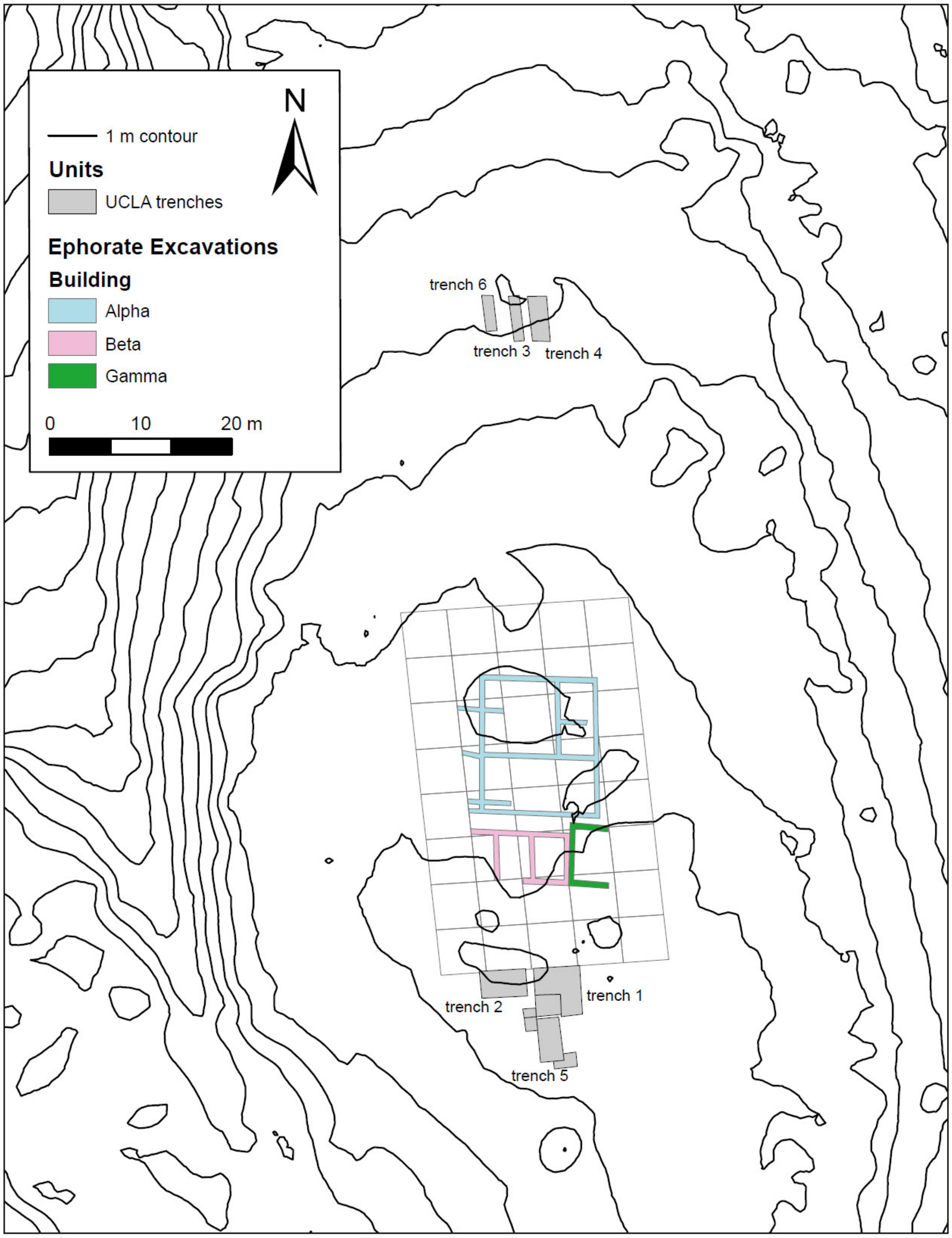


Figure 5.4: Worked animal objects by material type.

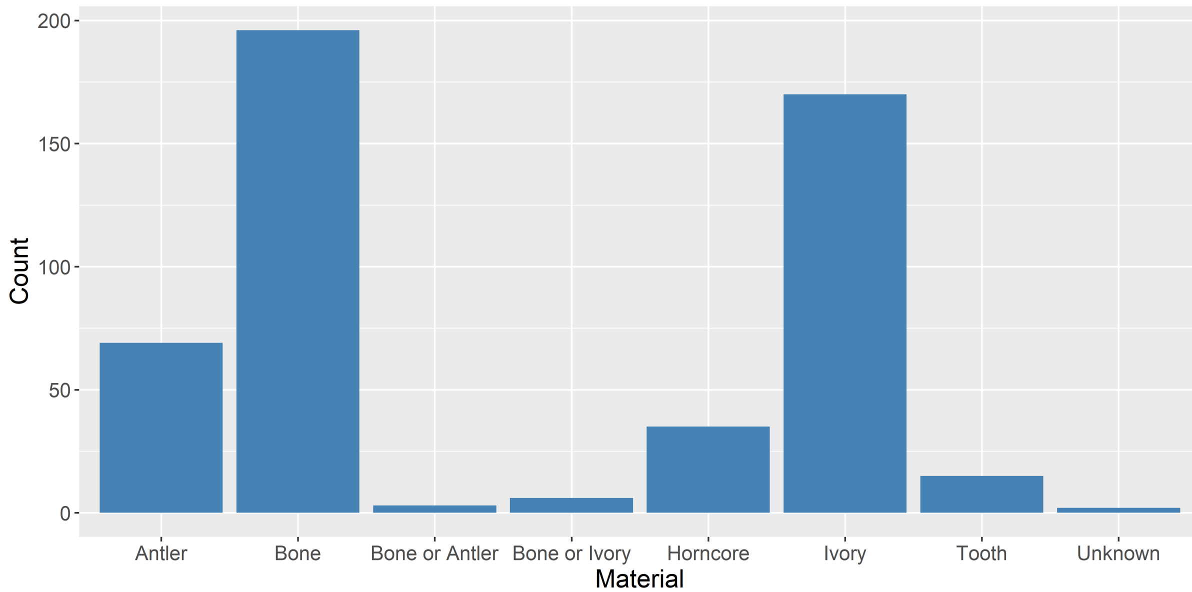


Figure 5.5: Worked animal objects by material type in each excavation area.

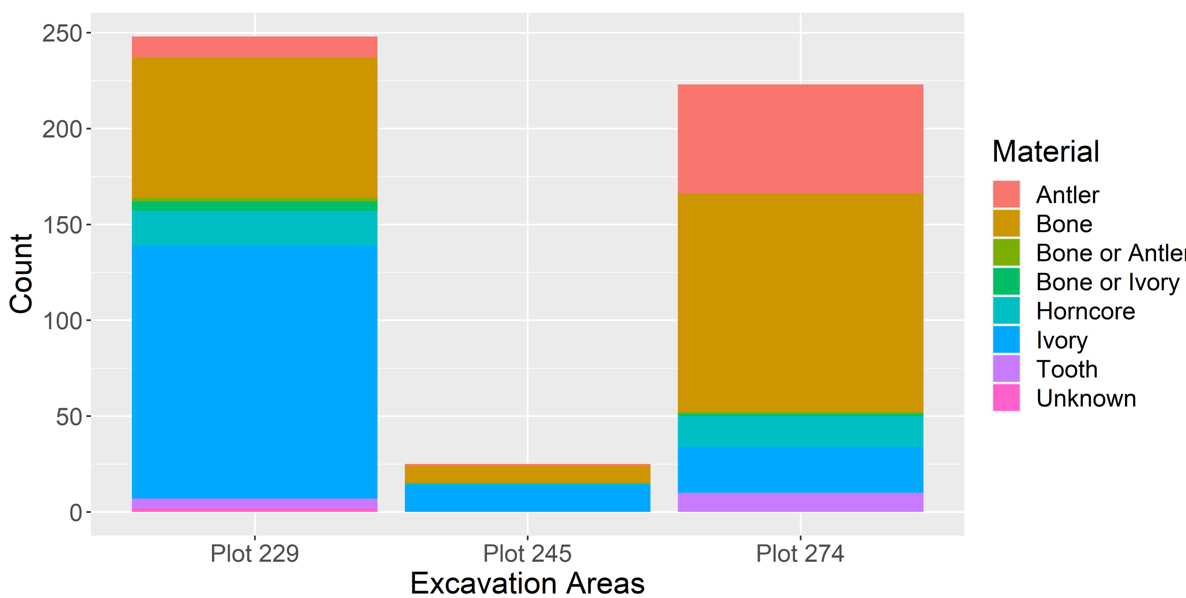


Figure 5.6: Antler Portions, image by Leah Olson.

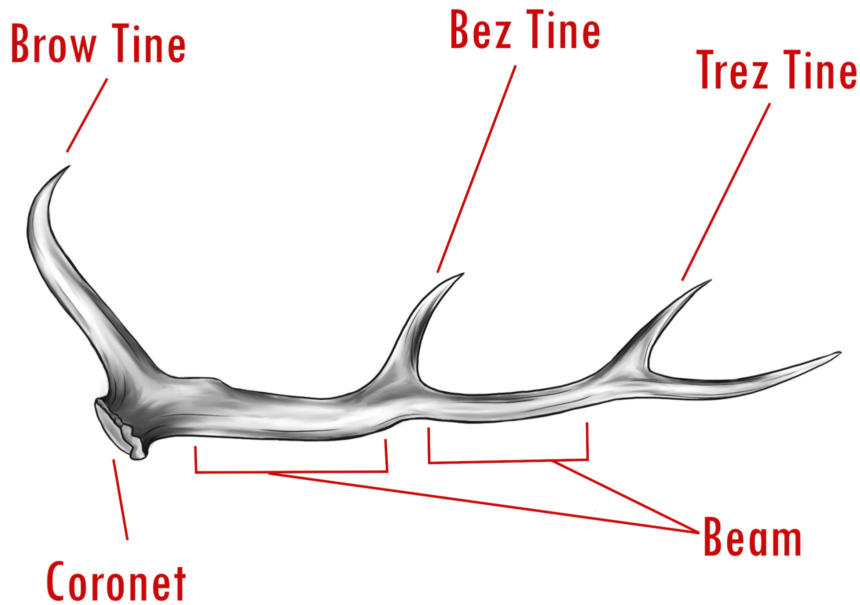
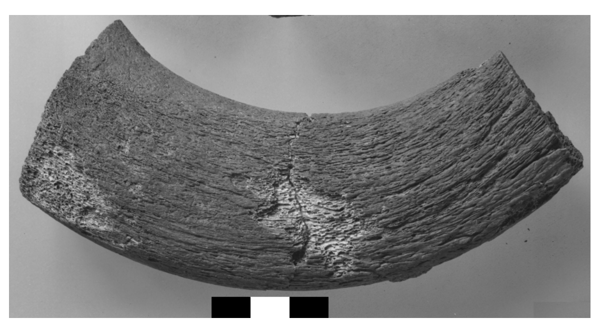


Figure 5.7: Comparison between horncore (ID 474) found at *a*, Methone and *b*, the workshop of Pheidias at Olympia, image by Eva-Maria Czakó (D-DAI-ATH-Olympia 4011).

(a)



(b)

Figure 5.8: Diagram of an elephant tusk (incisor), image by Leah Olson.

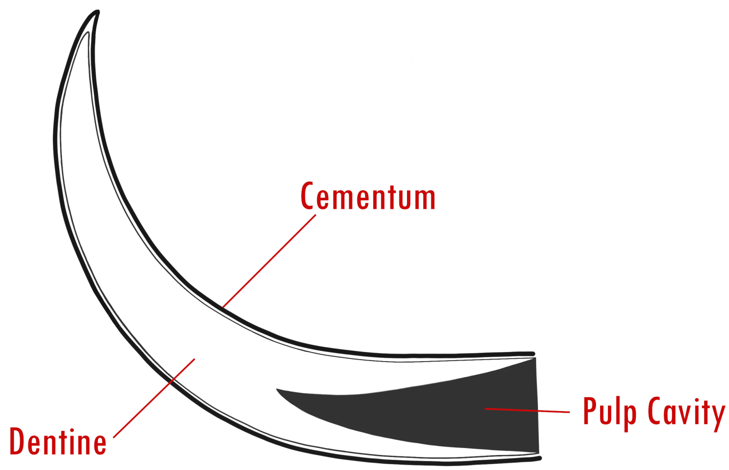
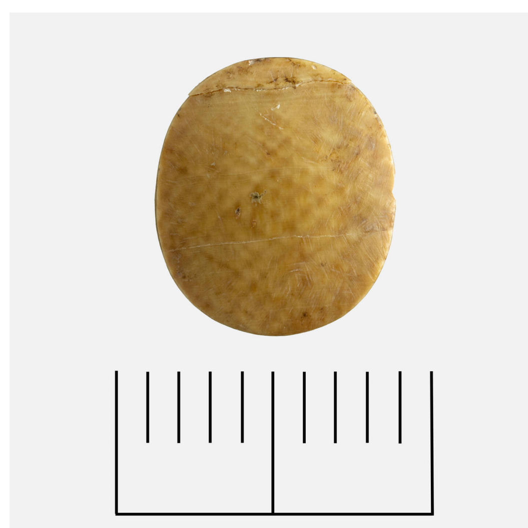


Figure 5.9: Schreger lines: *a*, Schreger lines are visible on the surface of a female figure from Central Africa (late 1800s–early 1900s)(The Cleveland Museum of Art, accession number: 2010.449); *b*, Schreger lines are visible on the back of the Seal from Methone (ID 76, photograph by Jeff Vanderpool).

(a)



(b)

Figure 5.10: "Cone-within-cone" splitting: *a*, the process is visible throughout the face and breast of the Dipylon ivory statuette; *b*, the same process is illustrated on ID 187 (photograph by Jeff Vanderpool).

(a)

(b)

Figure 5.11: Type A ivory waste, photograph by Jeff Vanderpool.

Figure 5.12: Details of Type A ivory production waste, photograph by Jeff Vanderpool.

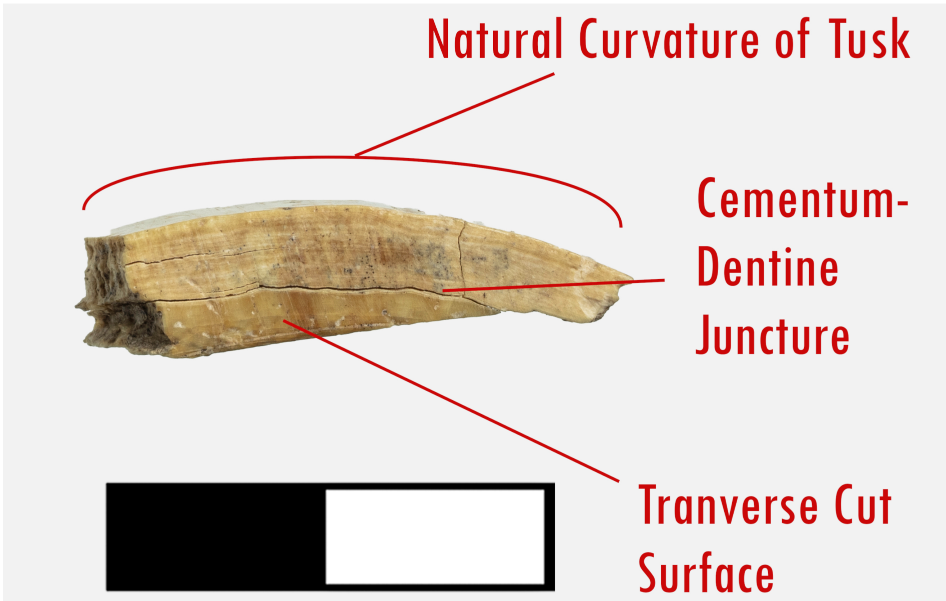


Figure 5.13: Type B ivory waste, photograph by Jeff Vanderpool.

Figure 5.14: Details of Type B ivory production waste, photograph by Jeff Vanderpool.

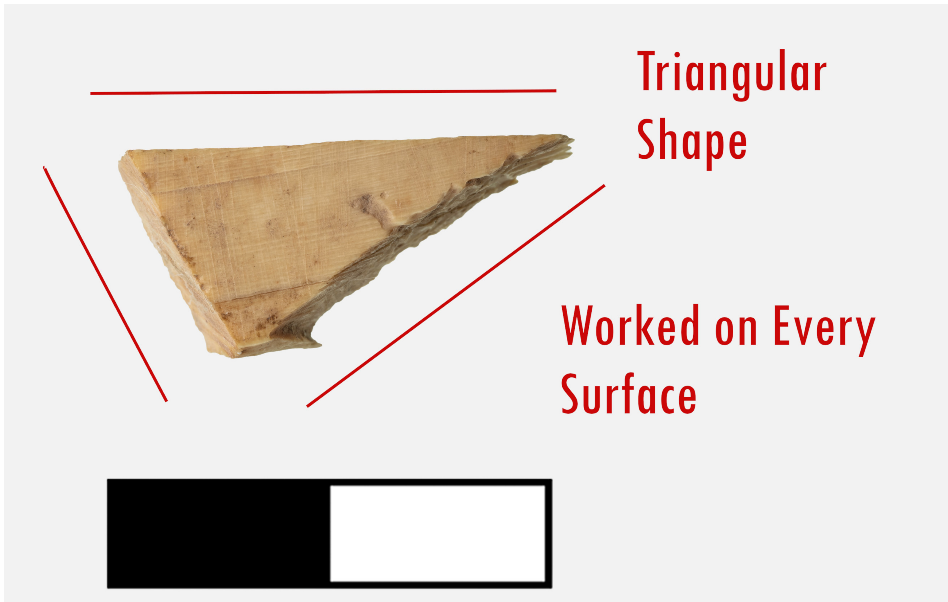


Figure 5.15: Reconstruction of an ivory production process.

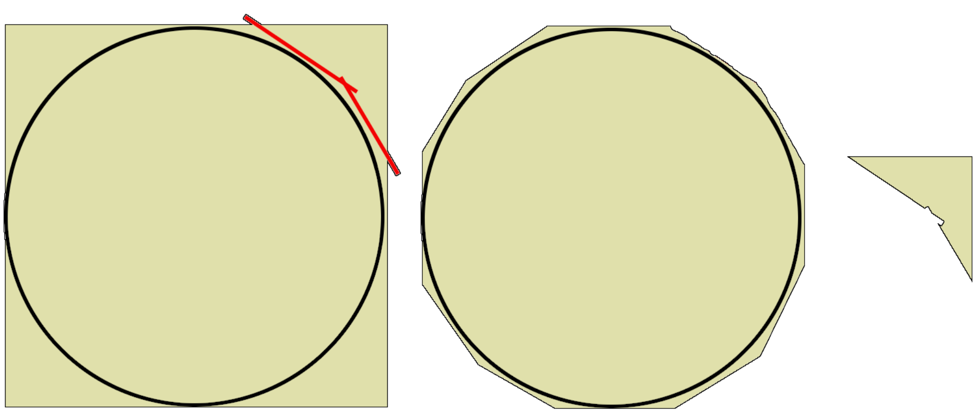


Figure 5.16: Kylix of the Eucharides Painter showing a youth with a writing tablet and bone stylus, 480 BCE. The Penn Museum, accession number: Object MS4842. Courtesy of the Penn Museum.

Figure 5.17: Four views of an astragalus, image by Leah Olson.

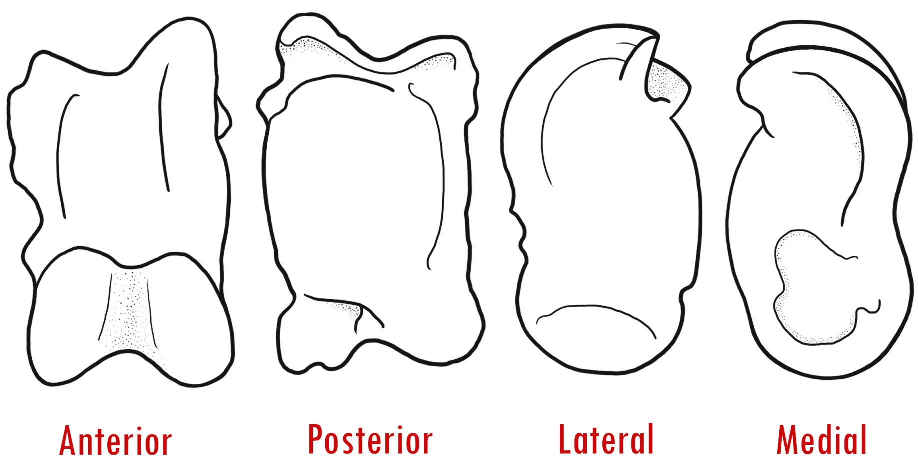


Figure 5.18: Worked *suidae* teeth: *a*, Methone ID 456; *b*, a worked *suidae* canine from the Kamiros well (the British Museum, accession number: 1864,1007.659, © The Trustees of the British Museum).

(a)

(b)

Figure 5.19: Krater displaying bear masks from Brauron, after Kahil 1977, 86, fig. c, pl. 20, image by Leah Olson.

Figure 5.20: Bear tooth pendants: *a*, a bear tooth pendant from Methone (ID 470); *b*, a bone pendant resembling a bear tooth from the Kamiros well (the British Museum, accession number: 1864,1007.680, © The Trustees of the British Museum).

(a)

(b)

Figure 5.21: Squirrel gnawing on antler, photograph by Peter Trimming.

Figure 5.22: Late Corinthian column krater showing the "Monster of Troy" (ca. 550 BCE). The Museum of Fine Arts, Boston, accession number: 63.420. https://collections.mfa.org/objects/259823.

Figure 5.23: Broad cut shown on ID 33, photograph by Jeff Vanderpool.

Figure 5.24: Cut marks on one face of ID 193, photograph by Jeff Vanderpool.

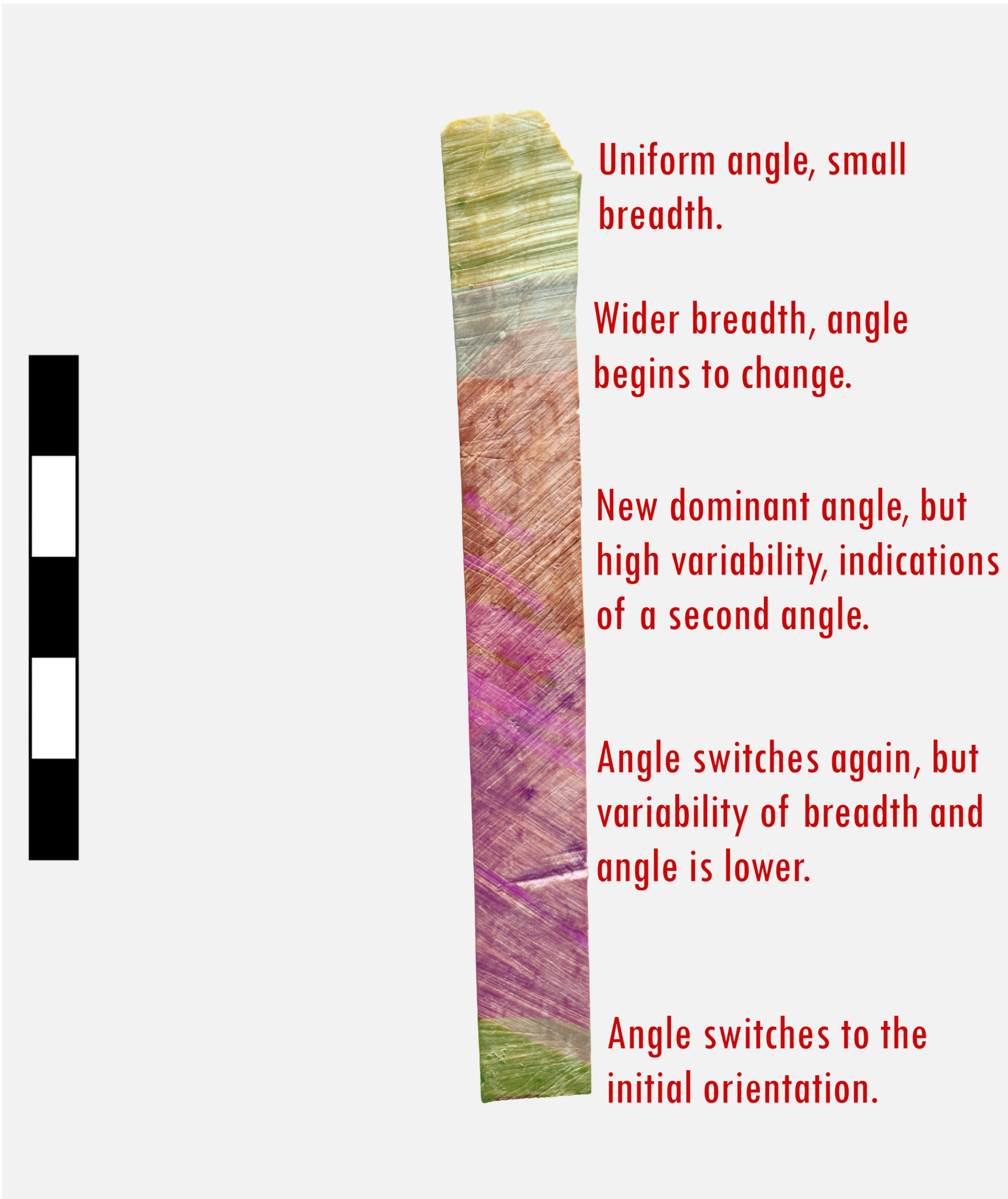


Figure 5.25: Cut marks on another face of ID 193, photograph by Jeff Vanderpool.

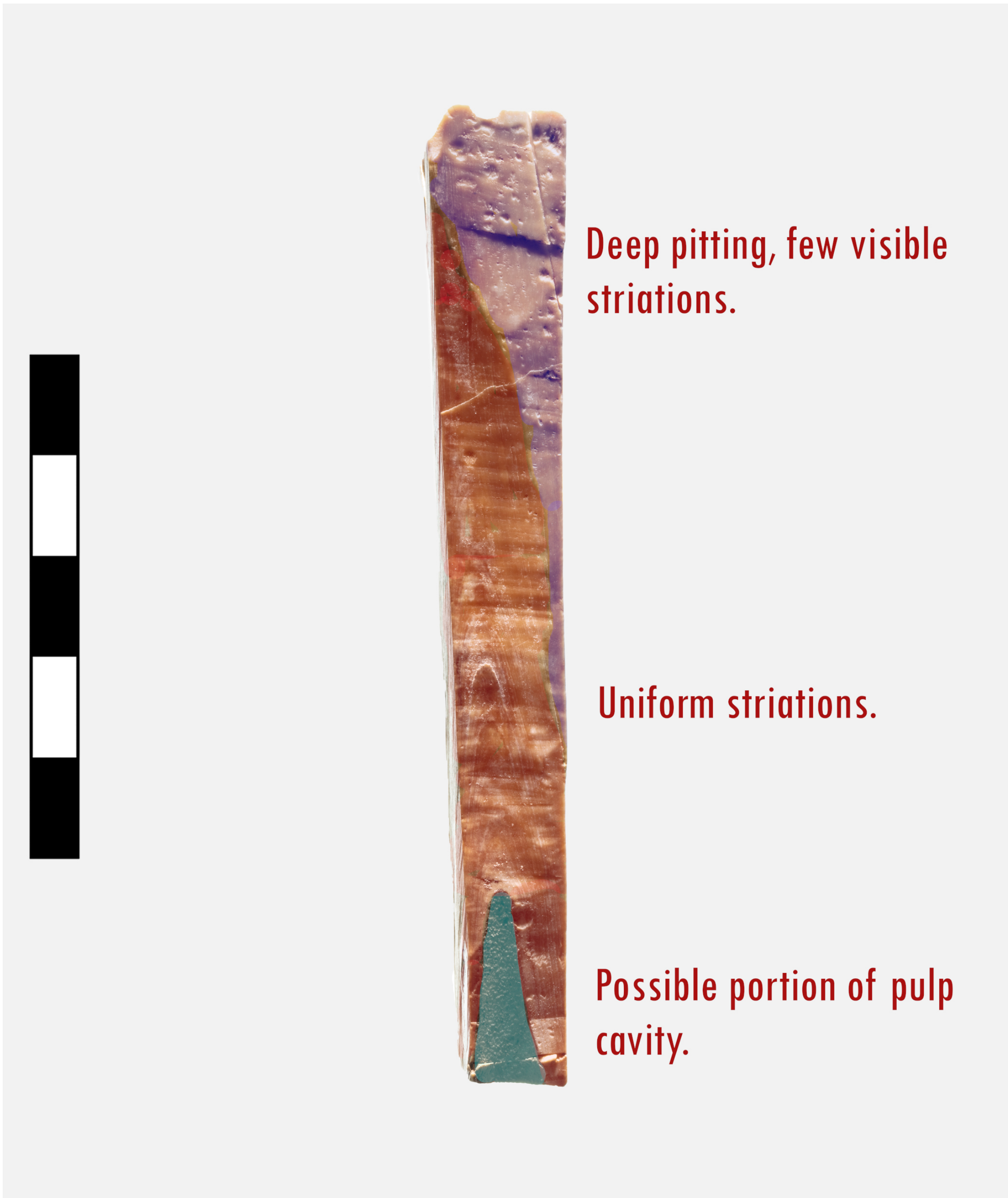


Figure 5.26: Chatter-marks on ID 2, photograph by Jeff Vanderpool.

Figure 5.27: Chatter-marks on ID 309, photograph by Jeff Vanderpool.

Figure 5.28: Chatter-marks on ID 21, photograph by Jeff Vanderpool.

Figure 5.29: Groove and snap technique on ID 455, photograph by Jeff Vanderpool.

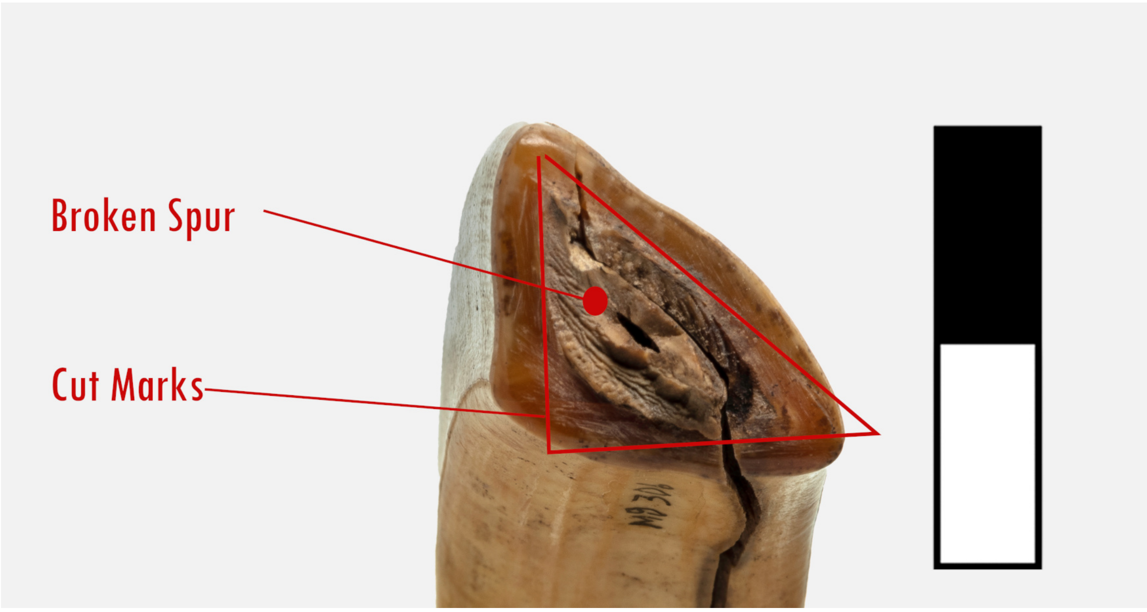


Figure 5.30: Compass incision on ID 2, photograph by Jeff Vanderpool.

Figure 5.31: Compass incision on ID 17.

Figure 5.32: Reconstruction of compass incision on ID 17.

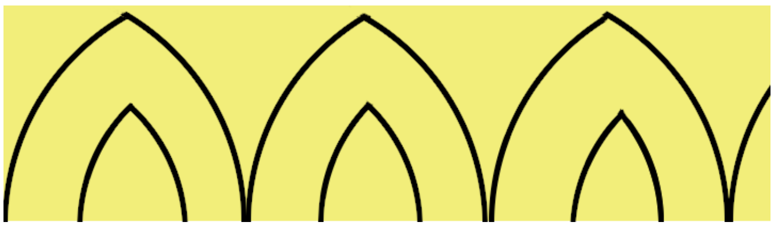
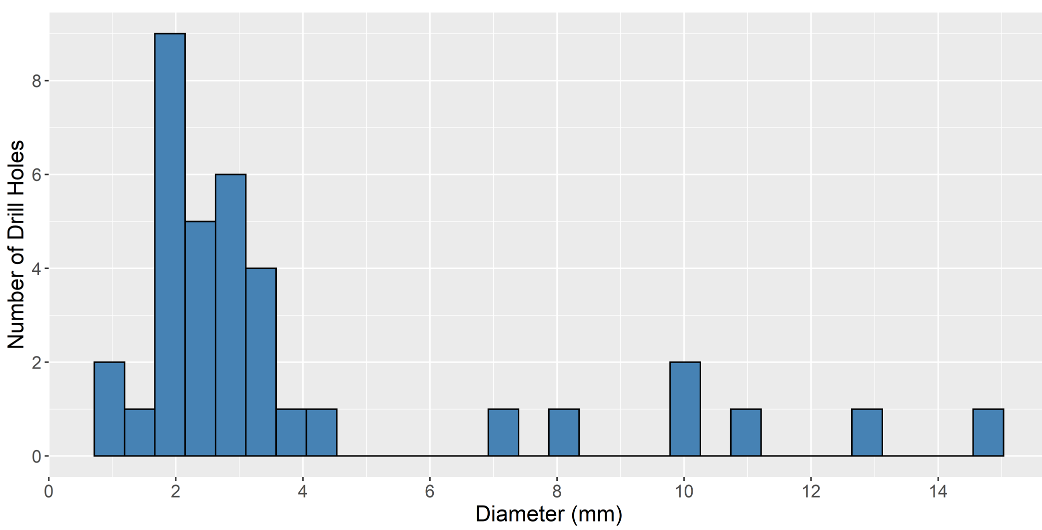


Figure 5.33: Distribution of drill hole diameters.



CHAPTER 6

Conclusions

6.1 Animals and Humans

There has never been a monolithic view of what separates humans from animals; indeed, some cultural groups make little distinction between the two. A radically different ontological status for non-human animals, such as may have existed in the ancient world, necessitates approaches to animal bodies that are different from those of the modern world. If the boundaries between human and animal were comparatively "blurred," objects made from the remains of animal bodies require new interpretations. Worked animal objects made in the past represent items crafted in a wholly different environment, one which has different parameters than the modern nature-culture dichotomy. These objects reflect an essential human fascination with the bodies of animals, the first evidence of which dates to the Paleolithic era and continues to this day. As a result, an archaeological assemblage of worked animal objects is a tangible record of the physical engagement between human and animal bodies. However, the technical practices which led to the creation of these objects were also performed in an environment different from that of the modern West. The materials do not become inert after they have been worked by craftspeople; instead they are activated. Ethnographic and anthropological research has demonstrated a near-universal human attraction to the most overtly dangerous parts of animal. Societies from Oceania, sub-Saharan Africa, lowland South America all have traditions of leaders using tooth-based regalia as a means of making a statement of power.[1] Elsewhere in the contemporary world, objects made from the

[1] Pickenpaugh 1997.

bodies of animals remain intriguing, and humans continue to be drawn to them. Animal pelts (or their artificial representations) are visible elements of material culture cross-culturally, and a pattern like leopard print has gained a variety of different meanings and connotations.[2] Pelts and teeth in the modern world serve as reminders that the role of animal materials in human culture has been both constant and meaningful. The opportunity to study such objects is an investigation into the roles animals play within human self-definition. These objects are also a testament to the ways humans integrate animals into society in a manner wholly separate from their diets.

There are many fruitful avenues for investigation into the role of human-animal relationships in the ancient Greek world that lie outside of the study of worked animal objects. The historical period offers rich texts like Aristophanes' *Birds* or Aristotle's many works on animals, among the earliest treatises on natural history.[3] Moreover, the mythology of Greece is replete with animal transformation and therianthropy. Outside the literary record, archaeological evidence for altars and faunal assemblages confirms the significance of animal sacrifice within Greek religious practices. The iconography of vase paintings is also a testament to the importance of animals in both myth and daily life. By comparison, the study of worked animal objects seems to offer a more opaque view into the relationships between the human and non-human worlds. Worked animal objects provide no narratives and may not have any iconography or imagery, and there are not many references to these items in the textual or iconographic records. As a result, worked animal objects appear to offer an indirect portrait of the relationship between humans and animals. Moreover, as these objects are made from the remains of animal bodies, they appear to portray an asymmetric view of

[2] The meanings of leopard print vary considerably between cultures. For example, Rachel Evans (2019) argues that Theresa May's choice of leopard print kitten heels are a form of "subaltern resistance." As a traditional Zulu attire, leopard skin has also been adopted into the Nazareth Baptist "Shembe" Church (Papini 2004), and conservation demands have resulted in the introduction of *faux* alternatives for religious ceremonies (Naude et al. 2020).

[3] *History of Animals, Parts of Animals, Movement of Animals, Progression of Animals, Generation of Animals.*

human-animal relationships, carrying the assertion that the creation of these items expresses human dominion over the animal world.

However, this ambiguity—the lack of simple narratives surrounding animal materials—is what makes these objects such a valuable element in understanding how individuals in ancient Greece defined themselves with respect to the non-human world. There is no single understanding of these worked animal objects, but rather a series of possible uses and meanings. Unlike written and iconographic evidence, worked animal objects transcend social boundaries. These objects were not created solely for religious practice, nor were they limited to the perspectives of a literate class. Instead, their variation is a result of the fact that these objects did not represent a single category in the minds of ancient Greeks. As an example, antler and bone react to striking forces differently, making antler better for use as a hammer or other percussive tool.[4] In addition to the physical differences, I argue that materials also had specific connotations that guided their use. Craftspeople, as well as the users of these objects, specifically chose a material like ivory when creating certain votive objects. Such a choice may have been partially governed by physical attributes; however, the reception of any given material also appears to have been culturally constructed. Perhaps one of the most enigmatic passages of Homer's *Odyssey* reveals how individuals in the early Greek world were attaching meanings to specific animal materials. In this passage, Penelope tells a disguised Odysseus that different types of dreams come through gates of ivory or horn:

> But shrewd Penelope said, "Stranger,
> dreams are confusing, and not all come true.
> There are two gates of dreams: one pair is made
> of horn and one of ivory. The dreams
> from ivory are full of trickery;
> their stories turn out false. The ones that come
> through polished horn come true. But my strange dream
> did not come out that way, I think."[5]

[4] See MacGregor 1985, 29 and section 5.3.

[5] *Od.* 19.562–67, trans. Wilson 2017.

While there is no shortage of interpretations and theories surrounding this text,[6] the fact remains that animal materials were used as representatives for human ideas. This passage suggests that materials could have distinct and opposing connotations, which may have conditioned their use and reception in different social settings.

6.2 Lessons from Methone: Animal Materials in Everyday Life

Unlike the considerable assemblages of worked animal materials found within sanctuaries across the Greek world, the collection of materials found at Methone is a record of the creation, use, and disposal of animal materials. Such an assemblage captures items that were not just intended for the religious sphere, and includes objects with much more quotidian uses as well. With robust amounts of production waste, Methone offers some of the best evidence for the creation of worked animal objects in the time between the Bronze Age and Classical period. The Methone assemblage shows that craftspeople employed a wide variety of animal materials, and employed methods with little attestation elsewhere. A wide range of animals was represented in the assemblage; in addition to the expected domesticated animals, there was also evidence for the use of multiple cervid species, bear, boar, and even a piece of fossilized ivory from an extinct proboscidean. The breadth of taxa is just one aspect of how the worked animal assemblage is representative of so many interconnected human-animal relationships. Although the Methone assemblage primarily represents production contexts, the spectrum of objects recovered suggests that animal materials were enmeshed in the lives of the individuals living there.

The assemblage is consistent with the patterns of sanctuary dedication of the 7th century, as it contained objects like spectacle fibulae and double axes, as well as the production waste associated with such items. The considerable amounts of ivory found across the site also imply that craftspeople at Methone were engaged in the creation of high-value objects, likely also seen as worthy of dedication. However, the assemblage also demonstrates that

6 Highbarger 1940; Amory 1966; Bulkeley 1998; Haller 2009; Anghelina 2010.

animal materials were elements of many different aspects of daily life at the site. Items like spindle whorls, loom weights, earrings, and styli all indicate that individuals used worked animal materials in many different ways. Such items would have been visible and quotidian, rendering animal materials an inextricable aspect of material culture. The assemblage at Methone shows that individuals gave shape to their world, using animal materials as cultural expressions and mediators between the human and non-human worlds.

Evidence from Methone demonstrates that animal materials were a prevailing aspect of Greek life, an inextricable part of the social world, simultaneously "natural" and "cultural." Haraway's idea of the natureculture provides a valuable means for understanding how animal materials were engrained into so many aspects of life. Naturecultures are not just ostensibly "natural" places to which humans have assigned cultural importance (e.g., a sacred cave). Instead, Methone reveals that animals and their bodies were woven through environments that were already built, urban, or decidedly "cultural." The human inhabitants of Methone consistently chose to integrate animal bodies into their material culture and daily life, while never transforming them into something devoid of animality. Worked animal objects illustrate the inadequacy of interpreting the early Greek world within a nature-culture dichotomy, because individuals in the past continually used them as mediators of human experiences. Objects like bone needles and antler hammers helped humans literally give shape to their material culture. Simultaneously, the dependence on these objects ensures that animals were never really far from the "human world." These objects had the potential to be active participants in the tangible processes by which individuals generated meaning. The act of creating an antler hammer as a powerful striking tool may not have been simply an opportunistic use of a pliable material, but rather a direct invocation of the object's animal past. When humans were helping to order their world with animal materials (e.g., weaving with a bone needle), they were acting alongside the animal.

An object like the bear tooth pendant found at Methone may help to maintain a connection to the idea of wildness or ferocity. However, it is not necessarily a purely symbolic or metonymical link to that animal; the pendant does not need to function as semiotic shorthand. Alternate ontologies open up the possibilities of an object like a bone tooth pendant as something far more active. Such an object might be viewed as an element of partible corporeality, allowing the human wearer of the pendant to retain some aspect of the bear from which it originated. Other ontological understandings of animals, combined with the prevalence of objects made from their bodies, suggests a world rich with lively, organic forces. The social environment of Methone and other sites in the past were a collage of humans, animals, with those objects occupying the space between. As Dobres shows, technical acts are never divorced from their social circumstances (see § 2.3), but the social world is not occupied by humans alone. Animals were conspicuous aspects of everyday life, likely visible occupants of Methone and other sites like it in the ancient world. Flocks of sheep and goat would not have been far from humans, and the sounds and smells of animals would have served as a constant reminder that sites were shared spaces with other, non-human occupants. With a rich mythohistoric landscape made up of gods able to change into animals, as well as a litany of therianthropic beings, it is presumptuous to see the Greek social world as only populated by humans. Like the animals themselves, materials like bone, horn, and antler were part of the fabric of daily life. These materials draw humans closer to the animals, generating and maintaining the web of relationships among species. Humans may transform animal materials, but never to the extent that their organic qualities are removed. As a result, the objects remain as a sort of mortar between humans and animals, structuring and maintaining dependencies. The reliance among humans, animals, and animal materials was not just driven by an anthropocentric need for "raw material." Rather, the connection between animals and humans was multimodal, built on a more symmetrical relationship between the two. While Methone possesses persuasive evidence for the use of worked animal objects, it could not have been an exception within the Greek sphere. Rather, it is more likely that Methone is emblematic of a larger trend in the ancient world: the consistent and meaningful integration of animal objects in daily life. The Methone assemblage is a reminder that the ancient world was truly a natureculture, inhabited, shared, and co-constructed by human and non-human forces.

The Ramifications of the Evidence for the Production of Ivory

While Methone illustrates aspects of human-animal relationships that were universalizing aspects of the ancient world, the assemblage also provides evidence for production practices specific to early Greece. Methone is unique in that there are no known contemporary sites with comparable amounts of ivory production waste. In its regional context, the extensive evidence for ivory production waste found at the site is not wholly surprising; its position on the Thermaic Gulf and at the mouth of a navigable river system (the Haliakmon, Axios, and Loudias River deltas) made it a consistent crossroads for cultural interaction. Moreover, the Phoenician amphorae also provide evidence that the site was well-integrated within Aegean trade networks from an early period (see § 5.1.2). A site like Methone is well-positioned to acquire ivory and to provide an environment for craftspeople with specialized knowledge to practice their craft. While Methone was not the only center of ivory production for the objects found across the Greek world in the 7th and 6th centuries BCE, the patterns of production seen at the site remain some of the best evidence for how this craft was structured and practiced at other places within the Greek world.

The distribution of waste at Methone suggests that the site was host to diverse forms of production. Highly concentrated waste from Building A strongly indicates that ivory production was housed in that structure (see § 5.6.3); the materials from this building represent some of the best evidence for an ivory workshop in the post–Bronze Age period. However, the distribution of ivory waste from across the site (nearly every plot excavated by AMAP and the Ephoria) also implies a more fluid arrangement of the production of ivory and other worked animal materials. Because smaller amounts of production waste were found across the site, individuals may have worked these materials on an intermittent or ad-hoc basis. If craftspeople created worked animal materials on an irregular schedule, perhaps deposition patterns would be more diffuse and less predictable. Different groups of individuals may have been responsible for creating ivory objects, resulting in smaller concentrations of production waste around the site. Access to ivory was likely somewhat restricted by the nature of long-distance trade, which may have discouraged the creation of more dedicated ivory workshops like Building A. The evidence from Methone suggests that different modes of production were operating simultaneously, resulting in both scattered and concentrated patterns of production waste. Excavations at Methone demonstrate that the creation of ivory objects may have occurred both inside and outside dedicated workshop environments, even within one site.

The production environments found at Methone suggest the potential for strong variation across the Greek world. In assemblages made up of large numbers of stylistically coherent objects, such as the plaques and recumbent animal figures found at the sanctuary of Artemis Orthia, single workshops are presumed to have served these specific sites. However, the waste and objects found at Methone suggest craftspeople were responsible for having created dedications, but were not necessarily unattached to a specific sanctuary. Several strong similarities between objects in the Methone and Thasos assemblages indicate that Methone could have been creating objects for dedicants at the sanctuary. However, it is more plausible that other, as yet undiscovered, production locales were responsible for the objects found at that sanctuary. Moreover, the similarities between the Thasos and Methone assemblages may appear more pronounced because so few worked animal assemblages from northern Greece are known. Likely the corpus of worked animal objects in the early Greek world is the result of different groups of individuals operating at varying scales of production.

The abundance of waste at Methone raises questions about why so few sites seem to have evidence for ivory production in the period following the Bronze Age. Several likely factors contribute to the archaeological invisibility of ivory production in the early Greek world, including a major bias resulting from the sites that have been excavated. Contexts from the 8$^{\text{th}}$–6$^{\text{th}}$ centuries are more likely to be domestic, dedicatory, or funerary, rather than industrial. As a result, there is comparatively less evidence for production waste than for finished objects. Additionally, production waste from worked animal materials may be less likely to be recovered or studied systematically. If craftspeople were seeking to maximize their use of a valuable material like ivory, very little material may have been left over. At many sites, the remains of ivory production may have suffered a collection bias similar to faunal assemblages recovered without flotation or sufficiently small screens. However, this does not seem to be the case at Methone, as many large pieces of ivory were discarded and subsequently collected by excavators; only small amounts of ivory were recovered as a result of flotation. Evidence from Methone reveals that craftspeople were responsible for the primary processing stages, including the removal of the outer cementum or "bark," suggesting that producers were handling entire tusks; these actions resulted in larger pieces of production waste. Regardless, many smaller pieces were also identified and collected. Another possible explanation is that sites less integrated within the Aegean trade networks may have only been able to acquire smaller amounts of the materials. As a result, craftspeople would have had to maximize their use of ivory, being careful to discard only those pieces which could not be further worked. At Methone, a site that appears well connected within Aegean trade networks, ivory may have been more abundant. Craftspeople appear to have been less concerned with maximizing the material; as a result, significant pieces of ivory waste were discarded rather than repurposed. As sites with less access to the material, craftspeople may have been much more cautious, leading to much less production waste in the archaeological record.

6.3 Recurrent Patterns in the Corpus of Worked Animal Objects

There is a wealth of evidence for the use and reception of worked animal objects outside Methone in the form of objects found in burials and sanctuaries. Evidence in the period between 1100 BCE and the start of the 8th century BCE is markedly sparser than the following century, although some graves contained unique and novel uses of worked animal materials (see § 4.2). By the 7th century BCE, the forms of worked animal objects found within production contexts, graves, and sanctuaries demonstrate that there were widely shared ideas about the appropriate ways to make and use these items. Many of the assemblages from this period share several specific types of artifacts, but there are also more generalized patterns, suggesting a common ethos surrounding the creation of worked animal objects. These recurrent patterns all underscore the importance of the material: Worked animal objects held special importance in specific contexts because of their animal origins. During the 7th century BCE, worked animal objects from dedicatory contexts make up the vast majority of the total corpus. Burial contexts from the same period also have a conspicuous lack of worked animal objects, and many of the examples of common items from sanctuaries were never recovered in graves.

Many objects within dedicatory contexts appear to highlight and celebrate the material, rather than obscure it. Objects like the cut shafts from the sanctuary of Artemis Orthia (see § 4.3.1) and the decorated shafts from the Kamiros well (see § 4.5.4) represent a type of object that was modified, while still retaining a fundamentally organic, bone-like shape. These objects do not represent significant alterations to the natural structure of the material, but rather they show craftspeople embracing the natural aspects of the bone. Their repeated dedication at these sites demonstrates that the value of these objects was rooted in their connection to the animal world (see § 4.1), and lends evidence to the idea that these objects may have maintained a connection to the bodies from which they originate (see § 2.1.2). Objects across other assemblages also attest to the importance of the material, as some craftspeople appear to have created items with designs highlighting anatomical features. Object found at the Harbour Sanctuary on Chios seem to have been selected for their natural attributes, these pieces exhibit the conspicuously wavy structure of cranial bone (see § 4.3.8). While worked cranial bone is not paralleled at any other site, these objects conform to a general phenomenon of emphasizing organic features.

One of the most consistent features of worked objects was the use of animal forms and motifs. This is not surprising in light of the strong role of animal imagery within early Greek material culture; however, the frequency of animal depictions among these objects suggests a deliberate choice to link material with form. The association of form and material is most evident in some of the most popular and widespread dedications featuring images of animals, including the recumbent carvings, circular seals, as well the "Little Lion Seals." Moreover, other objects with animal imagery, like the fish pendants of the Dodecanese islands, appeared to be limited to a more localized tradition. Such a regional practice suggests that the central idea, the representation of an animal in a once-living medium, was shared across the Greek world. In some cases, objects were made from animal materials such as claws or teeth, highlighting conspicuously wild attributes; the pendants made from a bear tooth and claw found at Methone are evidence for this practice. However, the items from Methone should not be seen as evidence for a uniquely Greek practice. Rather, they are a testament to a far broader cross-cultural tradition shared across Aegean societies.

Other aspects of worked animal material production in the Greek world suggest that the relationship between the material and the form is a central feature of the creation and dedication of these objects. A scrap of bone from Aetos decorated with an incised double axe suggests that its creator believed that the material was an indispensable aspect of the object (see § 4.3.5). Bone double axes have been found across sanctuaries (including Ithaca), indicating that the idea of a double axe as a dedication was dependent on the material. The object, while only a rough incision on a piece of bone, still expressed the idea that bone was crucial to the idea of the double axe. Additionally, the recumbent animals found at the sanctuary of Artemis Orthia and several other sites evince a similarly close relationship between form and material. These objects depicting animals in submissive poses were made exclusively in one specific type of animal material: ivory. The creation of these recumbent animals appears governed by the idea they be rendered in a single material. These small carvings show a series of animals with expressive faces and in poses that seem to act as commentary on the relationship between wild and tame. Perhaps ivory was seen as the best medium to create objects that seem charged, active, or even living.

6.3.1 Ivory

The creation of ivory objects represents one of the most enduring patterns in the use of worked animal materials throughout the Greek world. Like other societies in the Aegean, Greek culture consistently emphasized ivory as a material that was both distinct and meaningful. The Minoan, Mycenaean, early Greek/Archaic, and Classical periods all saw the creation of ivory objects that were either intended as gifts to the gods or were in the form of deities and their worshipers. While the luxury and exoticism of ivory ensured that it was an aspect of elite culture at various points during these periods, its connection to the divine remained an indelible aspect of the material. The reappearance of ivory, and the subsequent surge in dedications of the material, provides some of the best evidence that during the Early Iron Age and Archaic periods, the material was somehow set apart in the minds of Greeks. As ivory was primarily used for objects meant for dedication during the 7th century BCE, specific connotations surrounding the material seemed to have governed its popularity during the period. Many of the most widespread ivory dedications explicitly reference animals and the natural world, such as the recumbent animals made exclusively in the material. These objects showing scenes of both wild and domestic animals in poses of supplication were an immensely popular dedication that appears to reference the tension of the place of humans in a world that is simultaneously uncontrollable and orderly, "natural" and "cultural." With these objects, a ferocious lion can be rendered as something tame or subservient. Rather than viewing these objects as a commentary on human superiority over nature, I argue that they are a part of a dialogue between human and non-human forces (see § 2.3.1).

Ivory undoubtedly had non-dedicatory uses, as it occasionally functioned as a grave good, and was likely treated like other high-value materials throughout its usage in the early Greek and Archaic periods. However, the distinct focus on the material as a medium for dedications suggests that it was also viewed as something exceptional. The period of distinct popularity in the Greek world also arrived at the tail end of a larger trend in the 1st millennium BCE. Ivory production in the Levant reached its apex several centuries before the reappearance of the material in the Greek world. Moreover, some of the earliest ivory objects in the Greek world (e.g., the Dipylon statuettes) appear to be distinctly influenced by Near Eastern and Levantine models. The extent to which the ivory trade and production practices of the 9th century affected the reception of the material in the Greek world remains a challenging question. Moreover, the sources of elephant ivory in the Greek world are poorly understood and hampered by overly literal readings of the Assyrian textual record. A fuller understanding of elephant habitats in Syria and Africa may provide more clarity about whether the reappearance of ivory in the Greek world represents a source of the material separate from that used in the Near East and the Levant. I argue that the Syrian elephant was likely a member of an indigenous population more tolerant of hunting pressures and habitat change. Recent archaeological evidence also suggests that the populations may have survived into the 7th century BCE. As a result, the ivory of the 8th and 7th centuries BCE within Greece may have been sourced from the same trade networks that supplied the Levant and Near East.

6.3.2 The Legacy of the Archaic Period: Ivory in the Classical Period and Beyond

While the widespread dedication of objects made from animal materials is primarily a phenomenon of the mid-7th and 6th centuries BCE, the end of the Archaic and start of the Classical period brought about another distinct use of animal materials within religious contexts: chryselephantine statuary. By the 5th century BCE, the production of small worked animal objects dedicated across Greek sanctuaries in previous centuries ceased. Instead, the composite statuary that craftspeople began producing in the 6th century BCE (see § 3.4.1) became the most visible use of animal materials in the Greek world. Pheidias' massive 5th-century chryselephantine statues of Zeus at Olympia and Athena on the Athenian Acropolis (*Athena Parthenos*), while lost to the modern world, continue to permeate the cultural understanding of Classical Greece and are some of the best-known ivory works within the ancient world. The 5th century represents a turning point for the creation of this statuary; Lapatin identifies the victories against the Persians at Marathon, Salamis, and Plataia as opportunities which "provided both the funds and the occasions for the dedications of major new monuments, chryselephantine statues among them."[7] This emphasis on composite statuary is neither unprecedented nor is it detached from previous understandings of animal materials. Instead of creating small objects that draw on the liveliness of the material, sculptors chose ivory to render realistically the flesh of their deities on a massive scale.

The use of ivory to create large-scale cult imagery suggests that the material continued to be understood as something unique, the grandeur of which was not entirely the result of its economic value. The dedicatory practices of the 7th century BCE appear to have generated and reinforced connotations of ivory as an active and living material. Although the social, political, and economic environments that allowed for the creation and dedication of chryselephantine statuary were different than in the previous era, the ideas of the Archaic period appear to have been reinterpreted for a new form of worship involving animal materials. While individuals no longer brought many of the smaller worked animal objects, animal materials continued to act as mediators between the human and the divine, serving as an anchoring point for worship. The Greek world at the end of the Early Iron Age was a different place than in the Classical period; however, animal materials still retained distinct importance in the form of these large cult images. Perhaps these connotations even continued into the Roman period, as Ovid's telling of the Pygmalion myth captures some idea of the earlier Greek conception of this material. Before coming to life, Pygmalion's statue was made from "snowy ivory."[8] Patricia Salzman-Mitchell analyzes why Ovid chose ivory for the Pygmalion story; she concludes that based on the techniques of molding discussed

---

7 Lapatin 2001, 61.

8 Interea niveum mira feliciter arte
sculpsit ebur formamque dedit, qua femina nasci
nulla potest, operisque sui concepit amorem. Ov. Met. 10.247-249.

by Lapatin, that ivory was the perfect material for the story because it was "able to 'change form,' to make the transition from one shape to another."[9]

6.4 A Moment in Time

Worked animal objects have been a feature of the Greek world since some of the earliest periods of prehistory, including as prevalent aspects of both Minoan and Mycenaean material culture. Although these items were never absent from Greek life, the period following the Bronze Age showed individuals experimenting with and finding a new place for worked animal objects in the public, religious, and funerary spheres. The relatively sudden increase in sanctuary spaces (and dedications therein) across Greece necessitated new material expressions, including worked animal objects. I assert that the popularity and value of these dedications is inherently based in their connection to the animal world. While animal materials were often transformed to create beautiful objects, worshipers also chose to dedicate objects which were recognizably organic.

The mid-7th and early 6th centuries BCE represent a brief period when the use of worked animal objects reaches its zenith within sanctuaries. The archaeological assemblages from sites like the sanctuary of Artemis Orthia or the Archaic Artemision at Ephesus are evidence that these objects played a powerful role within the ethos of dedication in the Greek world. Thousands of individuals felt compelled to surrender objects like miniature axes, carved recumbent animals, and even simple worked astragali as gifts to deities at their sanctuaries. These objects were chosen because they embodied a specific type of value, divorced in some cases from rational, economic thought. The bones of common animals like cattle or sheep were not particularly scarce or valuable. However, their transformation into an object worthy of dedication was rooted in their organic otherness. The lesson of Methone, and the other assemblages in the Greek world, is that worked animal materials have special values, meanings, and uses that are drawn from their organic history. This

9 Salzman-Mitchell 2008, 303.

conclusion is likely true of most societies in the ancient world, as so much material culture highlights the importance of animals and animal materials in other societies. Understanding animal materials in Greece, and the ancient world more broadly, necessitates interpreting these materials with alternative perspectives.

APPENDIX A

Catalog of Objects and Production Waste at Methone

The following objects were recovered from excavations at Methone, each item in the appendix has an ID which was used as its reference throughout the dissertation. In addition to the ID, objects may have a ΜΕΘ identifier (a registration number used by the Pieria Ephoria). Most objects also have a record of stratigraphic information, beginning with a descriptor of the area:

Descriptor	**Plot**	**Area**
HYP	274	Excavations from the *Hypogeion* on the East Hill, conducted by the Ephoria
EEH	274	East Hill excavations conducted by the Ephoria
EWH	229	West Hill excavations conducted by the Ephoria
ESA	245	West Hill excavations in the southern area of the plot, conducted by the Ephoria
AWH	229	West Hill excavations conducted by AMAP

Objects from Ephoria excavations have a six-digit identifier listing the square and pass, whereas items from the AMAP excavations have a trench number, an excavation unit, and a pass.

Ephoria: 022015 = Square 22, Pass 15

AMAP: Tr. 3, 27.1 = Trench 3, Unit 27.Pass 1

If taxonomic identifications were made, that information is also listed. All antler objects originated from a species of cervid. Additionally, all objects classified as ivory come from a species of elephant (*Elephas maximus* or *Loxodonta sp.*), unless otherwise noted. For other instances where no taxonomic classification is given, the object can be considered as coming from an unknown mammal. The objects and raw materials/production waste are divided by their material: antler, ivory, ivory or bone, bone, other tooth, and horncore. After material, objects are subdivided into other categories depending on the objects.

Antler Objects

Bridle Fitting

1 (ΜΕΘ 1)

Fig. A.1, Drawing A.1

HYP | Plot 274, 022015

Diam. 0.033; H. 0.020; Diam (Interior) 0.007

ID 1 is a hemispherical antler object with a flat side, and a cylindrical portion extending from the rounded side. It has three drill holes, with the largest running through the center of the object. Another drill hole is parallel to the previous one that runs through the rounded portion and terminates on the flat side. On this side, there is a carved area around the drill hole, which may have been for affixing another object. The third drill hole is perpendicular to the previous two and goes through cylindrical section. The best parallels for this object come from outside of the Greek world in the form of bridle fittings for horses found throughout central Europe and the Balkans.[1] While bridle fittings often take a variety of shapes, ID 1 appears most similar to the "shield" cheek pieces.[2] Chechushkov and his collaborators describe their function, writing: "the cheekpieces [...] are wooden, antler, bone, or metal-made external elements of the snaffle bits used to apply additional pressure into the horse's cheeks and lips and to connect the straps of the bridle."[3] The protruding portion and central drill hole of ID 1 would have been the location where the bit and reins joined;

[1] Choyke and Bartosiewicz 2009, 140, fig. 12; Sofaer, Jørgensen, and Choyke 2013, 484, fig. 26.5; Chechushkov, Epimakhov, and Bersenev 2018; Choyke, Vretemark, and Sten 2004, 183, fig. 8.

[2] Chechushkov, Epimakhov, and Bersenev 2018, 127.

[3] Chechushkov, Epimakhov, and Bersenev 2018, 127, figs. 2, 6.

the smaller drill hole intersecting with the central drill hole may have been used to affix the reins, bit, and fitting together. The other drill hole (parallel to the central portion) may have been used to affix to another part of the horse fittings (e.g., headpiece or noseband). This antler around this drill hole appears slightly worn or crushed, suggesting that pressure from the reins and other attachments put pressure on this part of the fitting. Finally, a broad area of wear on one edge of the object (visible on drawing A.1) might have been the result of abrasion with another element of the fittings, such as the straps or a noseband. Within the Greek world, other evidence for bridle pieces comes from Mitrou, and possibly Lefkandi (see § 4.2.1), but those examples are of the "rod-shaped" type.[4]

Antler Fibula Plates

These two antler objects show strong affinity with the single and double-disk spectacle fibulae of bone and ivory found across the Greek world; however, these objects are somewhat unique in that they are made from antler. The best comparandum for IDs 2 and 3 comes from the nearby Artemision of Thasos, which features a single-disk fibula in antler especially similar to ID 2 (see fig. 4.20).[5] Both ID 2 and the example from Thasos feature birds around the edges, guilloche, and comparable floral designs in the center. Ten examples of spectacle fibulae with carved birds were found at Kythnos,[6] a fragment of a fibula with carved birds was found at the acropolis of Halai,[7] and two examples come from the Heraion at Delos.[8]

2 (ΜΕΘ 23)

Fig. A.2, Drawing A.2

HYP | Plot 274, 022009

---

4 Chechushkov, Epimakhov, and Bersenev 2018, 127, fig. 2.

5 Prêtre 2016, 35, n. 131, pl. 4.

6 Varvarinou-Vai 2017, 194, figs. 5–6.

7 Goldman 1940, 427, no. 18, fig. 79, 3.

8 Deonna 1938, 285, no. 728, pl. 86.

Diam. 0.051; H. 0.004; L. (Bird carving) 0.014

The fibula plate is similar to ID 3, although the border has a more intricate guilloche motif. The central design features a flower with six petals created using a compass. The back of the plate exhibits incised arcs that are the same size as the central flower, suggesting that the producers may have been practicing the decoration. Some examples from Perachora have comparable central designs.[9]

3 (MEΘ 22)

Fig. A.3, Drawing A.3

HYP | Plot 274, 022008

Diam. 0.039; H. 0.004; L. (Bird carving) 0.014

The surface of the fibula plate shows a border of circle-and-dot motifs that are touching one another in most places; this motif resembles a simplified guilloche pattern. The center is composed of three circles arranged in a bullseye pattern around a central point. For a comparandum of the bull's eye pattern, see an example from Lindos.[10]

4 (MEΘ 3187)

EWH | Plot 229, 015010

This object appears to be half of a double spectacle fibula with one of the disks missing. However, the "missing" portion is cut, rather than broken. The remains of incised floral patterns and circle-and-dot modification are partially visible, but the surface of the object appears to have been deliberately scraped or abraded away. This object may not have been intended to be a finished piece, and instead may have been rejected or used for practice.

---

9 Stubbings 1940, 436, nos. A170 and A157.

10 Blinkenberg 1931, 90, no. 133, pl. 9 (Center Right).

Point

5 (MEΘ 311)

Fig. A.4, Drawing A.4

HYP | Plot 274, 032045

L. 0.062; W. 0.018; H. 0.009

A point cut from the beam of the antler and abraded on the underside, its full length is not preserved.

Antler Hammers

Multiple examples of antler hammers were found at Methone, three of which were from the *Hypogeion*. All feature large drill holes in their center, presumably to affix a haft. Due to the strength and shock absorption of the material,[11] hammers made from antler are a cross-cultural phenomenon that begins in the Paleolithic period.[12] Antiklya Moundréa-Agrafioti notes a similar tool from Neolithic Dimini, although she does not classify it as a hammer.[13]

6 (MEΘ 1285)

Fig. A.5, Drawing A.5

HYP | Plot 274, 022064

L. 0.100; W. 0.084; H. 0.041; Diam. (Drill Hole) 0.020

Cervus elaphus

A hammer made from the forking section of an antler, between the beam and a large tine. The two ends of the beam and the tine were cut in roughly equal lengths, and the center contains a large drill hole. Part of a smaller drill hole is visible at the edge of the central

---

11 MacGregor 1985, 29.

12 For a discussion of antler hammers in the Paleolithic and Neolithic periods, see Bello, Delbarre, Groote, and Parfitt 2016, 108. For examples of antler hammers found at the Bronze Age site of Jászdózsa–Kápolnahalom in Hungary, see Choyke and Bartosiewicz 2009, 365

13 Moundréa-Agrafioti 1987, 251, no. 9.

hole, likely related to hafting the object. Additional wood could be inserted in the small hole to create a tighter fit between the hammer and the haft. A nearly identical example (ID 9), including the small drill hole, was found on the West Hill of the site as well.

7 (MEΘ 1286)

Fig. A.6, Drawing A.6

HYP | Plot 274, 022066

L. 0.072; W. 0.068; H. 0.044; Diam. (Drill Hole) 0.017

A hammer that was created from a section of the beam and rounded at the top through a series of cuts. Like ID 6, there is a large drill hole at the center for hafting. Additionally, there is use wear in the form of small impressions on the side, possibly from using the hammer to strike smaller objects like nails.

8 (MEΘ 301)

Fig. A.7, Drawing A.7

HYP | Plot 274, 022051

L. 0.085; W. 0.028; H. 0.049; Diam. (Drill Hole) 0.011

Dama dama

A hammer made from the forking section between the base and brow tine of a fallow deer. Like the other examples, there is a large drill hole in the center of the tool. The base of the antler has been deformed and smoothed from prolonged use.

9 (MEΘ 8406)

Fig. A.8

AWH | Plot 229, Tr. 3, 27.1

Diam. (Drill Hole) 0.014

A degraded section of antler hammer that was likely made from the intersection between the beam and a large tine. Like ID 6 (MEΘ 1285), it has a large drill hole in the center that encompasses part of a smaller drill hole.

Antler Tools and Hafts

A series of tools created from portions of antler tines appear to be hafts or handles, they were found primarily in the *Hypogeion*. ID 16 presents the best evidence for the use of an antler tine as a handle, as there is a small piece of metal protruding from the base, and it is covered in iron staining. The other examples are more ambiguous, as some are neatly worked (e.g., ID 15), but have no obvious wear patterns or function. Others like IDs 15 and 22 do not seem to have been used to hold tools, rather they were more likely employed as scrapers or chisels. There is the possibility that some of these tines represent waste, as producers may have removed them to access the beam of the antler.

10 (MEΘ 305)

Fig. A.9

HYP | Plot 274, 032061

L. 0.154; W. 0.044

A tool made from the shed antler of a young cervid (likely red deer), of which the distal end has been flattened through a series of cuts.

11 (MEΘ 936)

HYP | Plot 274, 032041

L. 0.085; W. 0.021; Diam. (Drill Hole) 0.005

An antler tine that was cut at its base; the opposite point has been abraded, which was likely the result of natural processes during the life of the deer.

12 (MEΘ 1291)

Fig. A.10

HYP | Plot 274, 022066

L. 0.116; W. 0.025

A tine with cuts and a recessed area at the base, it may have been a haft.

13 (MEΘ 313)

Fig. A.11, Drawing A.8

HYP | Plot 274, 032066

L. 0.136; W. 0.028

Cervus elaphus

A portion of antler neatly cut at one end, which shows a recessed area; this part of the object may have been used to affix a tool. The other end is polished and discolored from use, supporting the idea that it was used as a haft.

14 (MEΘ 1289)

Fig. A.12

HYP | Plot 274, 022062

L. 0.148; W. 0.025

An antler tine with several cut marks at its base, which may have been partially hollowed at the base.

15 (MEΘ 1287)

HYP | Plot 274, 022070

L. 0.076; W. 0.027

An antler tine that was neatly cut at its base and has a slightly recessed interior. The exterior is smooth, potentially the result of use wear.

16 (MEΘ 674)

Fig. A.13, Drawing A.9

HYP | Plot 274, 032060

L. 0.117; W. 0.024

An antler tine that was used as a handle. It was cut near the base of the tine, although the surface is convex rather than flat; it is also covered in iron staining and contains a small piece of iron in its center. The tip of the tine was cut off and rounded through a series of cuts, likely to make the object easier to hold. The cut tip and an adjacent surface on the tine were also significantly abraded, presumably through use.

17 (MEΘ 1288)

Fig. A.14, Drawing A.10

HYP | Plot 274, 022058

L. 0.081; W. 0.027

A straight section of antler that was cut at both ends, with slight bevels at both edges. It shows a series of shallow cut marks and strong abrasion, suggesting that it was heavily worn from use as a handle.

18 (MEΘ 1292)

Fig. A.15, Drawing A.11

HYP | Plot 274, 032079

L. 0.058; W. 0.030; Diam. (Drill Hole) 0.005

A cylindrical portion of antler (likely from a tine) with a flat end; a drill hole runs through the object at this side. Opposite the flat end are a series of rough hack marks. The object is highly polished from use, although the hack marks have no use wear. The fresh appearance of the cuts suggests that the object was reworked or modified after a long period of use, perhaps to remove a tool that was within the antler (see § 5.3).

19 (MEΘ 1293)

Fig. A.16

HYP | Plot 274, 032086

L. 0.124; W. 0.022

An iron-stained tine that was either cut or broken at its proximal end.

20 (MEΘ 309)

Fig. A.17, Drawing A.12

HYP | Plot 274, 032

L. 0.038; W. 0.017

An antler tine cut at both the base and tip to create a section. Its interior is hollow, which may have been a choice of the craftsperson. It also has a smooth surface, owing to a series of broad cuts and abrasion. The full length of the object is preserved, although it may have been too short to act as the handle for a tool.

21 (MEΘ 1290)

Fig. A.18, Drawing A.13

HYP | Plot 274, 022065

L. 0.122; W. 0.026

A straight section of antler that was cut at both ends, with a slight bevel at one edge. Near to the beveled edge is a rough groove that contains a small hole that does not fully pierce the antler. Additionally, the surface is covered in a series of marks, scratches, and shallow cuts. It is also strongly abraded and shows evidence of chatter, suggesting it is heavily worn from use (see § 5.5.1). There is a small trace of iron staining on the interior, which may indicate that it was a handle.

22 (MEΘ 8409)

Fig. A.19

HYP | Plot 274, 022073

L. 0.170; W. 0.051

Cervus elaphus

A degraded antler beam with one end worked to a flat, angular surface, similar to a scraper. It is significantly rougher than many of the other antler objects, and it may represent a more ad-hoc type of tool production.

23 (MEΘ 3185)

EWH | Plot 229, 010011

A portion of an antler tine cut neatly at its proximal end.

24

AWH | Plot 229, Tr. 1, 2.1

L. 0.104

A degraded and partially preserved antler fragment that appears tapered at one end. Cut marks on the exterior surface suggest that it is the remains of a haft or handle.

25

AWH | Plot 229, Tr. 1, 72.1

L. 0.086; W. 0.019

A portion of antler with significant surface modification. It is only partially preserved, and somewhat degraded. It has a degree of polish on its surface and it may have been a haft.

Antler Raw Material and Production Waste

Like much of the antler in the Methone assemblage, many of these objects were found in the *Hypogeion.* Within the earliest layers of the *Hypogeion,* large portions of unworked or mostly unworked antler (IDs 27, 35, 36) were discovered. These sizeable portions belong to fallow deer, and may represent stockpiled raw material. Most of the worked antler from the latest phase of the *Hypogeion* comes from red deer and appears to be the result of producers preparing large portions of antler for further processing. In these examples, the producers chose a large section of the antler such as the beam or tine, and split it lengthwise into two halves. They would then make a perpendicular cut, removing that portion from the rest of the antler. The results were semi-cylindrical pieces that were subsequently worked into other objects. The remains of this process are visible in the *Hypogeion* in the form of a large forking section (the intersection between beam and tine) with perpendicular cuts (ID 33), indicating where the semi-cylindrical pieces were removed. Two semi-cylindrical pieces (IDs 34 and 43) are also present within the assemblage. These pieces were clustered in nearby units, and are all from the same species, and may even come from the same antler. Outside of the *Hypogeion,* an example of a worked section belonging to the forked region between beam and tine was also discovered on the West Hill (ID 41). This example is roughly contemporary with the later periods of the *Hypogeion,* suggesting that these antler processing activities were happening across the site.

Large Portions of Antler

26

HYP | Plot 274, 032009

L. 0.007; W. 0.005

Cervus elaphus

A degraded antler fragment preserving a portion of the coronet and beam, indicating that it was shed.

27 (ΜΕΘ 8407)

Fig. A.20

HYP | Plot 274, 022070

L. 0.250; W. 0.074

Dama dama

A large section of palmation (the flattened upper section of antler particular to fallow deer) that is mostly unworked, with the exception of some cut marks from where it was removed from the rest of the beam.

28 (ΜΕΘ 8410)

Fig. A.21

HYP | Plot 274, 022

L. 0.255; W. 0.046

A shed antler from a young deer, with no visible anthropogenic modification.

29 (MEΘ 312)

Fig. A.22

HYP | Plot 274, 022

L. 0.123; W. 0.030

An antler tine cut at its base; the opposite point has been abraded, likely the result of natural processes during the life of the deer.[14] The cut at the base is entirely flat and is more likely the result of a craftsperson removing a tine to use the rest of the beam for another purpose.

30 (MEΘ 1304)

Fig. A.23

HYP | Plot 274, 022073

A degraded fragment of antler with a beveled edge, created through a series of cuts. The beveled edge may be the remnants of antler removal technique, in which the craftsperson chips or cuts around the antler to create a groove, and then breaks or cuts it at that point.[15]

31 (MEΘ 1299)

Fig. A.24

HYP | Plot 274, 022058

L. 0.255

Dama dama

A portion of antler including an upper tine and the palmation. The antler was cut at the beam, right below the tine. Additionally, there are broad cut marks and a smaller worked surface at the other end. There are also large patches of abrasion which were likely created

---

[14] Jin and Shipman 2010, 98.

[15] See § 5.5.1, as well as Vitezović 2017, 214–15.

during the lifetime of the deer.[16]

32 (MEΘ 937)

Fig. A.25

HYP | Plot 274, 032050

L. 0.133; W. 0.036

Dama dama

The base of a shed antler with a portion of the beam. Broad cut marks at the base indicate that the brow tine was removed. Another cut mark above the base suggests that this portion was cut away from the rest of the antler and discarded as production waste.

33 (MEΘ 21)

Fig. A.26, Drawing A.14

HYP | Plot 274, 022010

L. 0.123; W. 0.086; H. 0.052

Cervus elaphus

A heavily worked section of forked antler that originated between the beam and a large tine. The upper and lower portion of the beam were removed with large cuts, some of these indicate that semi-cylindrical sections were also removed. The tine was also sectioned into half-cylinders, visible through a series of large cut marks.

34 (MEΘ 62)

Fig. A.27, Drawing A.15

HYP | Plot 274, 022009

L. 0.155; W. 0.042

Cervus elaphus

A semi-cylindrical portion of the beam that was created through two transverse cuts as well

[16] For examples of natural wear on antler, see Jin and Shipman 2010.

as a longitudinal cut (splitting the beam lengthwise).

35 (ΜΕΘ 1300)

Fig. A.28

HYP | Plot 274, 022058

L. 0.154; W. 0.021

Dama dama

A significant portion of shed antler, in which the base and part of the beam are preserved. A small portion of the brow tine (tine closest to the base) and a faint cut mark also remain, although they are both heavily abraded.

36 (ΜΕΘ 1301)

Fig. A.29

HYP | Plot 274, 022053

L. 0.172; W. 0.023

Dama dama

A significant portion of shed antler which includes the base, part of the beam, and a tine. The brow tine has been cut off, and there is a small burnt area between the base and the remains of the tine.

37

Fig. A.30

HYP | Plot 274, 022073

L. 0.096; W. 0.069

Cervus elaphus

A portion of shed antler coronet that was cut from the rest of the beam; the brow tine was also removed.

38 (MEΘ 939)

Fig. A.31

HYP | Plot 274, 032054

L. 0.145

Dama dama

A portion of antler that preserves a full brow tine and a large portion of the beam. The coronet appears to be broken or cut away from the rest of the antler; there are no modifications.

39 (MEΘ 945)

Fig. A.32, Drawing A.16

HYP | Plot 274, 022073

L. 0.160; W. 0.071

Cervus elaphus

A section of the beam which was removed from the rest of the antler through two neat cuts. This section of antler included a large tine, which was hacked off in a series of uneven cuts. A significant amount of the antler from the upper region was removed on both sides, giving it a pair of narrow, straight sides. Additionally, a large, rectangular hole was cut through this section. This object may be a rough tool that was intended to be hafted.

40 (MEΘ 919)

EEH | Plot 274, 079

Cervus elaphus

A thick portion of the beam, that has been cut neatly on one side and broken on the other.

41 (ΜΕΘ 7907)

Fig. A.33

AWH | Plot 229, Tr. 2, 61.2

Cervus elaphus

A portion of antler from the intersection of the beam and a tine. It has a small drill hole at one end of the beam.

42

AWH | Plot 229, Tr. 2, 61.6

L. 0.079; W. 0.017

A partially preserved portion of antler beam with two transverse cuts.

Rectangular Antler Pieces

These objects show evidence of craftspeople creating rectangular antler sections of different thicknesses. Some of these pieces are only fragments, and may represent off-cuts or production waste. However, IDs 43, 46, 47, and 50 are sizeable pieces and may represent blanks or preforms. With evidence for fibula plates made from antler, it is possible that these partially worked pieces of raw material were intended for that purpose.

43 (ΜΕΘ 36)

Fig. A.34, Drawing A.17

HYP | Plot 274, 032004

Cervus elaphus

A rectangular portion of the antler beam that was made from two transverse cuts, as well as a cut in the longitudinal direction. This object retains the natural curvature of the antler, making it akin to the semi-cylindrical pieces that were also found in the *Hypogeion*.

44 (MEΘ 909)

EEH | Plot 274, 027013

A square section of antler that has been cut in both the transverse and longitudinal directions.

45 (MEΘ 920)

EEH | Plot 274, 079

A thin, rectangular piece of antler.

46 (MEΘ 25)

EEH | Plot 274, 007017

A thin and square section of antler that has been cut in both the transverse and longitudinal directions.

47 (MEΘ 2074)

EEH | Plot 274, 089

A square portion of antler created from transverse and longitudinal cuts. Unlike other examples, this object preserves much of the natural curvature of the antler. It also has a partial cut mark, which may indicate that this was discarded or unfinished.

48

EEH | Plot 274, 079

A somewhat rectangular antler fragment with a transverse cut, although no other surfaces show clear evidence for cut marks.

49 (MEΘ 1934)

EEH | Plot 274, 027023

A slightly rectangular piece of antler with longitudinal and transverse cuts. It is somewhat irregular and may be represent an offcut.

50

EWH | Plot 229, 013003

A nearly square section of antler beam created from transverse and longitudinal cuts. It is very similar in appearance to ID 47.

Antler with Tubular Drill Holes

These objects are pieces of antler, from which sections were removed using a tubular drill. The producers placed these drill holes close together in an effort to maximize the material (see § 5.5).

51 (MEΘ 933)

EEH | Plot 274, 078

A portion of antler with several circular sections removed through the use of a tubular drill.

52 (MEΘ 2073)

EEH | Plot 274, 079

A portion of antler with several circular sections removed through the use of a tubular drill.

53

EEH | Plot 274, 085

A portion of antler with several circular sections removed through the use of a tubular drill.

Antler Tines

These antler tines are smaller than the examples used for handles/tools, and are more likely to be the result of producers removing them as waste. Objects like ID 60 show producers making multiple hack marks in an effort to remove the material. There are also instances of the tips of the tines being cut or broken off (IDs 54, 59, 61, 64); it is unclear whether these were removed to be used later, or discarded as waste. Some of the examples that were not cut at their bases may have been the result of use; in a study of antler tools from Middle-Late Atlantic period (6050±30 B.P) sites from the Netherlands, antler tools were found with the tine tips broken off.[17] However, many of the tines from Methone were cut off, and are similar to Bronze Age examples found at Mycenae.[18]

54 (ΜΕΘ 304)

HYP | Plot 274, 032037

L. 0.027; W. 0.011

A highly polished antler tine that was broken at its base. It is unclear whether there is any anthropogenic modification.

55 (ΜΕΘ 1302)

HYP | Plot 274, 022061

L. 0.065; W. 0.015

A tine which was hacked away from the rest of the antler near its base.

56 (ΜΕΘ 2802)

Fig. A.35

HYP | Plot 274, 022001

L. 0.052; W. 0.02

A tine which was hacked away from the rest of the antler near its base.

57

HYP | Plot 274, 022073

L. 0.086; W. 0.018

A tine with a small cut mark at its base, but otherwise not visibly modified.

---

17 Clason 1983, 89, 91, 94.

18 Krzyszkowska 2007, 57, 75, fig. 10.

58

HYP | Plot 274, 022051

L. 0.054 W. 0.016

A tine with a series of hack marks at its base.

59 (ΜΕΘ 1944)

EEH | Plot 274, 086008

An antler tine that shows burning, but no other visible anthropogenic modification.

60 (ΜΕΘ 2115)

EEH | Plot 274, 090006

An antler tine with a series of cut marks at its proximal end. It appears to be chopped and broken, with hack marks that appear rough and haphazard.

61 (ΜΕΘ 3075)

EEH | Plot 274, 067 or 068

A point of an antler tine, neatly cut.

62 (ΜΕΘ 2116)

EEH | Plot 274, 090006

An antler tine that may exhibit a degree of use wear at its distal end.

63 (ΜΕΘ 2062)

EEH | Plot 274, 018001

A small tine fragment.

64 (ΜΕΘ 2116)

AWH | Plot 229, Tr. 1, 24.1

L. 0.0315, W. 0.0134

An antler tine tip, with possible rough cut marks at its base.

65

ESA | Plot 245, 017011

A curved tine, that was hacked off at its base.

Antler Tines With Drill Holes

Two instances of antler tine were worked in a distinct manner: cut transversely with a drill hole running parallel to that cut. The objects are only partially preserved, and their use is not clear.

66 (MEΘ 24)

Fig. A.36, Drawing A.18

HYP | Plot 274, 022006

L. 0.040; W. 0.017; Diam. (Drill Hole) 0.004

An antler fragment that shows a clean transverse cut, and two smaller cut marks parallel to that surface (perhaps hesitation marks). Additionally, a drill hole runs parallel to the transverse cut.

67 (MEΘ 8148)

Fig. A.37

AWH | Plot 229, Tr. 1, 87.2

L. 0.045; W. 0.016; Diam. (Drill Hole) 0.002

Antler fragment with two transverse cuts and a portion of a drill hole. The outside is fairly smooth, suggesting it was polished or abraded.

Other Antler Production Waste

68 (ΜΕΘ 925)

Fig. A.38

HYP | Plot 274, 022051

L. 0.093; W. 0.023

An irregular portion of antler with faint traces of abrasion.

69

HYP | Plot 274, 022038

L. 0.004; W. 0.003

A small portion of the coronet, indicating it was likely shed. It was also blackened and calcified from exposure to fire.

70

HYP | Plot 274, 022051

L. 0.069; W. 0.030

A small fragment of cranium and antler, but with no visible modification. While it was found in the *Hypogeion* alongside other production waste, it is possible that it was part of the dietary waste stream.

71

EEH | Plot 274, 016006

A fragment of antler with a transverse cut, and some discoloration from burning/fire exposure.

72

EEH | Plot 274, 056014

A fragment of antler with cut marks.

73

EEH | Plot 274, 066

A piece of antler with a series of fine cut marks, slightly abraded on one end.

74

AWH | Plot 229, Tr. 2, 79.2

L. 0.079; W. 0.017

A small portion of antler, with a transverse cut; it is exceptionally smooth and may have been polished.

75

AWH | Plot 229, Tr. 2, 19.1

L. 0.06; W. 0.021

Classical

A small piece of antler that exhibits a rough cut below another mark showing an unsuccessful cut.

Ivory Objects

Seal

76 (ΜΕΘ 507)

Fig. A.39, Drawing A.19

HYP | Plot 274, 032046

L. 0.016; W. 0.015; H. 0.014

An elliptical seal that is drilled lengthwise and depicts a helmeted centaur holding two branches, with a small bird between the figure's legs. An incised ellipse around the edge bounds the image. The seal comes from an early phase of the *Hypogeion*, making it one of the oldest examples of ivory from the deposit. It is both elliptical and undecorated on the reverse side, making it somewhat atypical when compared to other ivory and bone seals from early Greece, as most are circular and decorated on both sides. Another unusual aspect of its construction is the portion of ivory chosen by the craftsperson: part of the seal comes from the region between the dentin and cementum. This area is usually removed by ivory carvers, so using ivory closer to the outer edge may have been an attempt to maximize the material. A comparable design on an ivory seal comes from the Kastro Hill on Siphnos, which also features a helmeted centaur holding two branches.[19] A slightly different version of this scene also occurs on a seal from Perachora.[20]

Fibula

77 (MEΘ 8429)

Fig. A.40

HYP | Plot 274, 022034

Min. L. 0.0424; W. 0.013; H. 0.011

Three fragments of a bronze and ivory fibula. The arch is complete, although neither the central decoration (perhaps an amber bead), nor the catch has preserved. Comparable examples come from the sanctuary at Kythnos,[21] the sanctuary of Hera Limenia at Perachora,[22] the sanctuary of Artemis Orthia,[23] Aetos (Ithaca),[24] and the Argive Heraion.[25]

---

19 Brock and Young 1949, 23, nos. 2–3, pl. 10.

20 Stubbings 1940, 424, no. A65.

21 The sanctuary produced 112 pieces of similar fibulae. Varvarinou-Vai 2017, 195, fig. 9b.

22 Nine mostly complete examples and 13 pieces. Stubbings 1940, 440–41, nos. A241–A263.

23 Droop 1929a, 198, pl. 82, a,b,e,f,i,k.

24 Anderson and Benton 1953, 346, nos. C.52–C.54, pl. 64.

25 Norton 1905, 352–53, nos. 25, 42-043, pls. 139–140.

Ivory Cross Guard

78 (MEΘ 3183)

EWH | Plot 229, 012004

L. 0.085; W. 0.012

A curved rectangular ivory object, with a center that was carved out. Despite the large empty space, the object was created from a single piece of elephant ivory, sourced from a longitudinal section of the material. Two iron pins run through either side of the object along the longitudinal axis. Producers also inserted an additional iron pin perpendicular to the other two on one side of the object. On the bottom, producers scored a crosshatch pattern. This may indicate that the object was meant to be affixed to something else using an adhesive. The best parallel for this object is a Hellenistic sword excavated at nearby Makrygialos, Pieria. This sword shows a very similar guard made from either bone or ivory.[26] Perhaps ID 78 dates to a later period, or this object represents a local Archaic antecedent for the example found at Makrygialos.

Grooved Object

79 (MEΘ 13)

Fig. A.41, Drawing A.20

HYP | Plot 274, 022005

L. 0.033; W. 0.014; PH 0.006; Diameter (Hole) 0.001

An even rectangular object with one broken face. A series of small and irregular drill holes run through the width of the object. Two of the drill holes are unfinished, and their sizes are slightly variable. The purpose of this object is not clear, although it is not wholly different from some objects thought to be spacers (a weaving tool, see § 4.2.2 and 4.3.1). However, the small size of the holes would not be conducive for use with thread.

---

[26] Besios 2010, 186, no. 951.

Scribed Object

80

ESA | Plot 245, 007013

A broken portion of a thin, rectangular object that is square in profile. Each of its four sides shows inscribed ring-and-dot motifs. The purpose of the object is unclear, although its dimensions suggest that it could be a component of a pin or rod.

Square Bead-like Object

81

Fig. A.42

AWH | Plot 229, Tr.5, 33.1

L. 0.021; W. 0.010; H. 0.006; Diameter (Hole) 0.003

A rectangular object, with irregular holes at both ends. The holes do not appear drilled, and it is unclear whether the object is fully pierced; it may be a bead or piece of inlay.

Object With Bronze Stud

82 (MEΘ 2127)

EEH | Plot 274, 090002

A fragment of an ivory object containing a bronze stud. While only a small portion of this object is preserved, it also appears to have had a hollowed-out section. Its purpose is not obvious, although it is not wholly dissimilar to the cross guard (ID 78) discovered on the West Hill.

Thin Rectangular Object with Elliptical Hole

83 (MEΘ 1967)

Fig. A.43, Drawing A.21

HYP | Plot 274, 022070

L. 0.026; PW. 0.018; H 0.003; Diam (Hole) 0.003

A thin rectangular object with an elliptical hole in the center. This object was found in the earliest layers of the *Hypogeion,* and it is highly worn and slightly degraded. It represents one of the older ivory finds at Methone.

Ivory Spectacle Fibula Fragments

Spectacle fibulae are one of the most common forms of worked animal objects from the period, with many examples made from ivory (see § 4.6.5). While the two examples from Methone are both partially preserved or broken, they show that producers were able to use incision and compass techniques expertly. With neater lines and more even motifs, these objects show a higher level of skill than the examples in antler.

84 (ΜΕΘ 3177)

EWH | Plot 229, 015010

A partially preserved ivory spectacle fibula plaque with a fragment of an iron attachment. The plaque is decorated with a neat guilloche pattern around its border, and a small portion of an incised motif from the center of the plaque is visible. This central decoration may have been a floral motif like the other examples, but it is only partially preserved.

85

EWH | Plot 229, 018003

Est. Circumference 0.153

Possibly Hippopotamus

A small portion of a fibula plate exhibiting a very fine guilloche border around its edge and the remains of a compass-drawn floral motif in the center. It also exhibits the remains of a small drill hole which may have been where a metal backing would have been attached.

Disk Fragment

86 (MEΘ 3178)

EWH | Plot 229, 007005

A partially preserved ivory disk with a neat guilloche border around its edge and a recessed center that may have acted as an attachment to a pin.

Ivory Production Waste or Raw Material

For an explanation of the ivory production waste, see section 5.2.4.

Fossilized Ivory

87 (MEΘ 2809)

Fig. A.44, Drawing A.22

HYP | Plot 274, 022009

L. 0.071, W. 0.047; H. 0.017

Extinct Proboscidean

The fossilized ivory has no obvious anthropogenic modifications and is fully mineralized. Its shape is mostly irregular, but one surface has a concave curvature that may be the remnant of the pulp cavity. The lack of evidence for modification may indicate that only some part of a fossilized tusk was soft enough to use, but this portion was discarded.

Type A Production Waste

88

EWH | Plot 229, 016022

A large Type A piece with one transverse cut.

89

EWH | Plot 229, 053003

L. 0.022; W. 0.013

A large piece of Type A waste similar to ID 88.

90

EWH | Plot 229, 013002

A large Type A piece with one transverse cut.

91

EWH | Plot 229

A large piece of Type A waste.

92

EWH | Plot 229

Th. 0.012

A large piece of Type A waste.

93

EWH | Plot 229, 007005

Type A waste, with a thick section of cementum.

94

EWH | Plot 229, 010011

A large piece of Type A waste with one transverse cut.

95

EWH | Plot 229, 015002

Type A waste.

96

EWH | Plot 229

Th. 0.007

A smaller piece of Type A waste.

97

EWH | Plot 229, 015

Type A waste.

98

EWH | Plot 229, 015

Type A waste.

99

EWH | Plot 229, 007027

Type A waste.

100

EWH | Plot 229

Th. 0.007

Type A waste.

101

EWH | Plot 229

Type A waste.

102

EWH | Plot 229, 014008

Type A waste.

103

EWH / Plot 229, 014008

Type A waste.

104

EWH / Plot 229

Type A waste.

105

EWH / Plot 229

Th. 0.007

Type A waste.

106

EWH / Plot 229

Th. 0.011

Type A waste.

107

EWH / Plot 229

Th. 0.005

Type A waste.

108

EWH / Plot 229

Th. 0.005

A small piece of Type A waste.

109

EWH | Plot 229

A small piece of Type A waste.

110

EWH | Plot 229

Type A waste.

111

EWH | Plot 229

Th. 0.012

Type A waste.

112

EWH | Plot 229

Th. 0.007

Type A waste.

113

EWH | Plot 229

Type A waste.

114

EWH | Plot 229

Th. 0.007

Type A waste.

115

EWH / Plot 229

Type A waste.

116

EWH / Plot 229

A small piece of Type A waste.

117

EWH / Plot 229

Type A waste.

118

EWH / Plot 229

L. 0.019

A long fragment of Type A waste.

119

EWH / Plot 229

Th. 0.007

Type A waste.

120

EWH / Plot 229

A large, more rectangular piece of Type A waste.

121

EWH / Plot 229

Th. 0.006

A fragment of Type A waste.

122

EWH / Plot 229

Th. 0.007

A fragment of Type A waste.

123

EWH / Plot 229

Th. 0.007

A fragment of Type A waste.

124

EWH / Plot 229

Th. 0.007

A fragment of Type A waste.

125

EWH / Plot 229

Th. 0.008

A fragment of Type A waste.

126

EWH / Plot 229

Small fragments of Type A waste.

127

ESA / Plot 245, 013026

Type A waste.

128

ESA | Plot 245, 013026

Type A waste.

129

ESA | Plot 245, 007012

A piece of Type A waste made from two transverse cuts.

Type B Production Waste

130 (MEΘ 5)

Fig. A.45, Drawing A.23

HYP | Plot 274, 022005

L. 0.021; W. 0.010; H. 0.005

A fragment of a piece of triangular production waste, cut on each surface, and of a uniform thickness. Rather than an exact triangle, one corner has been replaced by a flat side.

131 (MEΘ 2)

Fig. A.46

HYP | Plot 274, 022010

L. 0.023; PW. 0.009; H. 0.004

A fragment of a piece of triangular production waste, cut on each surface, and of a uniform thickness.

132 (MEΘ 3)

Fig. A.47

HYP | Plot 274, 022021

L. 0.020; W. 0.015; H. 0.003

A piece of triangular production waste, cut on each surface, and of a uniform thickness. One edge is beveled.

133

EWH | Plot 229, 013002

Type B waste, blackened from heat exposure.

134

EWH | Plot 229, 013002

Type B waste with crossed cut marks, and blue color from heat exposure.[27]

135

EWH | Plot 229, 007027

Type B waste with cross cut.

136

EWH | Plot 229, 014003

Type B waste that is nearly triangular with crossed cut marks.

137

EWH | Plot 229, 015

Triangular Type B waste.

138

EWH | Plot 229, 015

Triangular Type B waste with crossed cut marks.

139

EWH | Plot 229, 006006

Triangular Type B waste with a portion of a shallow incised arc.

[27] See Baer, Indictor, Frantz, and Appelbaum 1971; Ellingham, Thompson, Islam, and Taylor 2015.

140

EWH | Plot 229, 006003

Triangular Type B waste.

141

EWH | Plot 229

Triangular Type B waste.

142

EWH | Plot 229, 006006

Type B waste.

143

EWH | Plot 229, 007022

Type B waste with a very smooth transverse cut, as well as other surfaces that show rough saw mark striations.

144

EWH | Plot 229, 053003

L. 0.017; W. 0.005

Type B waste.

145

EWH | Plot 229, 014003

Type B waste.

146

EWH | Plot 229

L. 0.01

Type B waste.

147

EWH | Plot 229

L. 0.015; Th. 0.003

Type B waste.

148

EWH | Plot 229

L. 0.019

Type B waste.

149

EWH | Plot 229, 013022

Type B waste.

150

EWH | Plot 229

L. 0.012; Th. 0.002

Type B waste.

151

EWH | Plot 229, 013002

Type B waste.

152

EWH | Plot 229, 013002

Type B waste.

153

EWH | Plot 229, 013002

Type B waste.

154

EWH | Plot 229, 007005

Type B waste.

155

EWH | Plot 229, 007005

Type B waste.

156

EWH | Plot 229

L. 0.021

Type B waste.

157

EWH | Plot 229

L. 0.024; Th. 0.005

A fragment of Type B waste.

158

EWH | Plot 229

L. 0.016; 0.002

A fragment of Type B waste.

159

EWH | Plot 229

L. 0.024; 0.001

A fragment of Type B waste.

160

EWH | Plot 229

L. 0.016; Th. 0.001

A fragment of Type B waste.

161

EWH | Plot 229

L. 0.024; Th. 0.002

A fragment of Type B waste.

162

EWH | Plot 229

L. 0.033

A fragment of Type B waste.

163

EWH | Plot 229

L. 0.021; Th. 0.003

A fragment of Type B waste.

164

EWH | Plot 229

Seven very small fragments of Type B production waste.

165

ESA | Plot 245, 007012

Large and slightly irregular Type B waste.

166

ESA | Plot 245, 013026

Type B waste.

167

AWH | Plot 229, Tr. 4, 2.3

L. 0.022; W. 0.013; Th. 0.005

Triangular Type B waste.

168

AWH | Plot 229, Tr 2, 95.1

L. 0.014; W. 0.012; Th. 0.005

A piece of triangular Type B waste.

169

AWH | Plot 229, Tr.2, 88.1

L. 0.017; W. 0.028; Th. 0.003

Triangular Type B waste.

Cementum

Pieces of ivory production waste that are primarily from the outer cementum layer of the tusk. While many of these pieces have a small amount of dentin attached, they seem to have been removed as an early step of the production process (see § 5.2.4).

170 (MEΘ 2807)

HYP | Plot 274, 022013

L. 0.034; W. 0.017; H. 0.003

A small piece of irregular cementum with fine cut marks on the surface.

171 (MEΘ 4)

Fig. A.48, Drawing A.24

HYP | Plot 274, 022005

L. 0.052; W. 0.024; H 0.006

A large section of cementum cut in the transverse direction with two broad cut marks near the center of the piece. The length of the object and the size of the cut marks suggest that craftspeople separated large sections of ivory such as this during the early steps of the production process.

172 (MEΘ 2075)

EEH | Plot 274, 089

A piece of production waste composed of two transverse cuts with a layer of cementum.

173

EWH | Plot 229, 018003

A portion of cementum with a transverse cut.

174

EWH | Plot 229, 013003

Cementum fragment with a partially preserved drill hole, which would have been quite large.

175

EWH | Plot 229, 011004

A thin, curved piece of ivory (preserving the curvature of the width of the tusk) made from two transverse cuts., it is likely a cementum fragment.

176

ESA | Plot 245, 013026

A piece of production waste that shows the cementum-dentin junction, with two transverse cuts.

177

ESA | Plot 245, 013026

Production waste that shows the cementum-dentin junction, with two transverse cuts.

178

AWH | Plot 229, Tr. 1, 2.1

L. 0.031; W. 0.014; Th. 0.004

A small cementum fragment, with cut marks on the interior surface.

179

AWH | Plot 229, Tr. 2, 75.2

L. 0.056; W. 0.026; Th. 0.005

A large piece of cementum that preserves the curvature of the width of the tusk. The piece is cut transversely and shows the cementum-dentin junction. It is fairly weathered and degraded, with several root marks.

180

AWH | Plot 229, Tr. 1, 64.1

L. 0.04; Th. 0.012

An ivory section created from two transverse cuts, which preserves the curvature of the width of the tusk. The outermost portion appears to be either cementum or the cementum-dentin junction.

181 (ΜΕΘ 7795)

Fig. A.49

AWH | Plot 229, Tr. 2, 42.9

L. 0.032; W. 0.021; Th. 0.006

Classical

A small section of ivory and cementum exhibiting a tight curvature, suggesting that it came from the distal end of the tusk.

182

AWH | Plot 229, Tr. 4, 2.2

L. 0.062; W. 0.021; Th. 0.005

A large cementum fragment cut on several sides, it also preserves the remains of an abandoned cut.

183

Fig. A.50

AWH | Plot 229, Tr. 5, 3.1

L. 0.033; W. 0.026; Th. 0.005

A fragment of ivory from the exterior of the tusk (likely cementum), it exhibits both transverse and longitudinal cuts.

184

AWH | Plot 229, Tr. 2, 88.4

L. 0.043; W. 0.023; Th. 0.004

A large cementum fragment with one transverse cut. The piece is highly weathered, likely from exposure.

185

AWH | Plot 229, Tr. 1, 4.3

L. 0.021; W. 0.012; Th. 0.003

A small cementum fragment.

Cross-sections

Small cross-sections that appear to come from nearer to the distal end or tip of the tusk (see § 5.2.4).

186

AWH | Plot 229, Tr. 2, 16.1

L. 0.03; W. 0.012; Th. 0.004

A section of ivory created from two transverse cuts, which appears to preserve a small part of the pulp cavity.

187

Fig. A.51

AWH | Plot 229, Tr. 1, 5.1

L. 0.043; Th. 0.005

A section of ivory created from two transverse cuts. This piece preserves a significant part of the width of the tusk, suggesting it is from a slightly thicker section.

188

Fig. A.52

AWH | Plot 229, Tr. 1, 60.1

L. 0.030; W. 0.019

A section of ivory from the distal portion of the tusk, created from two transverse cuts.

Other Pieces of Ivory Production Waste or Raw Material

189 (MEΘ 2806)

HYP | Plot 274, 022013

L. 0.020; W. 0.009

A small fragment of ivory created from two transverse cuts; it appears to be chipped off from a larger piece.

190 (MEΘ 65)

Fig. A.53, Drawing A.25

HYP | Plot 274, 022024

L. 0.092; W. 0.021; H. 0.007

A long piece of ivory that appears to preserve some of the hollow shape surrounding the pulp cavity. Two cut surfaces extend lengthwise down the tooth, each with fine cut marks. Another surface, perpendicular to the other two, exhibits a transverse cut across the tooth. A small portion of the inner pulp cavity is preserved by a concave curve. The object is the result of producers working around the cavity within the center of the tooth.

191 (MEΘ 8)

Fig. A.54

HYP | Plot 274, 022007

L. 0.033; W. 0.008, H. 0.003

A small rectangular fragment of ivory that was cut on two sides. One of the short sides is beveled, while the other has been broken. The small size and regularity of this piece suggests that it was an offcut from a later stage of production.

192 (MEΘ 10 and 7)

Fig. A.55

HYP | Plot 274, 032017

L. 0.110; W. 0.015; 0.003

Three joining fragments that form a mostly rectangular piece of ivory with a beveled edge. One side is slightly wider than the other, as a result of a diagonal cut. The piece is the same thickness, and one side has smoother, more uniform cut marks. This piece may be an offcut of a large, flat object like a plaque or spectacle fibula.

193 (MEΘ 318)

Figs. A.56, Drawing A.26

HYP | Plot 274, 022003

L. 0.098; W. 0.013; H. 0.01

A rectangular block of ivory originating from near the center of the tusk. The block has a slight taper and a beveled edge at the wider end. Three of the long rectangular faces have fine, crisscrossing cut marks and a flat, even surface. The fourth face appears to have been created with a different technique using unidirectional cuts. These cuts produced an uneven surface, suggesting that this side was cut with a different tool (see § 5.5.1). The block retains a significant portion of usable raw material, which was abandoned mid-production.

194 (MEΘ 63)

Fig. A.57, Drawing A.27

HYP | Plot 274, 022009

L. 0.014; W. 0.010; Diam (Drill Hole) 0.003

An ivory fragment with two transverse cuts, with drill holes that meet in the middle of the object, slightly offset from one another. Parts of the ivory have not preserved.

195 (MEΘ 8408)

Fig. A.58

HYP | Plot 274, 022003

L. 0.021; W 0.003

Ivory production waste fragment that is triangular in profile, and tapers to a rough point as of result of the material breaking. It is worked on three surfaces, and appears to be chipped, or removed in such a way that the material is split lengthwise from a larger piece of ivory.

196 (ΜΕΘ 2805)

Fig. A.59, Drawing A.28

HYP / Plot 274, 022002

L. 0.037; W. 0.010

Ivory production waste that is triangular in section, and tapers slightly to a smaller side. Both flat surfaces are the result of transverse cuts, but there are no other worked surfaces. Both IDs 195 and 196 have a similar chipped appearance and may been removed from the same piece of ivory.

197 (ΜΕΘ 316)

Fig. A.60

HYP / Plot 274, 022037

L. 0.018; W. 0.016; H. 0.003

A fragment showing two worked surfaces, and which was chipped off of a larger piece of ivory.

198 (ΜΕΘ 6)

Fig. A.61, Drawing A.29

HYP / Plot 274, 022003

L. 0.033; W. 0.010; H. 0.009

An uneven piece of rectangular production waste that contains both cementum and ivory. As a result of producers treating the cementum with less care, the cut marks are pronounced and irregular.

199 (ΜΕΘ 8412)

HYP | Plot 274, 032009

L. 0.019; W. 0.009, H. 0.003

A small fragment of ivory, cut transversely, but broken off of a larger piece that has not preserved.

200 (ΜΕΘ 1280)

Fig. A.62, Drawing A.30

HYP | Plot 274, 022064

L. 0.022; W. 0.016

A degraded piece of ivory with two neat cuts in the transverse direction.

201 (ΜΕΘ 2114)

EEH | Plot 274, 090004

A small, rectangular piece of production waste.

202

EEH | Plot 274, 006011

Possibly Hippopotamus

A small, rectangular piece of ivory.

203

EEH | Plot 274, 084014

A rough fragment with a transverse cut.

204

EWH | Plot 229, 013002

A poorly preserved piece of ivory production waste.

205

EWH / Plot 229, 107024

A thin, irregular piece of ivory with cut marks on both sides.

206

EWH / Plot 229, 010014

An irregular piece of ivory production waste.

207

EWH / Plot 229, 014004

A generally rectangular piece of ivory with a transverse cut. It has a curve that appears to be from the natural shape of the material.

208

EWH / Plot 229, 107010

A rectangular fragment of ivory with the remains of multiple drill holes in a row. Slightly blackened, potentially from burning.

209

EWH / Plot 229, 015

A long, degraded piece of ivory (split along the lamellae, in three pieces).

210 (ΜΕΘ 3184)

EWH / Plot 229, 012016

A piece of ivory made from two transverse cuts that preserves the elliptical shape of the tusk. Two complete holes run in the transverse direction with another that is only partially preserved; the purpose of these holes is uncertain.

211

EWH / Plot 229

A somewhat rectangular piece of ivory waste with multiple cut surfaces. It is similar to the larger pieces of Type A waste.

212 (ΜΕΘ 3180)

EWH / Plot 229, 014007

A triangular piece of ivory with a recessed area that was drilled in the center, it resembles drill holes used for inlay (see § 5.5.2).

213

EWH / Plot 229, 007005

A piece of ivory that was worked on every surface like Type B waste. Its shape is long and trapezoidal, and its lines are not quite straight or parallel. Like Type B waste, this piece may have been part of a larger flat section of ivory.

214

EWH / Plot 229, 007005

A piece of ivory that comes from near to the center of the tusk, and which was formed from two transverse cuts.

215

EWH / Plot 229

A roughly semi-cylindrical piece of ivory with a drill hole down the center. The piece has a series of very rough cuts on its exterior.

216

EWH / Plot 229

An irregular piece of flat ivory with a large drill hole partially preserved at the corner.

217

EWH | Plot 229, 013002

An irregular piece of Type A waste.

218

EWH | Plot 229, 013002

An irregular piece of Type A waste.

219

EWH | Plot 229, 013002

An irregular piece of Type A waste.

220

EWH | Plot 229, 010014

An irregular piece of ivory with a variety of cut marks; it may show evidence for chattermarks (see § 5.5.1).

221

EWH | Plot 229, 014003

An irregular piece of ivory production waste. It shows a series of rough cuts, suggesting it was removed during an early stage of the production process.

222

EWH | Plot 229, 012013

A very thin and rectangular piece of ivory. It is unclear whether it is production waste or abandoned material. While it is significantly worked, it is distinct from Type B waste.

223

EWH | Plot 229, 014003

A fragment of production waste that appears chipped off.

224

EWH | Plot 229, 014003

A degraded and blackened fragment of production waste with a single transverse cut. It may be a piece of cementum.

225

EWH | Plot 229, 016022

A piece of production waste with a single transverse cut. It is similar to Type A production waste, and may have broken off of a larger piece of that variety.

226

EWH | Plot 229

A slightly irregular piece of ivory with two transverse cuts, which are not parallel to one another. It likely comes from near to the outer edge of the tusk.

227

EWH | Plot 229

L. 0.027

A large, irregular portion of ivory that appears chipped off of a larger section.

228

EWH | Plot 229

Five very small fragments of ivory.

229

EWH | Plot 229, 013003

A rectangular piece of ivory that is fairly regular and may be an abandoned blank, unused raw material, or piece of production waste.

230

EWH | Plot 229, 013026

One of four thick pieces of ivory production waste found in the same location. It is similar to Type A, but with more worked surfaces.

231

EWH | Plot 229, 013026

One of four thick pieces of ivory production waste found in the same location. It is similar to Type A, but with more worked surfaces.

232

EWH | Plot 229, 013026

One of four thick pieces of ivory production waste found in the same location. It is similar to Type A, but with more worked surfaces.

233

EWH | Plot 229, 013026

One of four thick pieces of ivory production waste found in the same location. It is similar to Type A, but with more worked surfaces.

234

EWH | Plot 229, 015010

A long, irregular fragment of ivory, likely from the outer portion of the tusk.

235

EWH | Plot 229, 015010

A long, somewhat irregular piece of ivory with a transverse cut.

236

EWH | Plot 229, 015006

A long and thin piece of rectangular ivory, likely production waste.

237

EWH | Plot 229, 015007

Production waste created from two transverse cuts as well as a longitudinal cut on one side. The cuts suggest that this piece was from a later stage in the production process, it may be comparable to the Type B waste.

238

ESA | Plot 245, 013026

A rectangular piece with an irregular drill hole and slightly rounded edges.

239

ESA | Plot 245, 013026

A small rectangular piece with an irregular drill hole; it is very similar to ID 238 and comes from the same context.

240

ESA | Plot 245, 002037

Diam. (Drill hole) 0.003

A slightly irregular rectangular piece that came from the exterior of the tusk; it has a small drill hole.

241 (ΜΕΘ 7874)

Fig. A.63

AWH | Plot 229, Tr. 1, 75.2

L. 0.027; W. 0.009; Diam. (Drill hole 1) 0.004; Diam. (Drill hole 2) 0.003

A semicircular piece of waste composed of two transverse cuts and two drill holes in the transverse direction, it is similar to Type A waste.

242

AWH | Plot 229, Tr. 1, 106.4

L. 0.001

A small rectangular fragment.

243

AWH | Plot 229, Tr. 2, 8.1

L. 0.026; W. 0.016; Th. 0.013

Production waste with two transverse cuts, but no other obvious modifications.

244

AWH | Plot 229, Tr. 2, 99.1

L. 0.060; W. 0.019; Th. 0.011

A large triangular ivory fragment with a transverse cut. It is badly preserved (split along the lamellae) and shows root damage, suggesting it was exposed.

245

AWH | Plot 229, Tr. 2, 79.4

L. 0.021; W. 0.015; Th. 0.007

A fragmentary and fairly degraded ivory piece with two transverse cuts.

246 (ΜΕΘ 5772)

AWH | Plot 229, Tr. 1, 4.2

L. 0.025; W. 0.011; Th. 0.008

A piece of ivory that resembles Type B waste. However, it features several irregular cut marks which resulted in a piece of variable thickness.

247

AWH | Plot 229, Tr. 1, 38.2

L. 0.021; W. 0.012; Th. 0.003

Fragmentary production waste with the remains of two transverse cuts.

248

AWH | Plot 229, Tr. 4, 3.2

L. 0.040; W. 0.022; Th. 0.002

A thin, rectangular piece of ivory in fragments, that was beveled on one side. It may be an unfinished or abandoned piece.

Fragmentary Ivory Waste

249

EWH | Plot 229

Forty-Two small and irregular ivory fragments.

250

EWH | Plot 229, 013002

Four pieces of irregular fragments.

Bone or Ivory Objects

Rectangular Object with Semicircular Extension

251

EEH | Plot 274, 079

A flat, rectangular object, which was cut into a thin section of material. There is a region of material carved into a semicircle on one of its cut edges. Its purpose is unclear, although it may be a piece of inlay.

Plaque with Guilloche Pattern

252 (ΜΕΘ 8149)

Fig. A.64, Drawing A.31

AWH | Plot 229, Tr. 2, 21.1

L. 0.04; W. 0.019; Th. 0.004

A small bone or ivory plaque with a series of incised rectangles. Within these rectangles is a guilloche pattern enclosing an empty center. The incised rectangles are fairly uneven, and the guilloche is irregular with incised lines crossing through it. The plaque has a somewhat unfinished appearance, and it may be example of a craftsperson practicing, or an abandoned piece. The material designation is particularly difficult for this object, as it is heavily modified. It does not show any of the diagnostic characteristics of ivory (e.g., Schreger lines or cone-within-cone splitting), and its coloration is different from many of the other ivory objects in the assemblage[28] If it is ivory, it likely belongs to a region close to the pulp cavity, as the back of the object may show a natural concavity consistent with this area. The nature of the guilloche around the edge of the object is strongly reminiscent of some of the plaques from the sanctuary of Artemis Orthia. The Artemis Orthia plaques are not a perfect

[28] Coloration is a problematic criterion in itself, although many of the ivories at Methone display similar coloration. As a result, it was a helpful factor in some classifications.

comparison as nearly all had some sort of figural imagery and were carved in relief. Yet, in an example from Artemis Orthia featuring two figures standing around a standard, there is a definite similarity between the proportions of the plaques and their guilloche borders.[29]

Short Point

253

EWH | Plot 229

Diam. (Drill Hole) 0.0035

An object that is very similar to the "short points" made from bone within the assemblage (see below). Like many of those other objects, it has a drill hole at its base. This example is slightly neater than the others, and it appears to exhibit lamellar cracking/cone-within-cone splitting associated with ivory; however, it is not fully clear what material the object is made from. It seems unusual to create a seemingly utilitarian object out of such a valuable material, but the object may not have been intended to be functional.

Bone or Antler Objects

254

AWH | Plot 229, Tr. 1, 2.4

L. 0.041; W. 0.01

A rough point made from bone or antler.

255

EWH | Plot 229, 006003

A rough point made from bone or antler.

---

[29] Dawkins 1929a, 206, pl. 91, 1–2; Marangou 1969, 10.

Bone Objects

Miniature Bone Axe

256 (MEΘ 8146)

Fig. A.65, Drawing A.32

AWH | Plot 229, Tr. 1, 106.4

L. 0.34; W. (at center) 0.013; W. (at end) 0.023; Th. 0.006

A miniature double axe in bone. One side of the object exhibits shallow chisel marks, which were the result of producers removing material from its edges. The other side shows cut marks, perhaps remnants of the object being cut from a larger piece of material. Unlike miniature bone axes found at other sites, the example from Methone lacks a central hole and decoration. For examples of miniature axes in bone and ivory found in votive contexts from the period, see section 4.6.3.

Bone Aulos Fragments

See section 4.6.6.

257 (MEΘ 2668)

EEH | Plot 274, 068

An aulos fragment that preserves one end for attachment to another segment. Both the interior and exterior surfaces are highly polished and even.

258 (MEΘ 8152)

Fig. A.66, Drawing A.33

AWH | Plot 229, Tr. 2, 88.5

L. 0.046; W. 0.016; Diam. (tone hole) 0.009

An aulos fragment with the remains of two tone holes. The outside surface is strongly polished, perhaps from use.

Short Points

A series of short points made from bone (one example is also antler, and one is ivory or bone, see above) were primarily found within the earliest phases of the *Hypogeion,* while some also came from the East Hill. The short points are widest at their bases, and taper toward a slightly rounded tip. All are nearly the same length, have a flattened conical shape, and were created through cutting and abrading the material; most have drill holes. Despite the fact that the examples from Methone are very similar to one another, they do not have good comparanda in other assemblages.

259 (ΜΕΘ 1273)

Fig. A.67, Drawing A.34

HYP | Plot 274, 022061

L. 0.034; W. 0.013; H. 0.007; Diam. (Drill Hole) 0.004

The point was formed from a mixture of cut, abraded, and naturally curved surfaces, giving the base a more angular profile. Its overall appearance is very even, and it has a regular, but slightly off-center drill hole.

260 (ΜΕΘ 926)

HYP | Plot 274, 022052

L. 0.024; W. 0.008; H. .004; Diam. (Drill Hole) 0.002

This example has the most conical shape of the short points, although it is broken lengthwise. It has a shallow drill hole, a round tip, and it is slightly polished.

261 (ΜΕΘ 1272)

Fig. A.68, Drawing A.35

HYP | Plot 274, 022

L. 0.036; W. 0.014; H. 0.005; Diam. (Drill Hole) 0.003

A short point that is flatter than the other examples. The diameter of the drill hole extends beyond the material, so that the hole is exposed on one face.

262 (MEΘ 1274)

Fig. A.69, Drawing A.36

HYP | Plot 274, 022065

L. 0.035; W. 0.012; H. 0.0064

This example is the most angular of the short points: the sides are flat rather than rounded, and the base is rectangular. The tip of the point is similarly angular, and it has been abraded so that it is fairly flat.

263 (MEΘ 1052)

EEH | Plot 274, 065

L. 0.026; Diam. (Drill Hole) 0.003

A neat example of the short points, with a drill hole in the base. The base appears to have been removed with the groove and snap technique (see § 5.5).

264 (MEΘ 12)

EEH | Plot 274, 044004

L. 0.022; Diam. (Drill Hole) 0.003

Similar to ID 263, ID 264 is a neat point with a drill hole in the base.

265

ESA | Plot 245, 017001

L. 0.029

A very rough point that has been blackened due to exposure to fire, with a hole in its base.

Bone Stylus Points

These points were likely used for writing and are fairly regular in their design: one end is a small point while the other end is spatulate (see § 5.3).

266 (MEΘ 780)

EEH | Plot 274, 009010

A portion of the spatulate end which was wider than the rest of the point.

267 (MEΘ 1921)

EEH | Plot 274, 089

A complete point with a small spatulate end, and the same width throughout.

268 (MEΘ 1922)

EEH | Plot 274, 089

A complete point with a small spatulate end, and the same width throughout.

269 (MEΘ 1918)

EEH | Plot 274, 079

A complete point. The spatulate end is slightly wider and begins to take shape midway through the point. This may be an indicator that the point was reworked during the time it was used.

270 (MEΘ 1919)

EEH | Plot 274, 079

A point that does not preserve the spatulate end.

271 (MEΘ 2669)

EEH | Plot 274, 079

A point that does not preserve the spatulate end.

272 (MEΘ 783)

EEH | Plot 274, 068

A point with only the shaft preserved, both ends appear broken off.

273 (MEΘ 2063)

EEH | Plot 274, 069

The spatulate end of the point, with nothing else preserved. This spatulate end is markedly wider than others.

274 (MEΘ 1920)

EEH | Plot 274, 089

A small portion of a point, with the spatulate end preserved.

275 (MEΘ 2070)

EEH | Plot 274, 089

A wider example of a spatulate point, with a broken tip.

276 (MEΘ 8150)

AWH | Plot 229, Tr. 2, 14.1

L. 0.043; W. 0.006

Classical

A neat example of the spatulate end of a point, with some signs of wear throughout.

Bone Rings and Beads

277 (MEΘ 2109)

EEH | Plot 274, 068

A neat bone ring with a convex interior diameter that is teardrop-shaped in cross-section. Producers may have created this ring by using the cross-section of a bone shaft and taking advantage of the natural hollow of the diaphysis.

278 (MEΘ 1917)

EEH | Plot 274, 079

A thick bone ring with a small interior diameter, it is slightly uneven.

279 (MEΘ 907)

EEH / Plot 274, 079

A thick bone ring or bead with a small interior diameter; it is slightly uneven.

280 (MEΘ 1916)

EEH / Plot 274, 089

A tapered bead that is wider in the center. Concentric striations suggest that this bead was turned on a lathe.

281 (MEΘ 320)

EEH / Plot 274, 066

L. 0.017; Diam. 0.003

A bead that is thickest at a band in the center, and tapers to a thinner diameter on either side of the band.

282 (MEΘ 7308)

Fig. A.70

AWH / Plot 229, Tr. 1, 38.2

L. 0.012; W. 0.011; Diam. (Drill hole) 0.003

A small bead that was blackened as a result of fire exposure.

Constructional Piece

283 (MEΘ 14)

EEH / Plot 274, 085013

A rectangular bone object with a deep and narrow channel cut into the bone on one side and a wider, more shallow, rectangular area of bone removed from the other. On each of the smaller ends there are two small holes that may have acted as mortises, perhaps as a component of a small box.

Possible Examples of Inlay

284 (MEΘ 1295)

EEH | Plot 274, 089

A thin, trapezoidal strip of bone with a series of incised decorations made with a compass (see § 5.5.2 for details on its creation).

285 (MEΘ 2110)

EEH | Plot 274, 090003

An object that has been carved and incised to create a pattern reminiscent of the bead and reel motif. The sides of the object are wide and undecorated while the reverse side was either deliberately cut off or does not preserve. Additionally, the top and the bottom of the object were cut to flat surfaces. Somewhat similar examples are seen among the pin shanks from the sanctuary of Artemis Orthia.[30] The best comparison for the pattern comes from a larger example of decorated bone also from the sanctuary of Artemis Orthia.[31] The flat surfaces of ID 285 may suggest that it was intended to be inlaid next to others like it.

286 (MEΘ 3073)

EEH | Plot 274, 080003

A semi-cylindrical object with a rough meander pattern on either end, the center is undecorated.

287 (MEΘ 3181)

EWH | Plot 229, 011004

A small rectangular strip of bone with a series of cut out channels; a nearly identical example was found at Ephesus.[32]

---

30 Dawkins 1929a, 227, pl. 136.

31 Dawkins 1929a, 238, pl. 163, 5.

32 Hogarth 1908b, 196, pl. 40, 20.

Bird Carving

288 (ΜΕΘ 7157)

AWH | Plot 229, Tr. 2, 22.1

L. 0.031; W. 0.018; Diam. (Drill Hole) 0.003

Classical

A small carving of a bird created from the cross-section of a bone, with a slightly off-center drill hole. The bird shows outstretched wings that are raised, and a wedge-shaped tail. The head is small, with a rough approximation of a beak. While this object comes from a Classical context, it has a parallel in an earlier object from Kythnos.[33]

Points

289 (ΜΕΘ 308)

Fig. A.71

HYP | Plot 274, 032

L. 0.072; W. 0.005

A rough point made from a thin bone, likely the fibula of a pig. The majority of the shape of the object comes from the unaltered bone, although the point is made from several cuts, and appears dulled from use. Its gray-black color may be the result of some degree of burning or heat treatment (see § 5.5.3).

290 (ΜΕΘ 16)

Fig. A.72, Drawing A.37

HYP | Plot 274, 022016

L. 0.038; W. 0.01; H. 0.005; Diam. (Drill Hole) 0.004

A head of a point with a drill hole at the end. The object tapers, and only the portion

33 Varvarinou-Vai 2017, 197, fig. 21.

nearest to the head is preserved. There is a small amount of abrasion around the drill hole, which likely represents use wear.

291 (MEΘ 1270)

Fig. A.73, Drawing A.38

HYP | Plot 274, 032077

L. 0.126; W. 0.006; W. (At head) 0.004

A long point that is mostly whole, although missing the tip. There is a short section at the top that is a smaller diameter than the rest of the point. The remaining point is widest below the smaller section and tapers toward the broken end. The point is highly polished and has a unique coloration from heat exposure, similar to ID 458. The smaller section at the top may have been for affixing a pin head or finial.

292 (MEΘ 1271)

Fig. A.74,Drawing A.39

HYP | Plot 274, 032086

L. 0.078; W. (Head) 0.005; H. 0.003; Diam. (Drill Hole) 0.002

A complete needle with a rectangular head and drill hole. The needle retains the natural curvature of the bone, suggesting that the producer minimally modified a small element like a fibula, rather than reducing a larger portion of bone. There is a degree of discoloration at the tip of the point which may be use wear.

293 (MEΘ 319)

EEH | Plot 274, 088

A partially preserved rough point, with a uniform thickness throughout.

294

ESA | Plot 245, 015018

L. 0.053

A neat point that is slightly wider at its head which is rounded, the tip is also round and fairly dull.

Pendants

295 (ΜΕΘ 777)

EEH | Plot 274, 075

L. 0.023; Diam. (Drill Hole) 0.002

A small pendant, possibly an earring of the pyramidal form. This Type Begins in the Archaic period and "becomes a dominant form on mainland Greece in the Classical period."[34] The pendant/earring has a small suspension hole drilled into a small portion of bone protruding from the top. The rest of the object tapers downward in a series of incised bands. At the bottom, the incised bands end at a slightly wider bulb, which terminates in a small portion of bone that tapers outward.

296 (ΜΕΘ 3072)

EEH | Plot 274, 066

A rectangular bone strip with a suspension hole at one end; a somewhat similar example comes from the Archaic Artemision at Ephesus.[35]

297 (ΜΕΘ 1055)

EEH | Plot 274, 085

A small, irregular, and elliptical piece of bone with a rough drill hole. It is unclear from what element this object originates, but it may be a piece of cranial bone. Despite its irregularity, a similar object was found at Thasos.[36]

---

34 Castor 2008, 7.

35 Hogarth (1908b, 190, pl. 37, 5) categorizes a similar undecorated bone strips as "label or plummet-shape" pendants.

36 Varvarinou-Vai 2017, 34, no. 123, pl. 17.

298 (ΜΕΘ 5888)

Fig. A.75, Drawing A.40

AWH | Plot 229, Tr. 4, 2.2

L. 0.019; W. 0.016; Diam. (top drill hole) 0.002; Diam. (drill hole through the width) 0.002

A pendant with a rectangular upper section and a triangular lower section. A drill hole goes through the width of the object, as well as somewhat rougher drill hole running perpendicular through the top section (it does not go through the entirety of the length). There are not exact parallels to this object, but rectangular pendants that were divided into two sections were found at Aetos,[37] the sanctuary of Artemis Orthia,[38] and Perachora.[39] These examples are fairly similar to one another, but not wholly comparable to the example from Methone. It is also possible that the object from Methone is unfinished.

299 (ΜΕΘ 8072)

Fig. A.76, Drawing A.41

AWH | Plot 229, Tr. 2, 78.3

L. 0.043; W. 0.012; Diameter (Hole) 0.004

Ursus sp.

A pendant made from the claw (3rd phalanx) of a bear. It has a drill hole at the proximal end, but is otherwise unmodified.

Cylinders, Hafts, or Handles

300 (ΜΕΘ 1279)

Fig. A.77, Drawing A.42

HYP | Plot 274, 022063

---

37 Heurtley and Robertson 1948, 116, nos. C22–C26, pl. 47.

38 Dawkins 1929a, 226, pl. 135, 1.

39 Stubbings 1940, 444, no. A 326, pl. 188.

L. 0.055, W. 0.012; Diam. (Drill Hole) 0.001

A highly polished long bone shaft cut at both ends. At one end there are four exceptionally small drill holes opposite one another, which may have been for affixing the object to something else. The bone has a marbled appearance that suggests it was exposed to fire, which may have been a deliberate choice by the producer (see § 5.5.3).

301 (ΜΕΘ 1275)

Fig. A.78, Drawing A.43

HYP | Plot 274, 022069

L. 0.060; W. 0.011

A shaft of a metapodial bone (likely sheep or goat), tapered on one end; it may have been used as a handle.

302 (ΜΕΘ 927)

Fig. A.79, Drawing A.44

HYP | Plot 274, 032053

L. 0.036; W. 0.016; H. 0.010

A section of shaft bone, cut at both ends and polished. It is decorated with rows of six ring-and-dot motifs; a little more than half the object is preserved. A similar example comes from Lindos,[40] and a somewhat comparable example comes from the Kastro Hill on Siphnos.[41]

303 (ΜΕΘ 302)

Fig. A.80, Drawing A.45

HYP | Plot 274, 022056

L. 0.059; W 0.016

A long bone shaft that was cut at one end and polished; its use is unknown. Comparable

---

40 Blinkenberg 1931, 151, no. 433, pl. 16.

41 Brock and Young 1949, 26, no. 15, pl. 10.

examples of worked and polished shafts were deposited in the Kamiros well.[42]

304 (MEΘ 3182)

EWH | Plot 229, 013002

The remains of a small bone cylinder that is covered with circle-and-dot motifs, approximately arranged in columns of four. At either end there are short, incised lines. A roughly comparable example from Lindos has a single column of ring-and-dot motifs and incised lines on either end.[43]

Flat Rectangular Objects with Drill Holes

These objects have the remains of two drill holes, and are flat and rectangular.

305

EEH | Plot 274, 036007

A flat rectangular bone object, with the remnants of two iron-stained drill holes at either end of the object.

306 (MEΘ 1926)

EEH | Plot 274, 089

A flat rectangular bone object, with the remnants of two drill holes at either end of the object.

Partially Preserved Circular Objects

Both items are the remains of an object that was originally circular in shape. They have no decoration and do not have a clear function.

---

[42] While the majority of the worked bone shafts from the Kamiros well have incised decorations, three objects found in the British Museum from that deposit are all undecorated (accession numbers: 1864,1007.590, 1864,1007.591, 1864,1007.597).

[43] Blinkenberg 1931, 151, no. 442, pl. 16.

307 (ΜΕΘ 1927)

EEH | Plot 274, 027018

A small section of a flat, circular object. One side is flat, while the other is slightly convex. It could be a piece of a lid.

308

EWH | Plot 229, 006004

A round and thin portion of bone that is badly preserved, and it is flat on its underside. It may be part of a teardrop-shaped or petal-shaped inlay piece, such as those found at Ephesus,[44] the Papatislures Cemetery,[45] Thasos,[46] and in association with the couch found in the Kerameikos.[47] However, the piece is fragmentary, making it difficult to determine whether this was its original shape.

Bone With Incised Circles

309 (ΜΕΘ 5609)

Fig. A.81

AWH | Plot 229, Tr. 2, 2.2

L. 0.071; W. 0.029

ID 309 is a flat bone object with a series of incised circles around a central incised dot. Two circles are closer to the center, while two more incised circles decorate the edge. Additionally, a portion of an incised circle is visible at the very edge of the object indicating where it was cut away from the excess bone, some of which remains attached. Additionally, fairly rough chatter-marks (see § 5.5.1) remain on the exterior. Both of these factors suggest the object

[44] Hogarth 1908b, 196, pl. 40, 9, 10, 13, 15, 16.

[45] Objects from the British Museum: 1864,1007.712–15, 1864,1007.712.749

[46] Varvarinou-Vai 2017, 55–56, nos. 269–80, pl. 19.

[47] Knigge 1976, 60–83, pls. 103–5.

is unfinished. It is possible that this represents an unfinished spectacle fibula, although it is thinner than most other examples. Perhaps it was meant to be an element of inlay.

Carved Arm

310

EEH / Plot 274, 079

A representation of an arm carved in bone, exhibiting a medium-sized drill hole at the "shoulder." Small incisions represent musculature and the fingers on one side of the object; the reverse is undecorated. The drill hole suggests that this object may have formed a component of a figure with jointed limbs. Examples of jointed figures are known in terracotta, such as from the Pnyx in Athens.[48] They are rarer in bone, McK Elderkin describes a Hellenistic example of a jointed bone figure from Taranto, Italy as "the oldest Greek example of bone, and the only extant example in this material before the Christian era."[49]

Iron Blade with Bone Handle

311 (ΜΕΘ 8155)

AWH / Plot 229, Tr. 2, 78.3

L. 0.112; Max. W. 0.019

A nearly complete iron blade and bone handle. The bone handle is made from a rib, and would have likely been joined by another piece of rib worked in the same way. There is a drill hole at one end and a series of small circular punctures surrounded by a slight depression. These may be the remnants of another material or a decoration that would have covered the handle.

---

[48] Davidson and Thompson 1943, 114.

[49] McK Elderkin 1930, 468.

Bone Strip with Nails

312 (MEΘ 1049)

EEH | Plot 274, 075

A strip of bone, likely made from the rib of a large animal, with multiple bronze pegs/nails running through it. While it may represent a piece of inlay, the number of pegs/nails seem excessive for this purpose. It may also be a handle for a long knife, as was proposed for the comparable examples from Ephesus.[50]

Possible Stylus Fragment

313 (MEΘ 310)

Fig. A.82, Drawing A.46

HYP | Plot 274, 032

L. 0.035; W. 0.014; W. (Narrowest point) 0.006 H. 0.004

A flat, rectangular object decorated with four ring-and-dot motifs running lengthwise. There is a narrow section that tapers and then flares outwards, with a break indicating where the object would have continued. This object may be the head of a type of stylus point similar to those at Perachora.[51] It is also somewhat similar to possible pin heads found at the Argive Heraion,[52] and pin heads from examples found at the Acropolis of Halai.[53] While this object vaguely resembles a pin head, it may also be a small plaque, or a pendant without a suspension hole.

---

50 Hogarth 1908a, 195, pl. 39, 1–5.

51 The examples from Perachora are generally more spatulate than 313, although their general shape and decoration are similar. For a similar design, see Stubbings 1940, 446–47, nos. A 359, A 360, and A 372.

52 Norton 1905, 353, pl. 140, 36–37.

53 Goldman 1940, 425, nos. 2–12.

Polygonal Bone Strip

314

AWH | Plot 229, Tr. 2, 14.1

L. 0.04; Th. 0.002

Classical

A fine, thin object that is polygonal in cross section. The shape remains the same throughout this length and it shows worked surfaces on all sides. As all of the surfaces of this object are worked, and it is not clear whether this object represents production waste or an something similar to a small piece of inlay.

Shaft Fragment With Drill Hole

315 (ΜΕΘ 9)

Fig. A.83, Drawing A.47

HYP | Plot 274, 022004

L. 0.020; W. 0.013; H. 0.008; Diam. (Drill Hole) 0.002

ID 315 is a long bone shaft, cut into a rectangular section and drilled through; the drill hole is slightly off-center. The long sides have been cut and made flat. It is unclear whether it is a piece of inlay, some other object, or production waste.

Lozenge-Shaped Bone Object

316 ΜΕΘ 1923

EEH | Plot 274, 089

A thick, lozenge-shaped bone object, with two drill holes across the width of the object. The shape and drill holes both suggests that this object could have acted as a toggle for clothing.

Rectangular Object With Drill Holes

317 (MEΘ 26)

EEH / Plot 274, 007007

L. 0.066

A rectangular bone object with rounded edges and iron studs on either side. The bottom surface is flat, with a hollowed-out interior section created with a series of drill holes. The purpose of the object is unknown.

"Projectile Point"

318 (MEΘ 8147)

Fig. A.84, Drawing A.48

AWH / Plot 229, Tr. 2, 61.5

L. 0.020; W. 0.012; Th. 0.005

A partially preserved bone object that resembles a two-dimensional rendering of a projectile point. Only the central portion is preserved, with two flaring edges (like the barbs of a projectile point) and a narrow area in the center (like the tang). It is broken at both ends, blackened from burning, and slightly polished.

Possible Circular Pin Head

319 (MEΘ 784)

EEH / Plot 274, 075

A circular object with a series of grooves cut around the circumference in a sawtooth pattern. A small flat area protrudes from part of the circumference, which may represent the shaft of a pin.

Bone Fragment with Incised Flower

320 (MEΘ 3179)

EWH | Plot 229, 011009

An irregular piece of bone with a flower incised on the natural (curved) surface of the bone. This piece does not appear to be either a finished or unfinished object. Instead, it may represent craftspeople practicing a challenging motif, see section 5.6.3.

Phalanx With Three Drill Holes

321 (MEΘ 3190)

EWH | Plot 229, 013002

Sheep or Goat

The 1st phalanx of a sheep or goat with three drill holes in the medial-lateral direction. While its purpose is unclear, a similar astragalus with three holes (ID 385) was also discovered at Methone.

Spindle Whorl

322 (MEΘ 8145)

Fig. A.85

AWH | Plot 229, Tr, 5, 23.1

L. 0.043; W. 0.041; Diam. (Drill hole) 0.008

Bos taurus

An unfused head of a femur from a juvenile cow or bull, with a wide drill hole through the fovea. The object also exhibits a small worked surface on one section of the femur head. The shape of the object, along with the orientation and size of the drill hole, suggest that it was meant to represent a spindle whorl.

Lentoid Loomweight

323

ESA | Plot 245, 015

A round section of bone, likely the head of a cattle humerus, containing two drill holes similar to the design of lentoid loom weights.[54] The underside of the object exhibits cancellous bone, indicating where it was cut from the rest of the humerus. There is also a conical region cut into the cancellous bone, but which does not go through the object; the purpose of this cut section is unknown.

Bone Object with Drill Holes

324

AWH | Plot 229, Tr. 5, 62.1

L. 0.020; W. 0.015; Diam. (Drill hole) 0.003

A worn bone fragment with a complete drill hole and a partial drill hole. One side appears to be from the exterior of the bone, while the opposite shows the internal structure of the bone, suggesting it may have broken off of a larger object.

Long Bone Section

325

AWH | Plot 229, Tr. 1, 78.1

L. 0.018

A highly fragmentary shaft of a long bone that was cut at the proximal and distal ends.

---

[54] Staermose Nielsen 2005, 130.

Shaft Fragments – Worked on the interior

IDs 326 and 327 are shaft fragments cut across the width of the bone to a rounded edge. The objects are also cut down the length of the bone, creating two flat surfaces on either side of the hollow on the interior. While the objects were found in different phases of the *Hypogeion*, they are nearly identical. The full length of ID 326 is preserved; its small size and irregularity may indicate that these objects are production waste. Alternatively, they may have functioned as burnishers or some other type of tool.

326 (MEΘ 1165)

HYP | Plot 274, 032042

L. 0.027; W. 0.016; H. 0.007

This fragment has one rounded side, and one side which was partially cut and broken, preserving the entire length of the object. It is heavily blackened and highly worn.

327 (MEΘ 303)

HYP | Plot 274, 032034

L. 0.030; W. 0.019; H. 0.009

An object very similar to ID 326. The side opposite the rounded edge is broken off, making its full length unknown. Like ID 326, ID 327 is also blackened from fire exposure.

Worked Astragali

See section 4.6.10.

328 (MEΘ 221)

HYP | Plot 274, 022 or 032

Fig. A.86

Ovicaprid

An astragalus that was drilled in the anterior-posterior direction, but otherwise unmodified.

329 (MEΘ 329)

EEH | Plot 274, 076

A partially preserved astragalus, that only shows abrasion on the posterior side.

330 (MEΘ 1941)

EEH | Plot 274, 007020

An astragalus that was abraded on the anterior and posterior sides.

331 (MEΘ 2108)

EEH | Plot 274, 090003

Bos taurus

An astragalus that was abraded on the anterior and posterior sides.

332 (MEΘ 2106)

EEH | Plot 274, 028002

An astragalus that was abraded on the anterior and posterior sides.

333 (MEΘ 1933)

EEH | Plot 274, 089

An astragalus that was abraded primarily on the anterior side, but only slightly abraded on posterior.

334 (MEΘ 1943)

EEH | Plot 274, 084008

An astragalus that was only partially abraded on the anterior side.

335 (MEΘ 1932)

EEH | Plot 274, 089

An astragalus that was abraded on the anterior and posterior sides.

336 (MEΘ 1931)

EEH | Plot 274, 089

An astragalus that was abraded on the anterior and posterior sides.

337 (MEΘ 1930)

EEH | Plot 274, 079

An astragalus that was abraded on the anterior and posterior sides.

338 (MEΘ 1929)

EEH | Plot 274, 018004

An astragalus that was abraded on the anterior and posterior sides, and drilled between these faces toward the proximal end.

339 (MEΘ 1928)

EEH | Plot 274, 017020 An astragalus that was abraded on the anterior and posterior sides.

340 (MEΘ 1063)

EEH | Plot 274, 077

An astragalus that was abraded on the anterior and posterior sides.

341 (MEΘ 33)

EEH | Plot 274, 056017

An astragalus that was lightly abraded on only the anterior side.

342 (MEΘ 1061)

EEH | Plot 274, 075

An astragalus that was abraded on anterior and posterior sides.

343 (ΜΕΘ 2072)

EEH / Plot 274, 089

An astragalus that was abraded on only the anterior side.

344 (ΜΕΘ 1060)

EEH / Plot 274, 065

Sus scrofa

An astragalus that was abraded on the anterior and posterior sides.

345 (ΜΕΘ 859)

EEH / Plot 274, 074

An astragalus that was abraded on the anterior and posterior sides.

346 (ΜΕΘ 789)

EEH / Plot 274, 017009

An astragalus that was abraded on the anterior and posterior sides.

347 (ΜΕΘ 791)

EEH / Plot 274, 085

An astragalus that was abraded on the anterior side and filled with lead.

348 (ΜΕΘ 790)

EEH / Plot 274, 075

Bos taurus

An astragalus that was highly abraded on the anterior and posterior sides.

349 (ΜΕΘ 792)

EEH / Plot 274, 085

Bos taurus

An astragalus that was highly abraded on the anterior and posterior sides.

350 (MEΘ 908)

EEH | Plot 274, 017004

An astragalus that was highly abraded on the anterior and posterior sides.

351 (MEΘ 31)

EEH | Plot 274, 007017

An iron-stained astragalus that was abraded on the anterior and posterior sides.

352 (MEΘ 18)

EEH | Plot 274, 085022

Sus scrofa

An astragalus that was abraded on the anterior and posterior sides.

353 (MEΘ 328)

EEH | Plot 274, 087

An astragalus that was abraded on the anterior and posterior sides.

354 (MEΘ 324)

EEH | Plot 274, 066

Ovicaprid

An astragalus that was abraded on the medial and lateral sides.

355 (MEΘ 1062)

EEH | Plot 274, 075

An astragalus that was abraded primarily on the posterior side, but with some abrasion on the anterior side.

356

EEH | Plot 274, 086010

Sus scrofa

An astragalus that was both cut on the anterior face and drilled in the anterior-posterior direction.

357 (MEΘ 1942)

EEH | Plot 274, 084002

An astragalus with its anterior side abraded (the posterior side is not preserved). It is drilled in both the anterior-posterior direction as well as the medial-lateral direction.

358 (MEΘ 2107)

EEH | Plot 274, 079

An astragalus that was abraded on the anterior and posterior sides.

359 (MEΘ 1059)

EEH | Plot 274, 036006

An astragalus that was abraded on the anterior and posterior sides, which also appear polished from use.

360 (MEΘ 2105)

EEH | Plot 274, 018006

An astragalus that was abraded on the anterior and posterior sides.

361 (MEΘ 38)

EEH | Plot 274, 085013

An astragalus that was abraded on the anterior and posterior sides.

362 (ΜΕΘ 327)

EEH | Plot 274, 067

An astragalus that was abraded on the anterior and posterior sides.

363 (ΜΕΘ 15)

EEH | Plot 274, 086022

An astragalus that was abraded on the anterior and posterior sides.

364

EWH | Plot 229, 015008

An astragalus that was abraded on the anterior and posterior sides.

365

EWH | Plot 229, 013009

An astragalus with flat faces that were cut on the anterior and posterior sides.

366

EWH | Plot 229, 020004

An astragalus that was abraded on the anterior and posterior sides.

367

EWH | Plot 229

An astragalus that was abraded on the anterior and posterior sides.

368

EWH | Plot 229, 013002

An astragalus that was abraded on the anterior and posterior sides.

369

EWH | Plot 229, 014007

An astragalus that was abraded on the anterior and posterior sides.

370

ESA | Plot 245, 015013

An astragalus that was abraded on the anterior and posterior sides.

371

AWH | Plot 229, Tr. 2, 78.2

L. 0.03; W. 0.021; Th. 0.011

An astragalus that was abraded on the anterior and posterior sides. It was also partially burned, leading to calcification.

372

AWH | Plot 229, Tr. 2, 79.4

L. 0.029; W. 0.019; Th. 0.016

An astragalus that was abraded on the anterior side.

373

AWH | Plot 229, Tr. 2, 88.4

L. 0.03; W. 0.022; Th. 0.01

An astragalus that was heavily abraded on the posterior side.

374

AWH | Plot 229, Tr. 2, 22.6

L. 0.030; W. 0.019; Th. 0.015

Classical

An astragalus that was lightly abraded on the anterior side.

375

AWH | Plot 229, Tr. 2, 19.1

L. 0.062; W. 0.045; Th. 0.021

Bos taurus

Classical

A large astragalus that was abraded on the posterior and anterior sides.

376

AWH | Plot 229, Tr. 3, 6.5

L. 0.032; W. 0.011; Th. 0.015

Sus scrofa

An astragalus that was abraded on the posterior, anterior, medial, and lateral sides; it is also blackened from fire exposure.

377

AWH | Plot 229, Tr. 2

L. 0.035; W. 0.025; 0.014

An astragalus that was abraded on the anterior and posterior sides.

378 (ΜΕΘ 7152)

AWH | Plot 229, Tr. 2, 2.2

L. 0.022; W. 0.018; Th. 0.012

An astragalus that was abraded on the anterior and posterior sides.

379

AWH | Plot 229, Tr. 2, 22.3

L. 0.029; W. 0.020; Th. 0.010

Classical

An astragalus that was abraded on the anterior and posterior sides.

380 (ΜΕΘ 5771)

AWH | Plot 229, Tr. 1, 4.1

L. 0.032; W. 0.022; Th. 0.017

An astragalus that was lightly abraded on the anterior side and drilled in the posterior-anterior direction.

381 (ΜΕΘ 5580)

AWH | Plot 229, Tr. 3, 1

L. 0.030; W. 0.019; Th. 0.01

An astragalus that was abraded on the anterior and posterior sides.

382

AWH | Plot 229, Tr. 2, 14.1

L. 0.013; W. 0.012; Th. 0.004

Classical

An astragalus that was abraded to an exceptionally narrow thickness.

383

AWH | Plot 229, Tr. 2, 27.4

L. 0.029; W. 0.015; Th. 0.021

Classical

An astragalus that was primarily abraded on the anterior side, with some abrasion on the posterior.

384

AWH | Plot 229, Tr. 2, 27.3

L. 0.03; W. 0.015; Th. 0.019

Classical

An astragalus that was primarily abraded on the anterior side, with some abrasion on the posterior.

385

AWH | Plot 229, Tr. 2, 27.5

L. 0.06; W. 0.038; Th. 0.032; Diam. (Drill Hole) 0.007

Bos taurus

Classical

A large astragalus with three drill holes in the posterior-anterior direction, but is otherwise unmodified. A similar astragalus was found with late 5$^{\text{th}}$-century pottery at the Athenian Agora.[55]

386

AWH | Plot 229, Tr. 2, 61.3

L. 0.022; W. 0.018; Th. 0.009

An astragalus that was abraded on the anterior and posterior sides.

387 (MEΘ 7908)

Fig. A.87

AWH | Plot 229, Tr. 2, 51.1

L. 0.22; W. 0.012; Th. 0.011

An astragalus that was abraded on the anterior and posterior sides, which was also filled with lead in the natural hollow of the anterior face. As the lead is visible on both sides, a

[55] Corbett 1949, 340.

craftsperson likely drilled the astragalus before filling it with lead.

388 (ΜΕΘ 7909)

Fig. A.88

AWH | Plot 229, Tr. 2, 56.5

L. 0.021; W. 0.007; 0.015

An astragalus that was abraded on the anterior and posterior sides.

389

AWH | Plot 229, Tr. 2, 79.2

L. 0.027; W. 0.019; Th. 0.011

An astragalus that was abraded primarily on the anterior side, with a small amount of abrasion on the posterior side. There are also small cut marks, which may be the remnants of the extraction of the bone from the hindlimb.

390

AWH | Plot 229, Tr. 2, 79.4

L. 0.040; W. 0.020; Th. 0.008

An astragalus that was either cut or abraded on the anterior and posterior sides, it is only partially preserved and very thin.

391

AWH | Plot 229, Tr. 2, 56.3

L. 0.027; W. 0.013; Th. 0.014

An astragalus that was lightly abraded on the anterior side.

392

AWH | Plot 229, Tr. 3, 4.3

L. 0.031; W. 0.014; Th. 0.017

An astragalus that was abraded on the medial and lateral sides.

393

AWH | Plot 229, Tr. 2, 11.2

L. 0.064; W. 0.042; Th. 0.033

Bos taurus

Classical

An astragalus that was lightly abraded on the anterior side.

394

AWH | Plot 229, Tr. 2, 88.3

L. 0.031; W. 0.021; Th. 0.017

An astragalus that was abraded on the anterior side.

395

AWH | Plot 229, Tr. 2, 79.1

L. 0.030; W. 0.018; Th. 0.015

An astragalus that was abraded on the anterior side, and it is only partially preserved and very degraded.

396

AWH | Plot 229, Tr. 1, 70.1

L. 0.026; W. 0.021; Th. 0.014

An astragalus that was abraded on the posterior side but is poorly preserved.

397

AWH | Plot 229, Tr. 5, 61.3

L. 0.027; W. 0.016; Th. 0.013

An astragalus that was abraded on anterior and posterior sides.

398

AWH | Plot 229, Tr. 2, 51.2

L. 0.036; W. 0.023; Th. 0.023

An astragalus that was abraded on medial side and blackened from burning.

Bone Raw Material and Production Waste

399 (MEΘ 1278)

L. 0.052; W. 0.009 HYP | Plot 274, 022061

A rectangular piece of bone that was cut or broken in multiple locations.

400 MEΘ 931

Fig. A.89

HYP | Plot 274, 032052

Sus scrofa

A fibula bone that has been abraded/polished at the distal end, likely in preparation for further work.

401 (MEΘ 2670)

EEH | Plot 274, 028001

A rectangular piece of bone with multiple even cut marks (perhaps saw marks) that altered the shape of the surface of the bone.

402 (MEΘ 2111)

EEH | Plot 274, 069

A small, rectangular piece of bone that is likely production waste.

403 (MEΘ 30)

EEH | Plot 274, 004028

A portion of rib bone that was cut into a trapezoidal section.

404 (ΜΕΘ 331)

EEH | Plot 274, 087

A section of bone cut transversely, with another broad cut mark parallel to the transverse surface.

405 (ΜΕΘ 2071)

EEH | Plot 274, 089

A section of bone with flat cut marks, likely the result of producers trying to make the curved bone more rectangular.

406 (ΜΕΘ 1939)

EEH | Plot 274, 054010

A small piece of worked bone that is polished and tapers at one end, it also appears abraded.

407 (ΜΕΘ 787)

EEH | Plot 274, 068

A shaft fragment with two transverse cuts, creating a small section. It is likely production waste.

408 (ΜΕΘ 1048)

EEH | Plot 274, 007

A small piece of bone cut into a rough conical section. Its purpose is unclear, but it is likely production waste.

409 (ΜΕΘ 1053)

EEH | Plot 274, 016006

A piece of worked bone exhibiting a thick layer of cortical bone, attached to a smaller area of cancellous bone. A series of broad cuts rendered this object fairly rectangular. This may be a piece of production waste resulting from craftspeople attempting to target cortical bone.

410

EEH | Plot 274, 077

An even, rectangular bone fragment created through a series of cuts; it may be a blank or preform.

411

ESA | Plot 245, 013026

A thin, rectangular piece of bone perhaps prepared as a blank or preform.

412

AWH | Plot 229, Tr. 2, 79.1

L. 0.031; W. 0.017

A bone shaft fragment with two transverse cuts. It is likely production waste but could also be part of the dietary waste stream.

413

AWH | Plot 229, Tr. 2, 21.2

L. 0.032; Th. 0.003 A small rectangular fragment of worked bone; it shows fine cut mark striations; it is likely production waste.

414 (ΜΕΘ 7151)

AWH | Plot 229, Tr. 1, 2.3

L. 0.019; W. 0.017; Th. 0.002

A thin fragment of worked bone, it may be from a rib. It is possible that this part of the dietary waste stream rather than production waste.

415

AWH | Plot 229, Tr. 2, 8.1

L. 0.025; W. 0.014

A shaft fragment that was cut transversely and subsequently snapped off the rest of the bone (the groove and snap technique, see § 5.5.1); it is likely production waste.

416

AWH | Plot 229, Tr. 4, 1.1

L. 0.029; W. 0.014

A small piece of worked bone with two transverse cuts.

417

AWH | Plot 229, Tr. 1, 106.4

L. 0.019

A small sliver of worked bone with lightly incised cross hatching.

418

AWH | Plot 229, Tr. 2, 88.1

L. 0.038; W. 0.010; Th. 0.002

A very thin, triangular piece of bone; it may have been related to the creation of inlays.

Shaft Fragments with Transverse Drill Holes

419 (ΜΕΘ 1166)

Fig. A.90

HYP | Plot 274, 032043

L. 0.034; W. 0.024; Diam. (Drill Hole) 0.004

A shaft fragment of a long bone cut across the width and drilled through. The drill hole is similar to that of the short points, and it may be an unfinished example.

420

ESA | Plot 245, 017018

A shaft fragment that was cut transversely, and then drilled through the cut surface; it was otherwise unmodified.

421

ESA | Plot 245, 017002

A shaft fragment with two transverse cuts and drill holes on both of them, the holes do not connect. Like the other examples, its use is unclear.

422

ESA | Plot 245, 017002

A rough shaft fragment with the remains of a drill hole.

Bone Production Waste-Remains of Tubular Drill Holes

The remains of a distinct drilling technique for removing circular sections (see § 5.5.2).

423

EEH | Plot 274, 077

A portion of bone with several circular sections removed with a tubular drill.

424 (ΜΕΘ 32)

EEH | Plot 274, 086012

A portion of bone with several circular sections removed with a tubular drill.

Bone Production Waste-Metapodials

425 (ΜΕΘ 28)

EEH | Plot 274, 085013

Bos taurus

A metapodial that was broken along its fusion line and cut transversely.

426 (ΜΕΘ 1054)

EEH / Plot 274, 077

Bos taurus

A metapodial cut at distal end, with a very clean cut mark.

427 (ΜΕΘ 795)

EEH / Plot 274, 087

Equus asinus

A metapodial with broad, unfinished cut marks at the proximal end. Perhaps this represents abandoned raw material.

428

EEH / Plot 274, 036006

Bos taurus

The cut distal end and shaft of a metapodial bone

429 (ΜΕΘ 20)

EEH / Plot 274, 007008

Equus asinus

The distal end of a metapodial that was cut cleanly.

430

EEH / Plot 274, 068

Bos taurus

A small, cut portion of the distal end of a metapodial.

431

EEH | Plot 274

Bos taurus

The cut distal end and a portion of the shaft of a metapodial.

432

EWH | Plot 229, 013002

Bos taurus

A metatarsus cut between the center and the proximal end. It also has a small cut facet on the exterior surface.

433

EWH | Plot 229, 015010

Bos taurus

A metapodial cut at the distal end and broken lengthwise as well.

434

EWH | Plot 229, 013003

Bos taurus

The distal end of a metapodial, cut such that it preserves a portion of the shaft.

435

EWH | Plot 229, 018007

Bos taurus

A metapodial that was cut close to the distal end and was also broken lengthwise.

436

EWH | Plot 229, 014001

A metapodial cut through the proximal shaft, it may have also been split.

437

EWH | Plot 229, 015007

Bos taurus

A metapodial cut neatly and close to the proximal end.

438

AWH | Plot 229, Tr. 1, 72.2

L. 0.036

Bos taurus

A metapodial cut neatly and close to the proximal end.

439

AWH | Plot 229, Tr. 2, 61.8

L. 0.027; W. 0.027

Bos taurus

A metapodial shaft cut transversely in two places and split longitudinally. It is possible that this was related to the dietary waste stream.

440

AWH | Plot 229, Tr. 4, 3

L. 0.081

Bos taurus

A metapodial broken or cut at the proximal end, with some signs of burning. It is possible that this was related to the dietary waste stream.

441

AWH | Plot 229, Tr. 4, 3.2

L. 0.11

Bos taurus

The distal end and shaft of a metapodial with large hack marks. It is possible that this was related to the dietary waste stream.

442

AWH | Plot 229, Tr. 1, 106.4

L. 0.090

Bos taurus

A metapodial with the proximal end and half of the shaft. The bone has incomplete hack marks at its proximal end; it is possible that this was related to the dietary waste stream.

443

AWH | Plot 229, Tr.1, 72.1

L. 0.039; W. 0.020

A small fragment of a metapodial shaft with the remnants of a cut mark.

444

AWH | Plot 229, Tr. 2, 88.1

L. 0.03; W. 0.06

Bos taurus

A metapodial cut neatly at the proximal end.

Ad Hoc Tools

These objects represent tools that appear to have been created opportunistically. The shape of many of these tools implies that craftspeople may have utilized broken or uneven pieces of bone to create these objects.

445 (MEΘ 1277)

HYP | Plot 274, 022066

A highly worn object made from the shaft of a long bone (it preserves the full shaft in places), with some worked surfaces; it may have been used as a scraper.

446 (MEΘ 2803)

Fig. A.91

HYP | Plot 274, 022002

L. 0.073; W. 0.012

A portion of a shaft of a long bone that was worked into a rough point; it exhibits a high degree of use wear on the tip.

447 (MEΘ 307)

Fig. A.92, Drawing A.49

HYP | Plot 274, 032037

L. 0.079; W. 0.078; H. 0.010

A partially preserved point made from a long bone (likely an ulna). The area around the tip is highly abraded from use. It is unclear whether the rest of the bone was worked or finished in any way; this object may be a more ad hoc tool.

448 (MEΘ 1305)

Fig. A.93, Drawing A.50

HYP | Plot 274, 022074

L. 0.068; W. 0.022

A portion of a long bone shaft with one end abraded to an angled surface for use as a scraper; the rest of the bone is unmodified.

449

EEH | Plot 274, 056011

A rough bone point made from a shaft fragment. It has an elliptical head that appears broken and subsequently abraded.

450 (MEΘ 19)

EEH | Plot 274, 056017

An irregular bone fragment abraded to a broad, round point.

451

EEH | Plot 274, 055

A fragment of a bone shaft worked into a dull point.

452 (MEΘ 785)

EEH | Plot 274

A point likely made from the distal end of an ulna that was blackened and nearly calcified.

453

EEH | Plot 274, 017001

A piece of bone that was shaped into an irregular point.

Other Tooth Objects

Worked Suidae Tooth

The majority of the worked *suidae* teeth came from the *Hypogeion*, but examples were also found during the AMAP excavations of the West Hill. Most examples of *suidae* canine within the *Hypogeion* represent either raw material (unused or partially used) or production waste. As a result, it is not apparent what types of objects were being made by craftspeople at Methone. With the exception of ID 459, all of the *suidae* canine material from the *Hypogeion* were clustered in several excavation units from its initial phase (Late 8^{th}/early 7^{th} century BCE).

454 (MEΘ 929)

Fig. A.94, Drawing A.51

HYP | Plot 274, 032071

L. 0.058; W. 0.016; H. 0.014

Sus scrofa

A section of boar canine that was cut such that both ends and one of the enameled sides were removed. The result is a V-shaped portion of tooth, with a partially hollow interior. It is highly polished and has unusual amber coloration that is semi-translucent. The appearance of the material of ID 454 is nearly identical to ID 460, suggesting that ID 454 was created in preparation to make a similar object. The coloration appears to be a result of heat treatment (see § 5.5.3).

455 (MEΘ 306)

Fig. A.95, Drawing A.52

HYP | Plot 274, 032056

L. 0.090; W. 0.013

Sus scrofa

A lower right canine of a boar. The end of the tooth was partially cut, and then subsequently snapped off.

456 MEΘ 923

Fig. A.96, Drawing A.53

HYP | Plot 274, 022046

L. 0.035; W. 0.011; H. 0.010; Diam. (Drill Hole) 0.003

Sus scrofa

A canine that was cut at both ends, and one of the enamel-covered faces has been removed. Like ID 454, it is v-shaped in profile and has a hollow interior. The object has two drill holes through the width of the tooth, one of which does not go all the way through. A worked boar canine from the Kamiros well was cut similarly, and also exhibits a drill hole in the same orientation and of a similar size.[56]

457 (MEΘ 1284)

Fig. A.97, Drawing A.54

HYP | Plot 274, 022059

L. 0.039; W. 0.010; H. 0.010

Sus scrofa

A canine that was cut at both ends, and it is missing the face without enamel; the cut sides exhibit a degree of polish.

458 (MEΘ 314)

Fig. A.98

HYP | Plot 274, 022056

L. 0.090; W. 0.018

Sus scrofa

A lower left canine of a domestic pig or wild boar which shows no modification.

459 (MEΘ 34)

Fig. A.99, Drawing A.55

HYP | Plot 274, 032004

L. 0.038; W. 0.012; Diam (Drill hole) 0.004

Sus scrofa

A *suidae* canine that has been cut at both ends and drilled lengthwise. The craftsperson attempted to pierce the object by drilling through both ends; however, they appear to have broken the tooth in the process.

[56] British Museum accession number: 1864,1007.659.

460 (MEΘ 1282)

Fig. A.100, Drawing A.56

HYP | Plot 274, 022061

L. 0.017; W. 0.014; H. 0.006

Sus scrofa

A square portion of boar canine with eight iron studs pierced through the object. The studs are finished on both sides, so they were not designed to affix the object to something else. Like ID 454, this object is amber-colored, semi-translucent, and may have been exposed to heat; both objects were found at similar depths and likely the result of the same manufacturing process. This is a unique object with no known comparanda and may represent craftspeople experimenting with their production techniques.

461 (MEΘ 3237)

EEH | Plot 274, 080005

Sus scrofa

A small canine fragment with a cut mark.

462

EWH | Plot 229, 012007

Sus scrofa

The proximal portion of canine with cut mark; it appears to be production waste.

463

EWH | Plot 229, 107010

Sus scrofa

A small fragment of *suidae* canine pierced with bronze nail, and stained green. It is unclear what type of object this came from.

464 (MEΘ 1283)

Fig. A.101

EWH / Plot 229, 032077

L. 0.0175; W. 0.010

Sus scrofa

A small portion of the wear facet cut from the canine, it is likely production waste.

Possible Helmet Plates

Objects made from *suidae* canines that closely resemble the boar tusk helmet plates of the Bronze Age (see § 5.4).

465

Fig. A.102

AWH / Plot 229, Tr. 1, 2.3

L. 0.045; W. 0.018; Diam. (Drill Hole) 0.002

Sus scrofa

A canine fragment with a small drill hole, which may have been attempted twice. One side shows a larger incised hole, perhaps indicating that producers were going to drill a larger hole. Saw marks indicate that it was removed from the rest of the tooth to create a flat surface.

466 (MEΘ 3074)

EEH / Plot 274, 080005

Sus scrofa

A flat piece of canine from an enameled-covered section of the tooth, and which preserves part of a drill hole. It was cut away from the rest of the tooth to create a flat section. The shape and use of the enameled portion strongly parallels an example from Mycenae.[57]

[57] Krzyszkowska 2007, 439, no. MM 9815.

467

EWH | Plot 229, 016009

Sus scrofa

A flat piece of canine from an enameled-covered section of the tooth, and which preserves part of a drill hole. It was cut away from the rest of the tooth to create a flat section. It is similar to ID 466, although the hole has a larger diameter.

Pendants Made from Teeth

Pendants made from the canine of carnivores are another cross-cultural phenomenon, of which a single example was found in the *Hypogeion* and others from the West Hill.[58]

468 (ΜΕΘ 315)

Fig. A.103, Drawing A.57

HYP | Plot 274, 032041

L. 0.038; W. 0.011; Diam (Suspension Hole) 0.003

Canis sp.

A pendant made from the canine tooth of a dog or wolf. Other than the suspension whole at its base, the tooth is unworked.

469

EWH | Plot 229, 010014

Canis sp.

A pendant made from the canine tooth of a dog or wolf, with a large drill hole at the proximal end.

58 For a discussion of the use of such pendants in Northern Europe, see Kivisalo 2008; Jonuks and Rannamäe 2017.

470 (MEΘ 5933)

Fig. A.104, Drawing A.58

AWH | Plot 229, Tr. 4, 2.3

L. 0.067

Ursus sp.

The canine tooth of a bear, which exhibits a small hole drilled at the proximal end.

Horncore Production Waste

Horncore was only collected when it showed signs of anthropogenic modification. Only the AMAP excavations collected horncore systematically.

471 (MEΘ 300)

HYP | Plot 274, 022038

L. 0.025; W. 0.018

Ovicaprid

A small portion of horncore sectioned by two transverse cuts.

472 (MEΘ 938)

HYP | Plot 274, 032063

L. 0.007; W. 0.021

Ovicaprid

A piece of horncore hacked at the proximal end.

473 (MEΘ 330)

EEH | Plot 274, 085

A small portion of horncore sectioned by two transverse cuts.

474 (ΜΕΘ 798)

EEH / Plot 274, 068

Ovicaprid

A large portion of horncore that was cleanly cut at proximal and distal end, but otherwise unmodified.

475

EEH / Plot 274, 028003

Ovicaprid

A small portion of horncore that was sectioned by two transverse cuts.

476

EEH / Plot 274, 028003

Ovicaprid

A piece of horncore cut at the base.

477

EEH / Plot 274, 028003

Ovicaprid

A large portion of horncore cut at both proximal and distal ends.

478

EEH / Plot 274, 089

Ovicaprid

A piece of horncore cut at proximal end, with a broken distal end.

479 (ΜΕΘ 797)

EEH / Plot 274, 027013

Ovicaprid

A piece of horncore cut at the proximal end.

480

EEH | Plot 274, 089

Bos taurus

A piece of horncore cut at proximal end.

481

EEH | Plot 274, 016006

Ovicaprid

A piece of horncore cut from the cranium.

482

EEH | Plot 274, 089

Horncore fragments cut from the proximal end, and which are poorly preserved.

483 (ΜΕΘ 1056)

Plot 274, 036012

A piece of fossilized or mineralized horncore, it is unclear if it is modified.

484

EEH | Plot 274, 089

A distal end of horncore with multiple deep cut marks.

485

EEH | Plot 274, 079

A small fragment of horncore.

486

EEH | Plot 274, 004032

A piece of horncore with rough cuts at the proximal end.

487

ESA | Plot 245, 001016

A piece of horncore with a transverse cut near the base.

488

AWH | Plot 229, Tr. 1, 46.2

L. 0.08

Bos taurus

A piece of the base of the horncore, with a portion still attached to the cranium; it also exhibits a transverse cut.

489

AWH | Plot 229, Tr. 1, 4.1

L. 0.17

Bos taurus

A complete piece of horncore cut at the cranium.

490

AWH | Plot 229, Tr. 2, 88.3

L. 0.14

Ovicaprid

A piece of horncore cut at its base.

491

AWH | Plot 229, Tr. 1, 2.4

L. 0.1

Ovicaprid

A complete horncore cut at the cranium.

492

AWH | Plot 229, Tr. 3, 3

L. 0.103

Bos taurus

A piece of horncore cut at its base.

493

AWH | Plot 229, Tr. 3, 3.2

L. 0.16

Ovicaprid

A piece of horncore cut at its base.

494

AWH | Plot 229, Tr. 1, 70.1

L. 0.14

Ovicaprid

A piece of horncore cut at its base.

495

AWH | Plot 229, Tr. 2, 8.2

L. 0.06

Ovicaprid

A piece of horncore cut at its base.

496

AWH | Plot 229, Tr. 1, 2

L. 0.061; W. 0.034

A piece of horncore cut at the base, it shows a large puncture mark from an animal bite.

497

AWH | Plot 229, Tr. 4, 3.2

L. 0.076; W. 0.03

Ovicaprid

A piece of burned horncore with a series of cut marks at the distal end.

498

AWH | Plot 229, Tr. 1, 24.2

L. 0.15

Ovicaprid

A piece of horncore cut at the proximal end.

499

AWH | Plot 229, Tr. 1, 64.1

L. 0.117

Bos taurus

A piece of horncore cut at the proximal and distal ends.

500

AWH | Plot 229, Tr. 1, 78.3

L. 0.14

Bos taurus

A complete horncore cut at the cranium.

501

AWH | Plot 229, Tr. 5, 2.1

L. 0.03; W. 0.02

The remains of cranium and the base of the horncore, which were cut transversely.

502 ΜΕΘ 8056

Fig. A.105

AWH | Plot 229, Tr. 2, 74.1

L. 0.03; W. 0.03

Ovicaprid

A small portion of horncore sectioned from two transverse cuts.

503

AWH | Plot 229, Tr. 2, 79.4

L. 0.15

Ovicaprid

A piece of horncore and cranium with cut marks at the base.

504

AWH | Plot 229, Tr. 1, 48.2

L. 0.11

A piece of horncore cut at the cranium.

505

AWH | Plot 229, Tr. 1, 38.3

Bos taurus

A complete piece of horncore cut at the cranium.

Production Waste From an Unknown Material

506

AWH / Plot 229, Tr. 2, 88.4

L. 0.019; W. 0.017; Th. 0.004

A possible ivory fragment.

507

AWH / Plot 229, Tr. 2, 88.1

A likely ivory fragment, it strongly resembles Type B waste.

508

AWH / Plot 229, Tr. 2, 61.7

L. 0.020; W. 0.011

A possible ivory fragment with a circular cavity which looks natural rather than anthropogenic.

509

AWH / Plot 229, Tr. 2, 78.3

L. 0.045; W. 0.012; Th. 0.004

A curved piece of bone or antler, with two cut surfaces. It looks like an offcut.

510

AWH / Plot 229, Tr. 4, 2.5

A bone or ivory fragment.

Figures

All of the following images are by Jeff Vanderpool.

Figure A.1: ID 1/MEΘ 1

Figure A.2: ID 2/MEΘ 23

Figure A.3: ID 3/MEΘ 22

Figure A.4: ID 5/MEΘ 311

Figure A.5: ID 6/ΜΕΘ 1285

Figure A.6: ID 7/ΜΕΘ 1286

Figure A.7: ID 8/MEΘ 301

Figure A.8: ID 9/MEΘ 8406

Figure A.9: ID 10/MEΘ 305

Figure A.10: ID 12/MEΘ 1291

Figure A.11: ID 13/MEΘ 313

Figure A.12: ID 14/MEΘ 1289

Figure A.13: ID 16/MEΘ 674

Figure A.14: ID 17/MEΘ 1288

Figure A.15: ID 18/MEΘ 1292

Figure A.16: ID 19/MEΘ 1293

Figure A.17: ID 20/MEΘ 309

Figure A.18: ID 21/MEΘ 1290

Figure A.19: ID 22/MEΘ 8409

Figure A.20: ID 27/MEΘ 8407

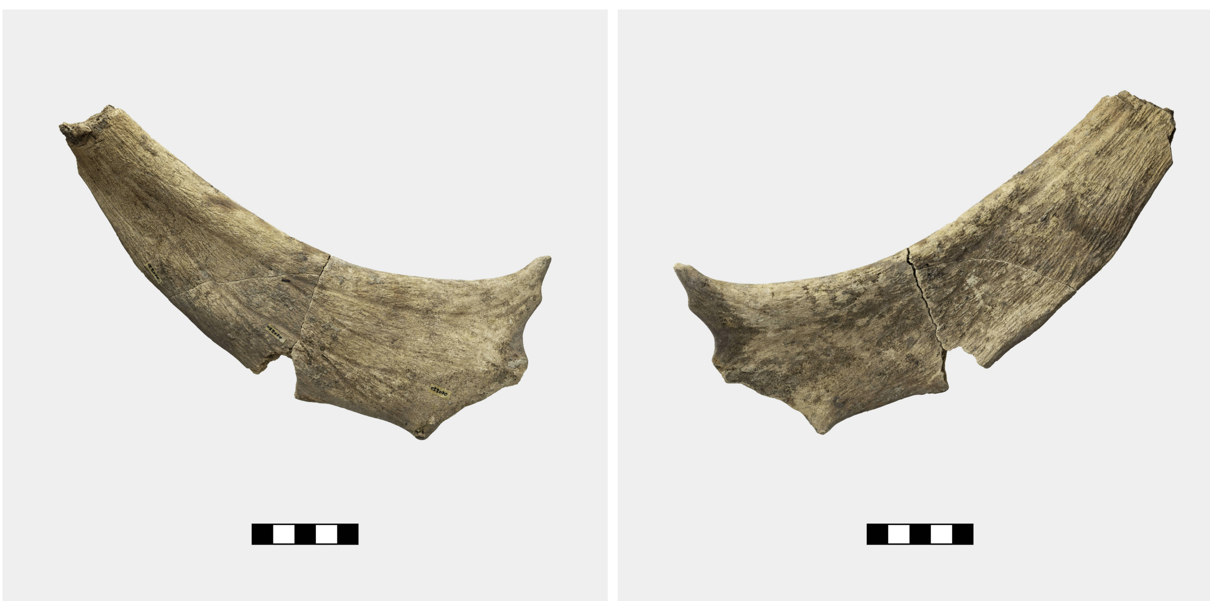


Figure A.21: ID 28/MEΘ 8410

Figure A.22: ID 29/MEΘ 312

Figure A.23: ID 30/MEΘ 1304

Figure A.24: ID 31/MEΘ 1299

Figure A.25: ID 32/MEΘ 937

Figure A.26: ID 33/MEΘ 21

Figure A.27: ID 34/ΜΕΘ 62

Figure A.28: ID 35/ΜΕΘ 1300

Figure A.29: ID 36/MEΘ 1301

Figure A.30: ID 37

Figure A.31: ID 38/MEΘ 939

Figure A.32: ID 39/MEΘ 945

Figure A.33: ID 41/MEΘ 7907

Figure A.34: ID 43/MEΘ 36

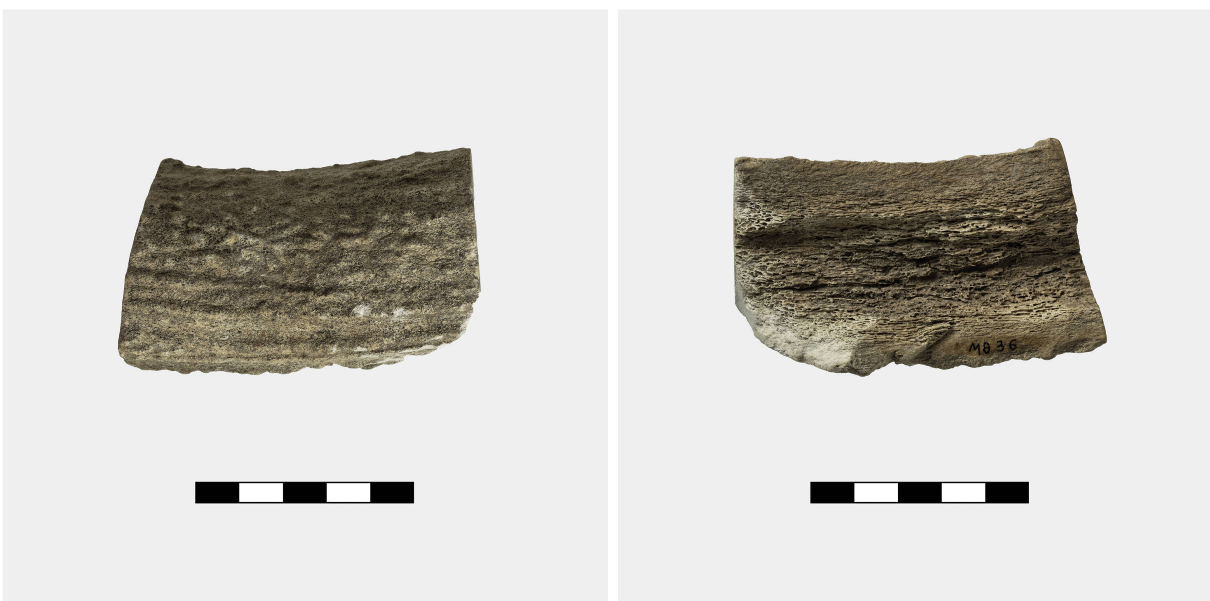


Figure A.35: ID 56/MEΘ 2802

Figure A.36: ID 66/MEΘ 24

Figure A.37: ID 67/ΜΕΘ 8148

Figure A.38: ID 68/ΜΕΘ 925

Figure A.39: ID 76/MEΘ 507

Figure A.40: ID 77/MEΘ 8429

Figure A.41: ID 79/ΜΕΘ 13

Figure A.42: ID 81

Figure A.43: ID 83/ΜΕΘ 1967

Figure A.44: ID 87/ΜΕΘ 2809

Figure A.45: ID 130/MEΘ 5

Figure A.46: ID 131/MEΘ 2

Figure A.47: ID 132/MEΘ 3

Figure A.48: ID 171/MEΘ 4

Figure A.49: ID 181/ΜΕΘ 7795

Figure A.50: ID 183

Figure A.51: ID 187

Figure A.52: ID 188

Figure A.53: ID 190/MEΘ 65

Figure A.54: ID 191/MEΘ 8

Figure A.55: ID 192/MEΘ 10

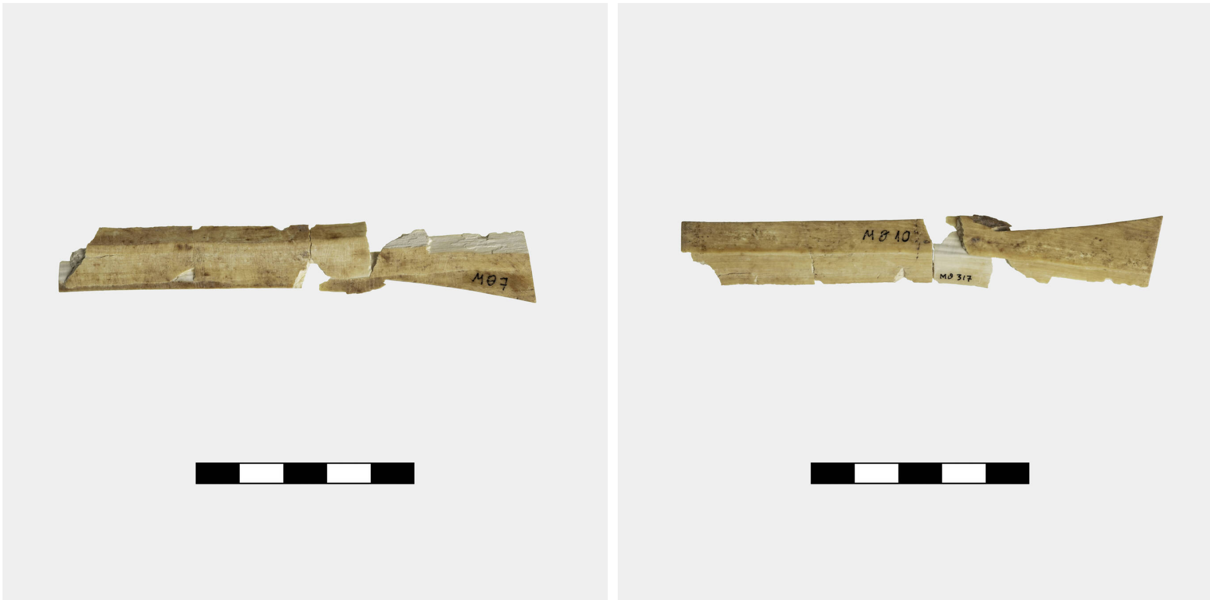


Figure A.56: ID 193/MEΘ 318

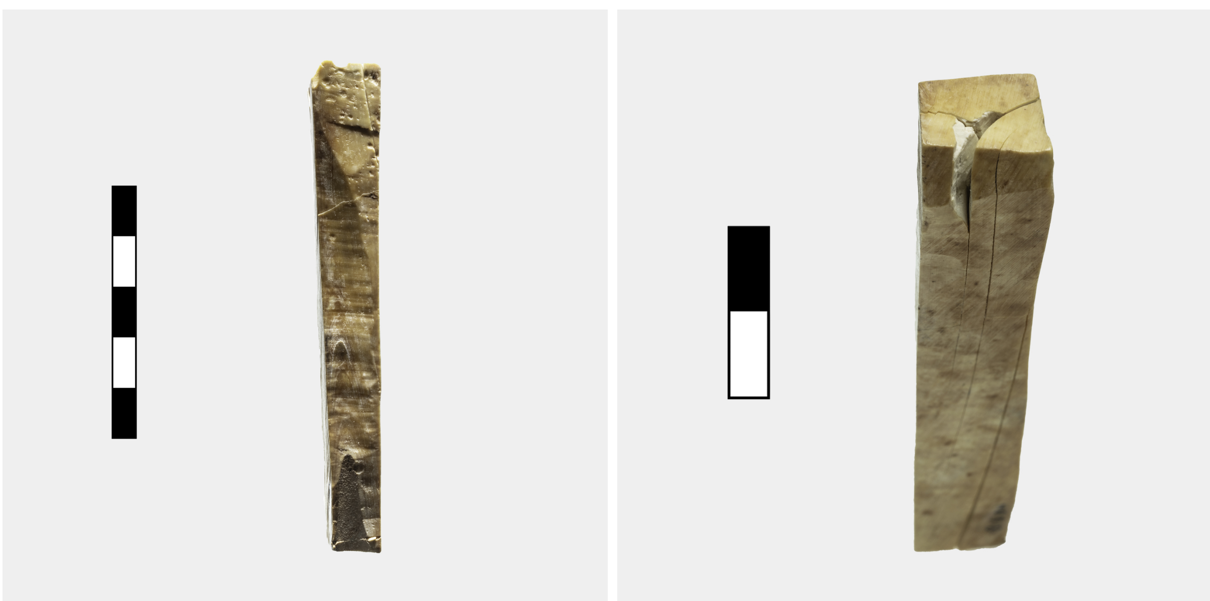


Figure A.57: ID 194/MEΘ 63

Figure A.58: ID 195/MEΘ 8408

Figure A.59: ID 196/MEΘ 2805

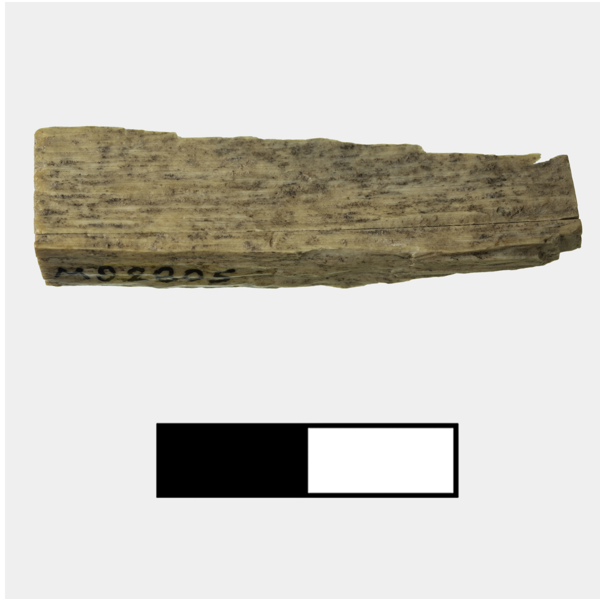


Figure A.60: ID 197/MEΘ 316

Figure A.61: ID 198/MEΘ 6

Figure A.62: ID 200/MEΘ 1280

Figure A.63: ID 241/MEΘ 7874

Figure A.64: ID 252/MEΘ 8149

Figure A.65: ID 256/MEΘ 8146

Figure A.66: ID 258/MEΘ 8152

Figure A.67: ID 259/MEΘ 1273

Figure A.68: ID 261/MEΘ 1272

Figure A.69: ID 262/MEΘ 1274

Figure A.70: ID 282/MEΘ 7308

Figure A.71: ID 289/ΜΕΘ 308

Figure A.72: ID 290/ΜΕΘ 16

Figure A.73: ID 291/MEΘ 1270

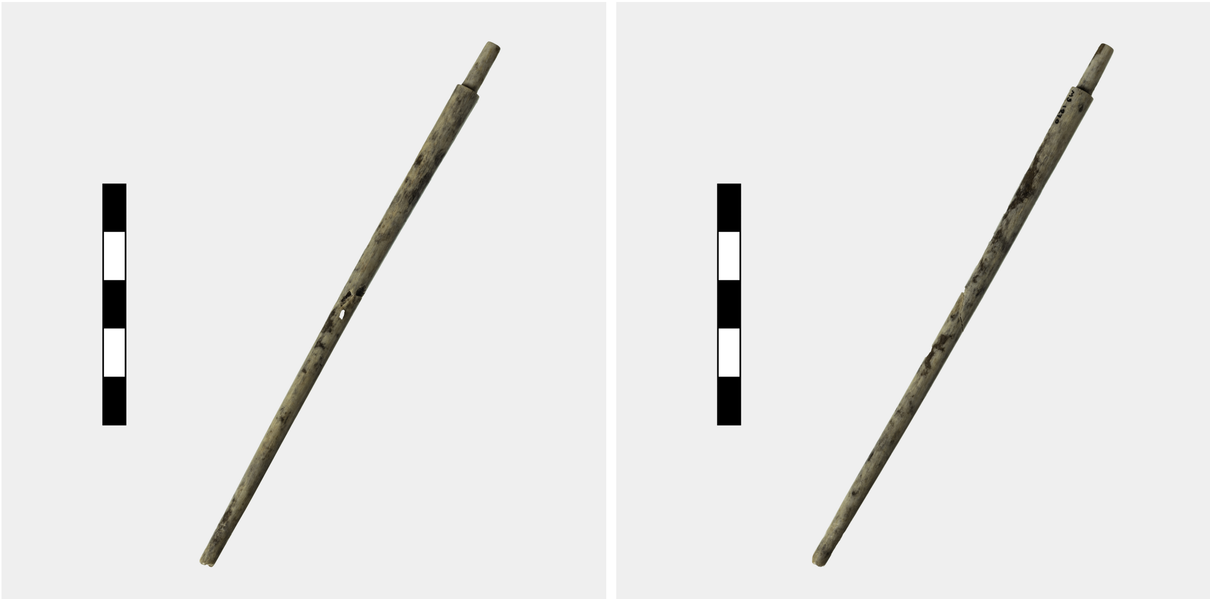


Figure A.74: ID 292/MEΘ 1271

Figure A.75: ID 298/MEΘ 5888

Figure A.76: ID 299/MEΘ 8072

Figure A.77: ID 300/MEΘ 1279

Figure A.78: ID 301/MEΘ 1275

Figure A.79: ID 302/MEΘ 927

Figure A.80: ID 303/MEΘ 302

Figure A.81: ID 309/MEΘ 5609

Figure A.82: ID 313/MEΘ 310

Figure A.83: ID 315/MEΘ 9

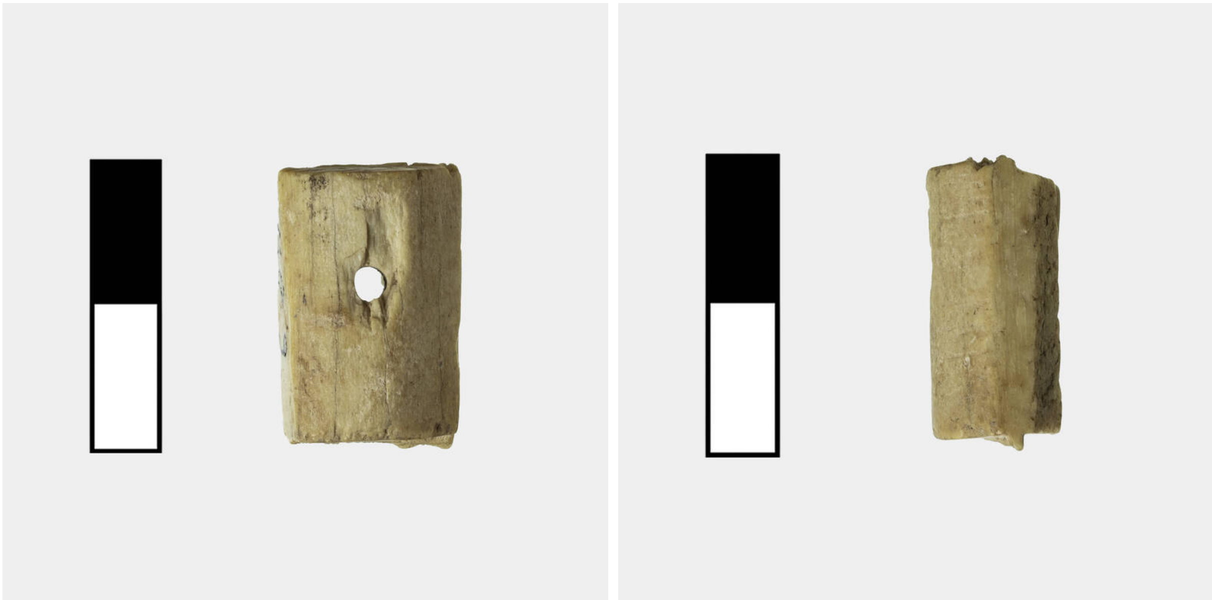


Figure A.84: ID 318/MEΘ 8147

Figure A.85: ID 322/MEΘ 8145

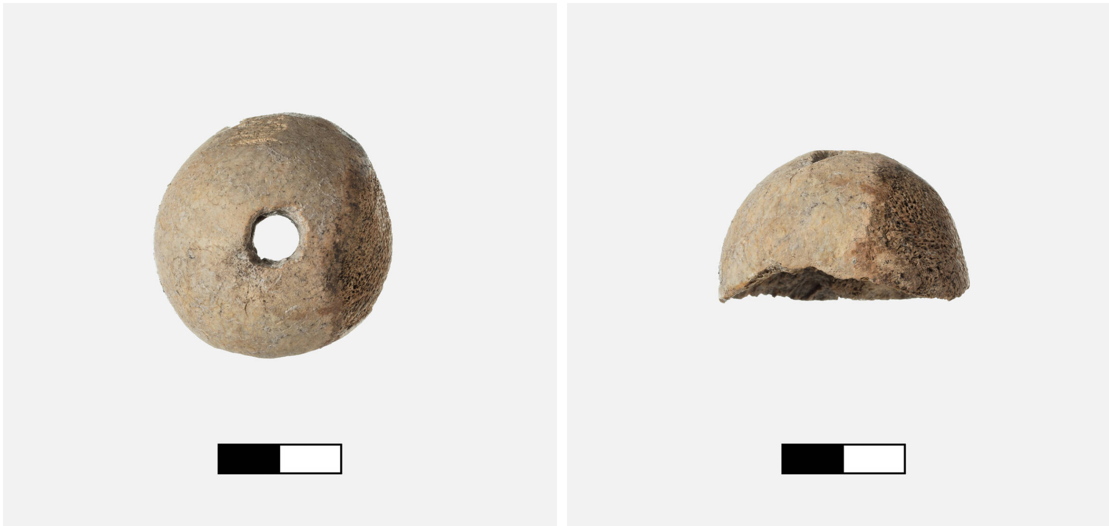


Figure A.86: ID 328/MEΘ 221

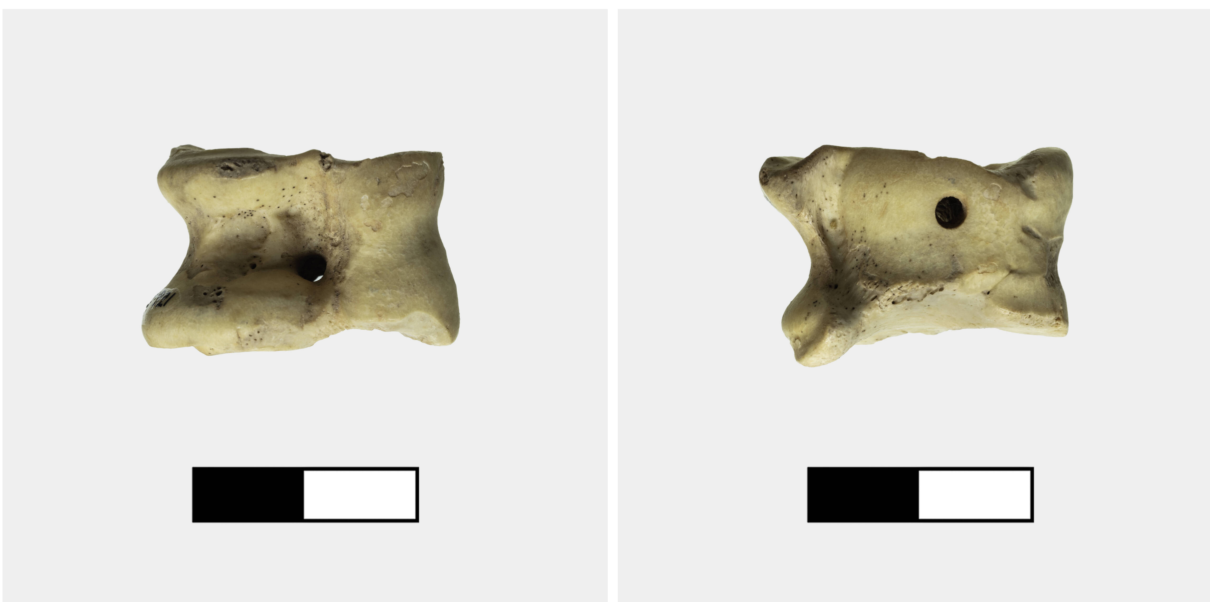


Figure A.87: ID 387/MEΘ 7908

Figure A.88: ID 388/MEΘ 7909

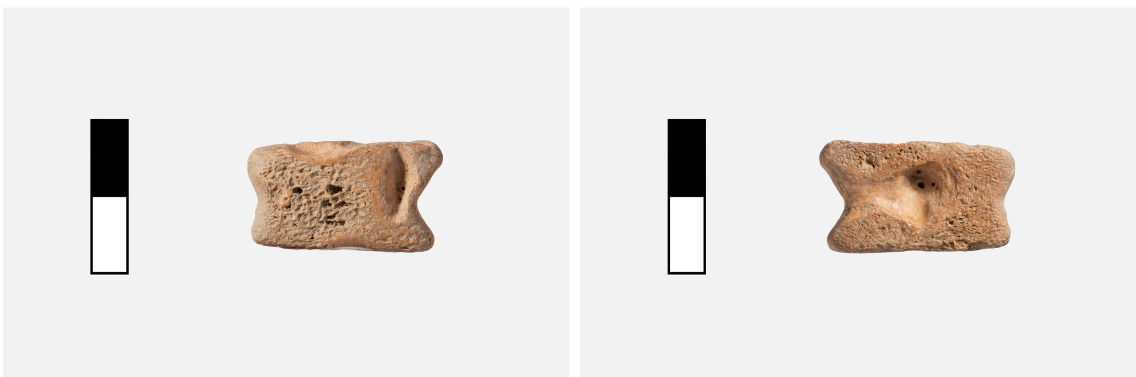


Figure A.89: ID 400/MEΘ 931

Figure A.90: ID 419/MEΘ 1166

Figure A.91: ID 446/MEΘ 2803

Figure A.92: ID 447/MEΘ 307

Figure A.93: ID 448/MEΘ 1305

Figure A.94: ID 454/MEΘ 929

Figure A.95: ID 455/MEΘ 306

Figure A.96: ID 456/MEΘ 923

Figure A.97: ID 457/MEΘ 1284

Figure A.98: ID 458/MEΘ 314

Figure A.99: ID 459/MEΘ 34

Figure A.100: ID 460/MEΘ 1282

Figure A.101: ID 464/MEΘ 1283

Figure A.102: ID 465

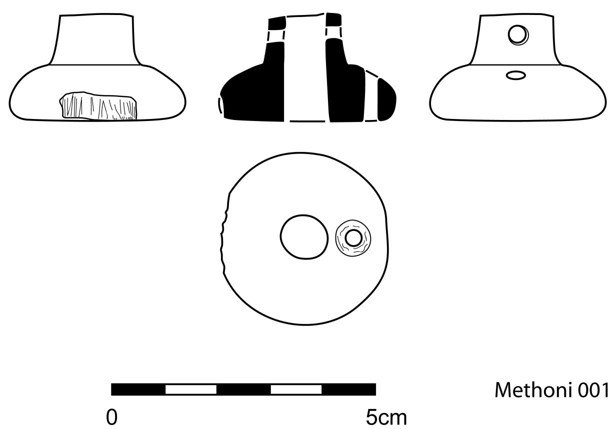
Figure A.103: ID 468/MEΘ 315

Figure A.104: ID 470/MEΘ 5933

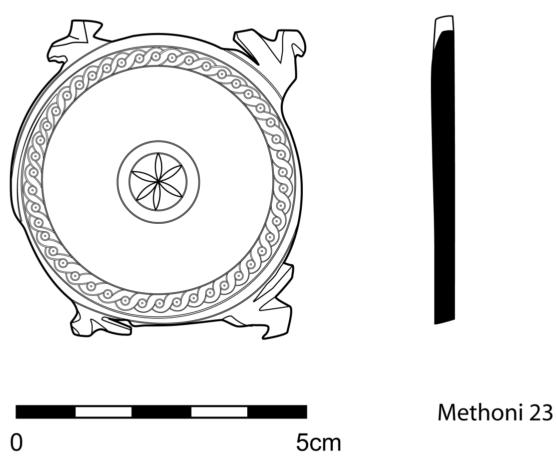
Figure A.105: ID 502/ΜΕΘ 8056

Drawings

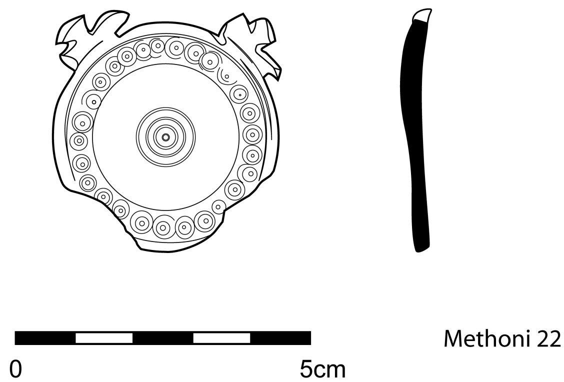
All of the following drawings are by Tina Ross unless otherwise noted.



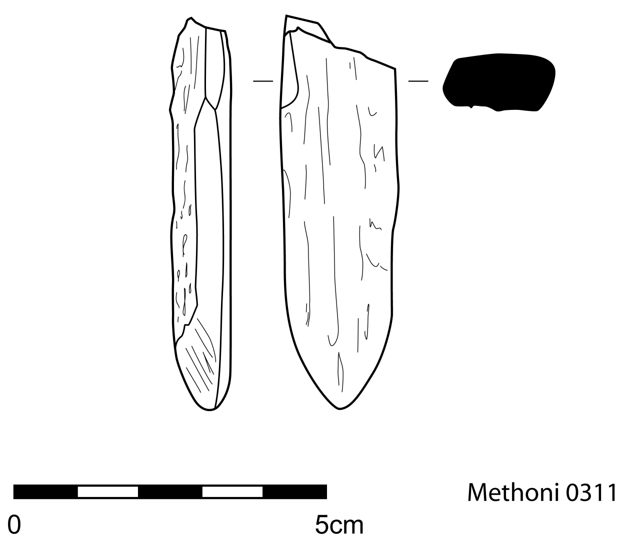
Drawing A.1: ID 1/ΜΕΘ 1



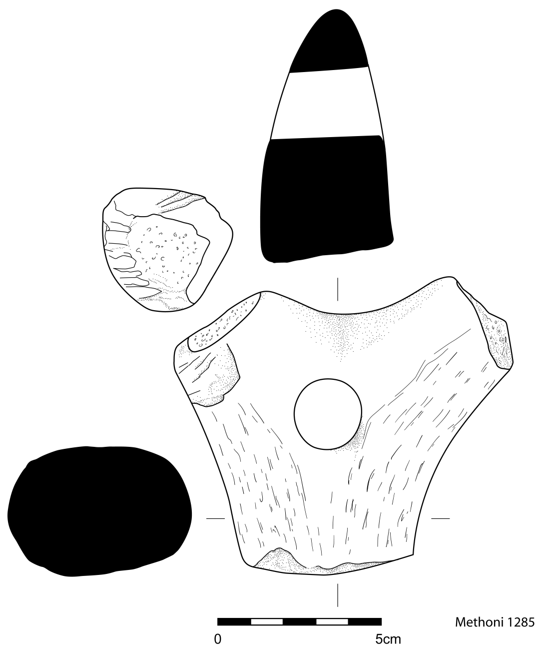
Drawing A.2: ID 2/ΜΕΘ 23



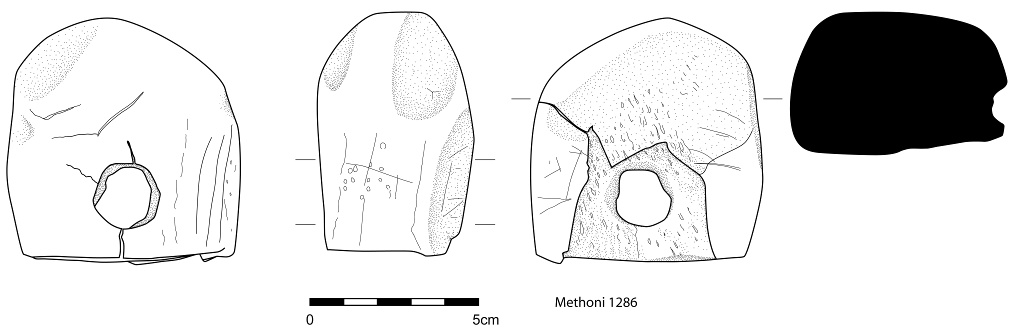
Drawing A.3: ID 3/ΜΕΘ 22



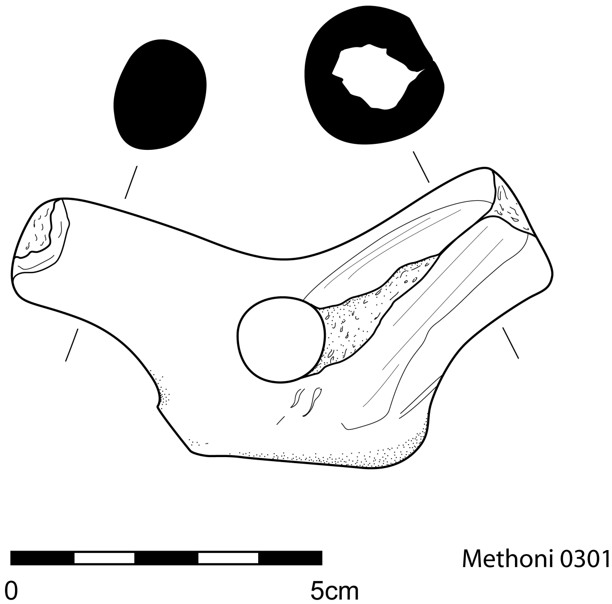
Drawing A.4: ID 5/ΜΕΘ 311



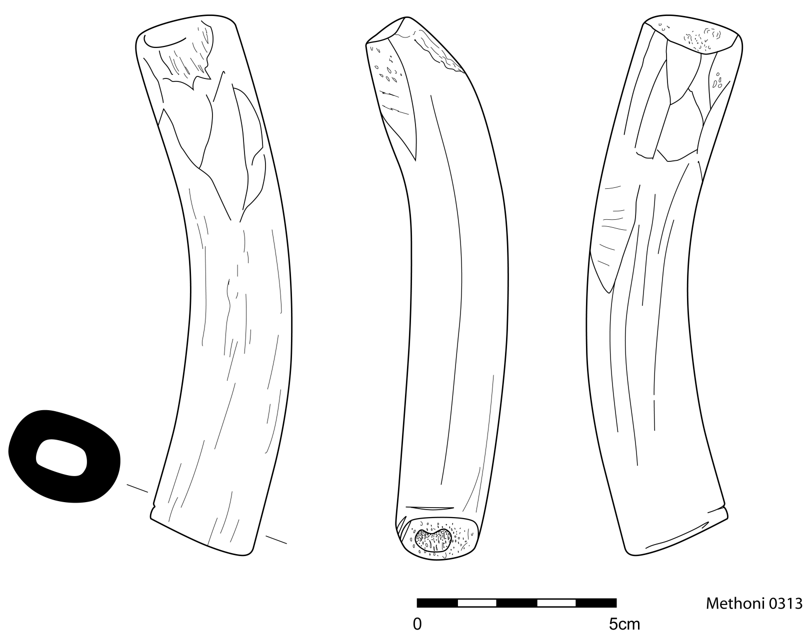
Drawing A.5: ID 6/ΜΕΘ 1285



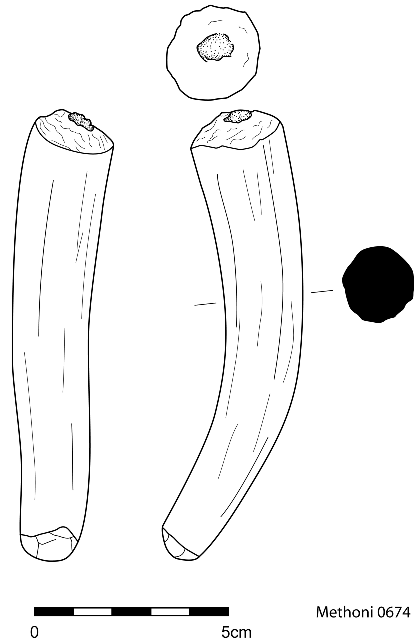
Drawing A.6: ID 7/ΜΕΘ 1286



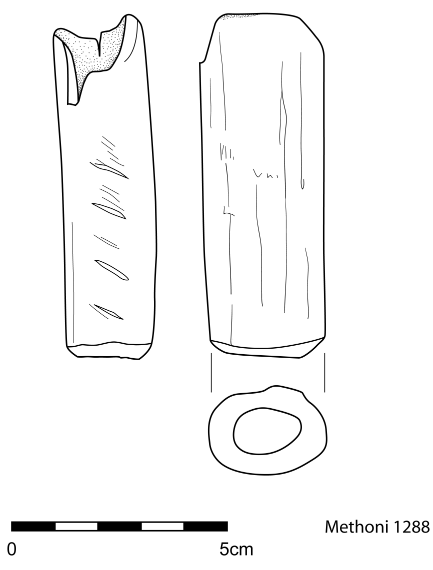
Drawing A.7: ID 8/ΜΕΘ 301



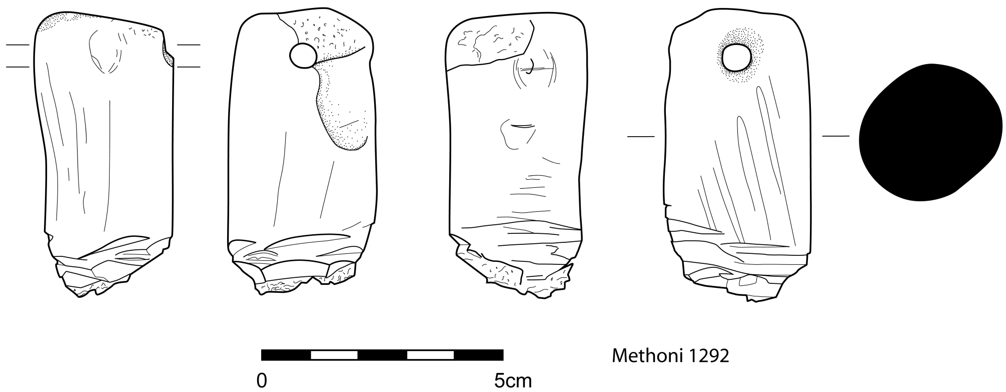
Drawing A.8: ID 13/ΜΕΘ 313



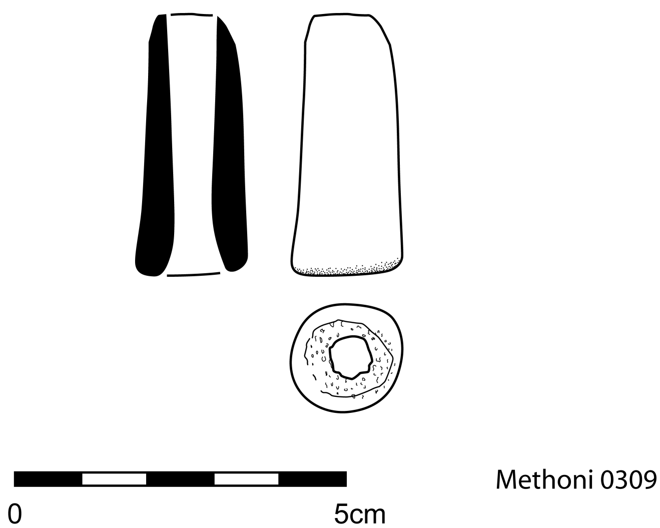
Drawing A.9: ID 16/MEΘ 674



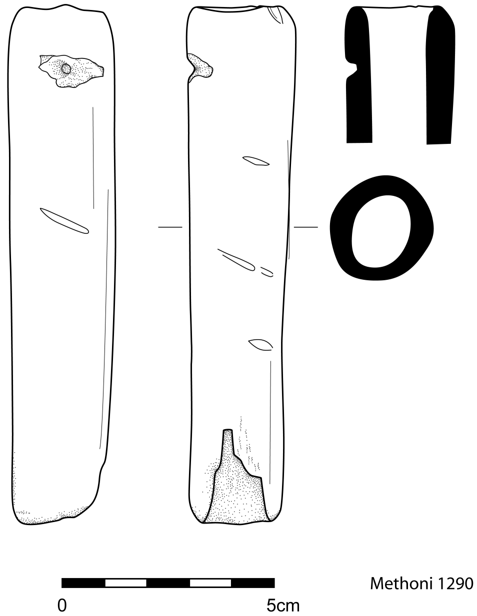
Drawing A.10: ID 17/MEΘ 1288



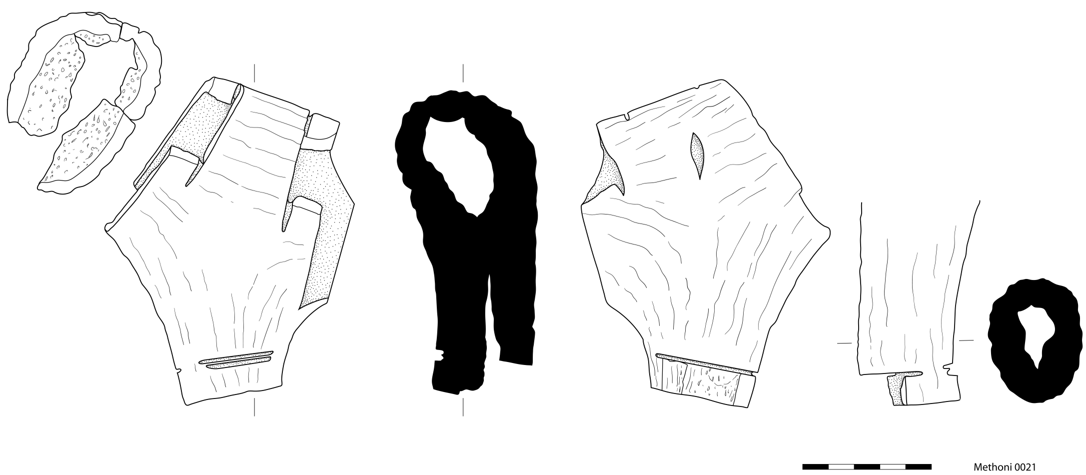
Drawing A.11: ID 18/MEΘ 1292



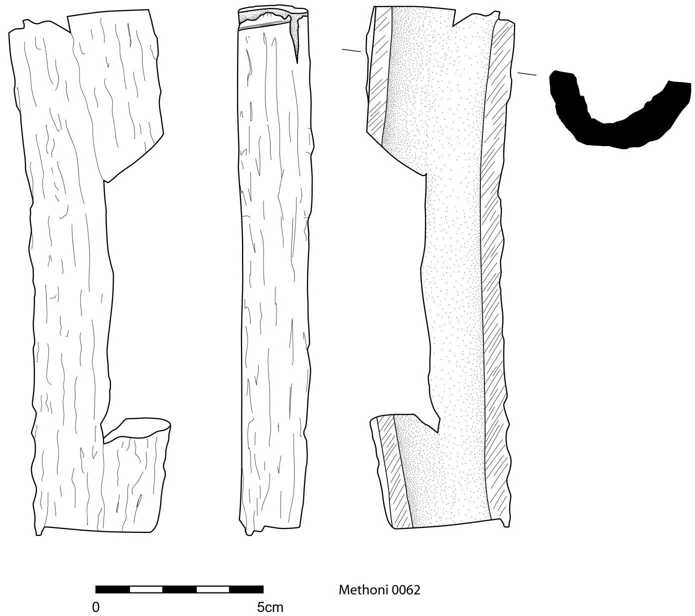
Drawing A.12: ID 20/MEΘ 309



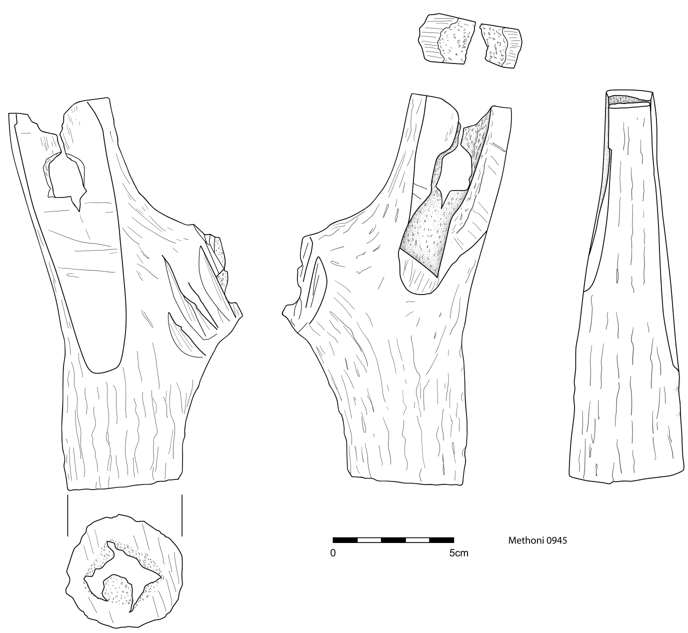
Drawing A.13: ID 21/MEΘ 1290



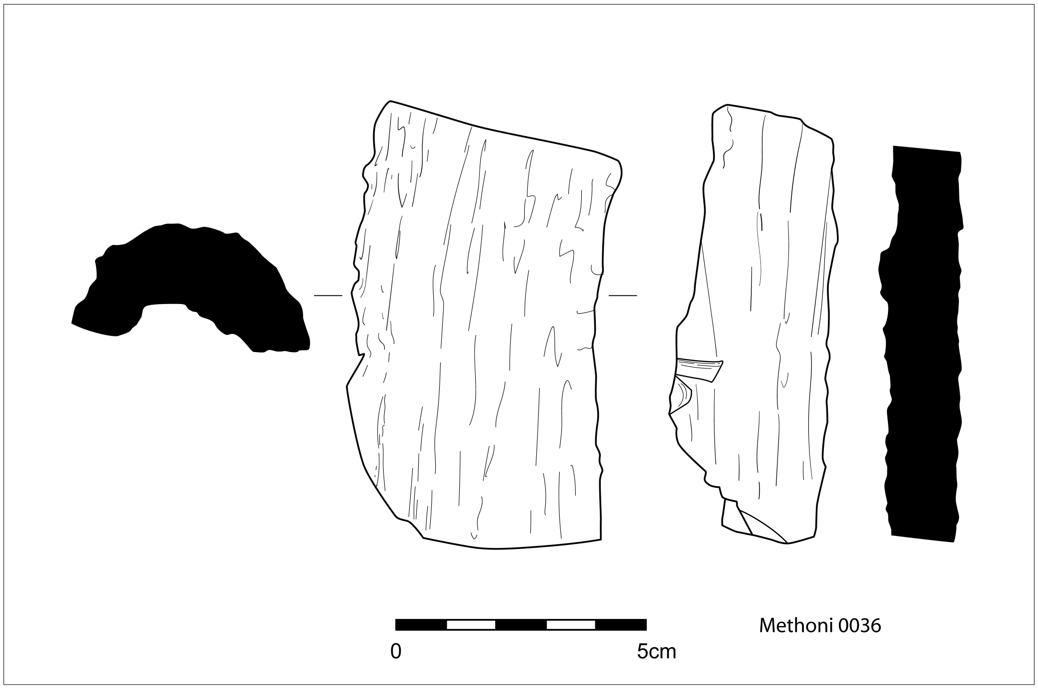
Drawing A.14: ID 33/MEΘ 21



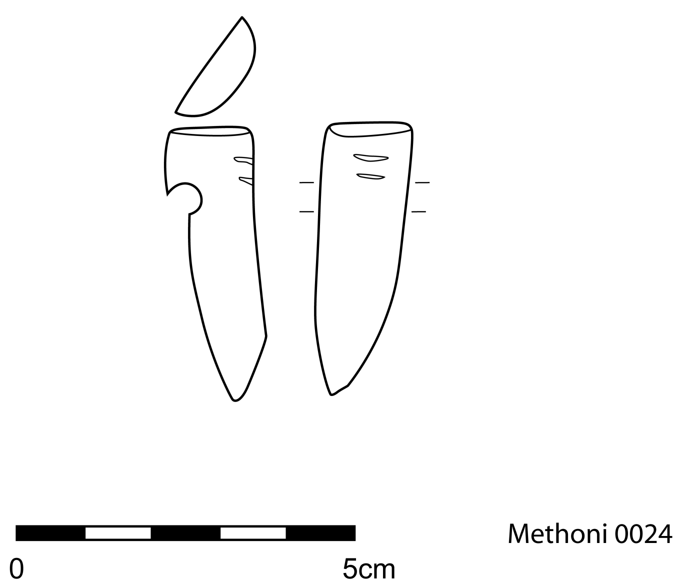
Drawing A.15: ID 34/ΜΕΘ 62



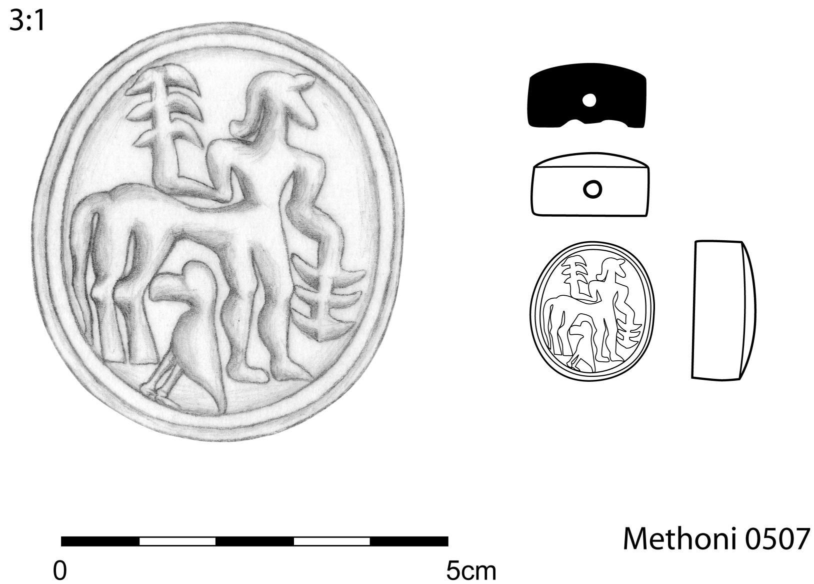
Drawing A.16: ID 39/ΜΕΘ 945



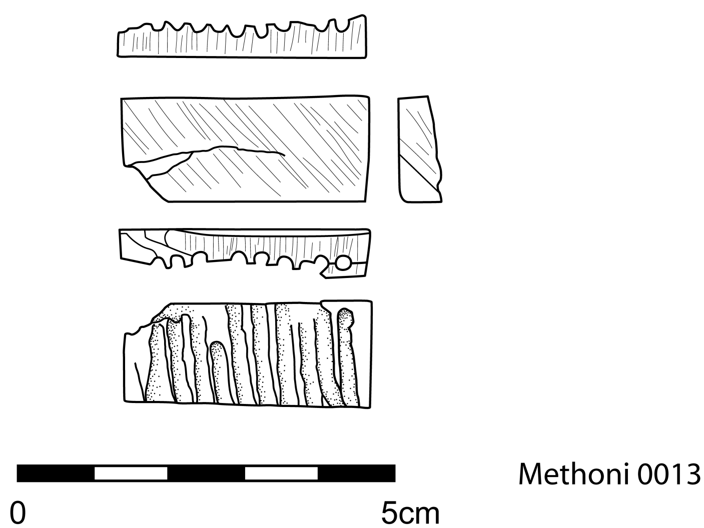
Drawing A.17: ID 43/ΜΕΘ 36



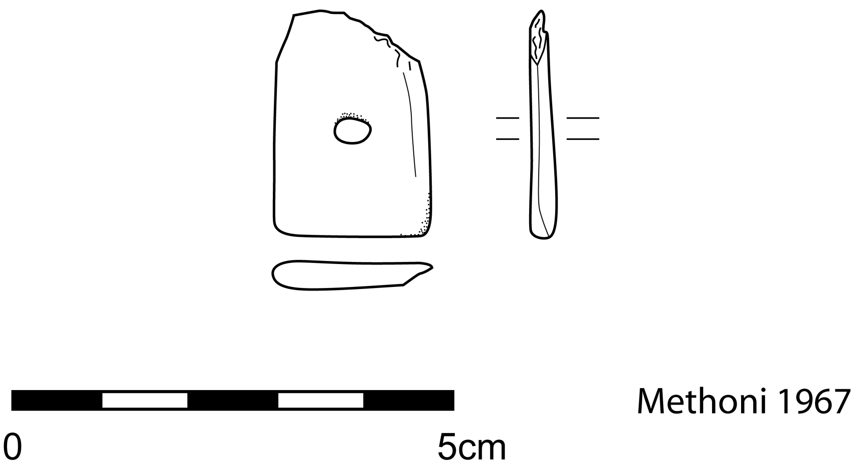
Drawing A.18: ID 66/ΜΕΘ 24



Drawing A.19: ID 76/MEΘ 507

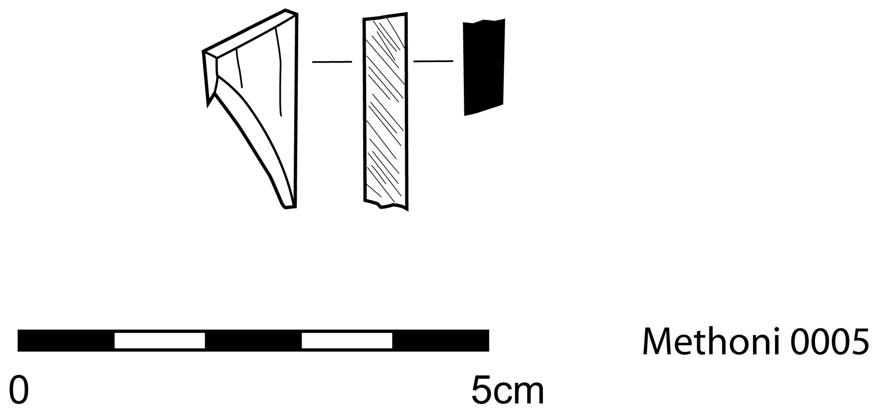


Drawing A.20: ID 79/MEΘ 13

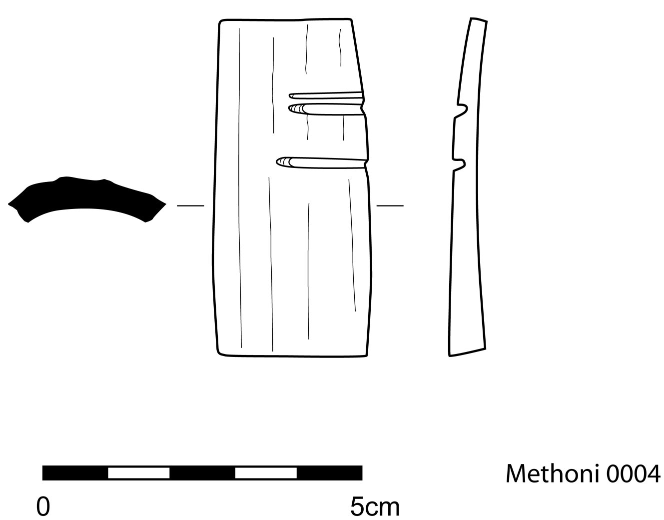


Drawing A.21: ID 83/ΜΕΘ 1967

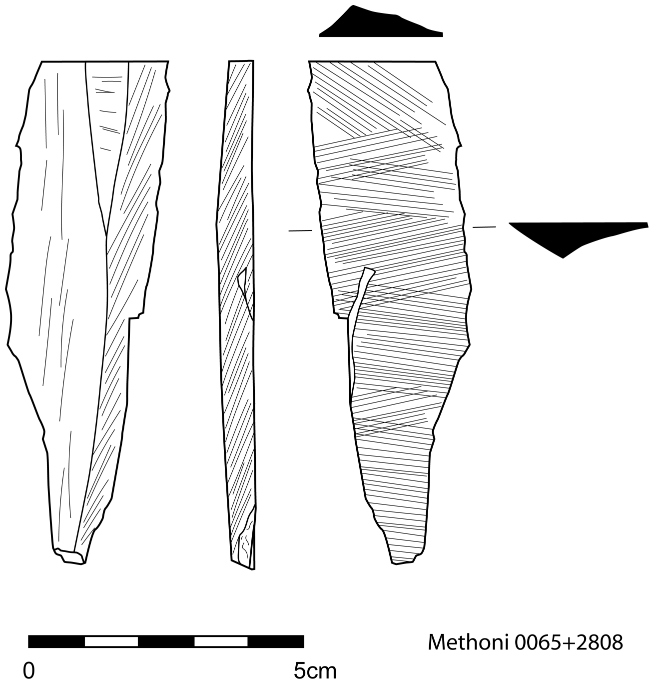
Drawing A.22: ID 87/ΜΕΘ 2809



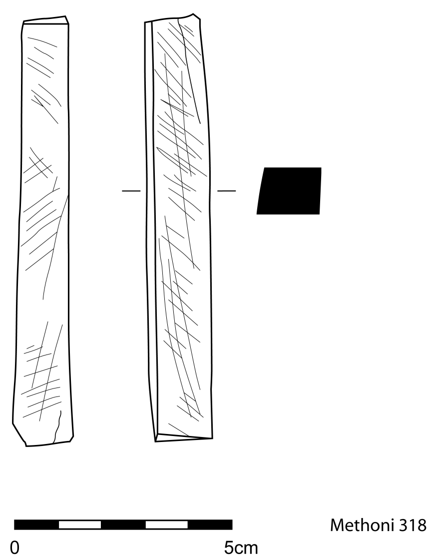
Drawing A.23: ID 130/MEΘ 5



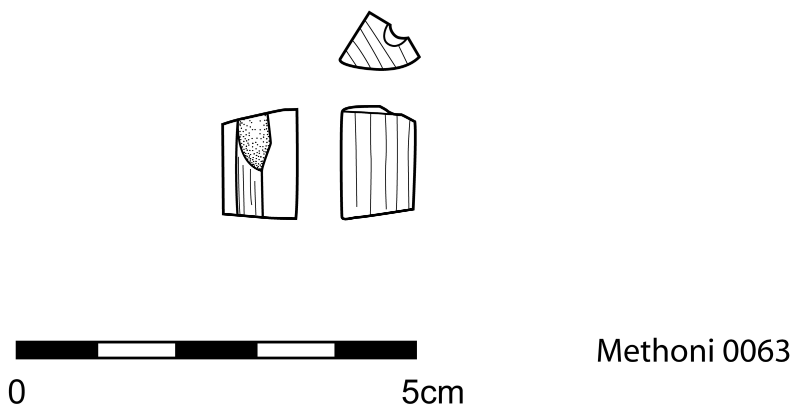
Drawing A.24: ID 171/MEΘ 4



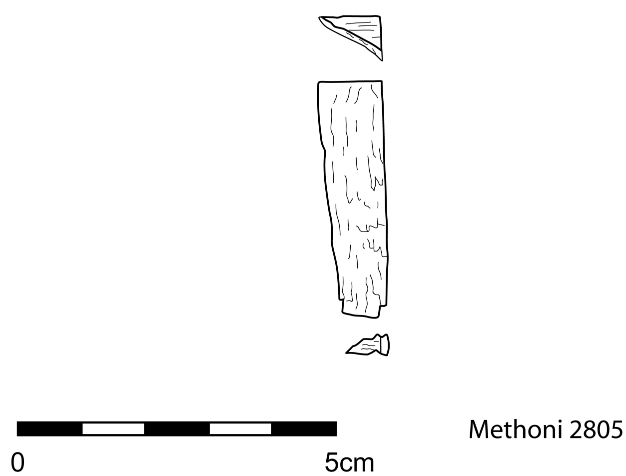
Drawing A.25: ID 190/ΜΕΘ 65



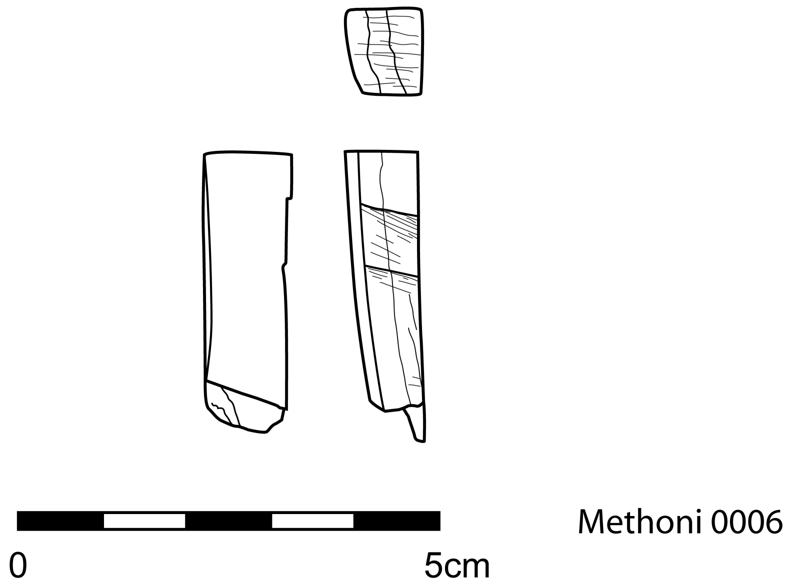
Drawing A.26: ID 193/ΜΕΘ 318



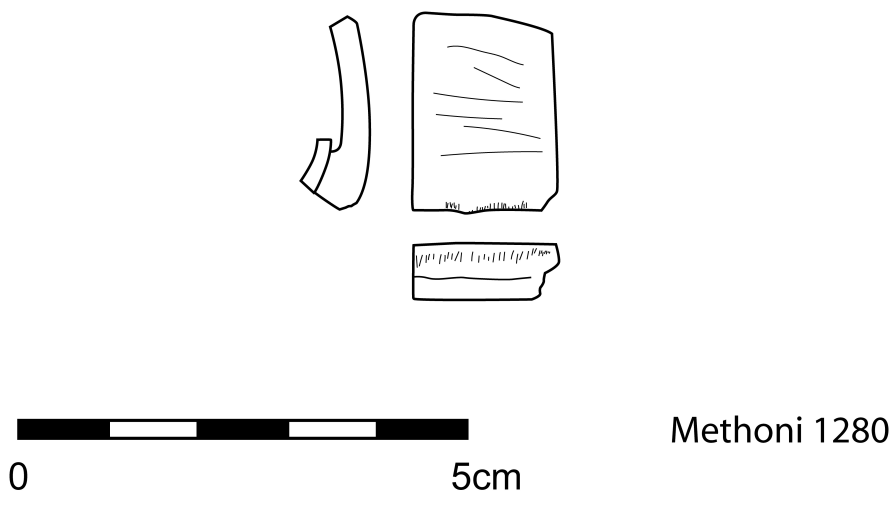
Drawing A.27: ID 194/MEΘ 63



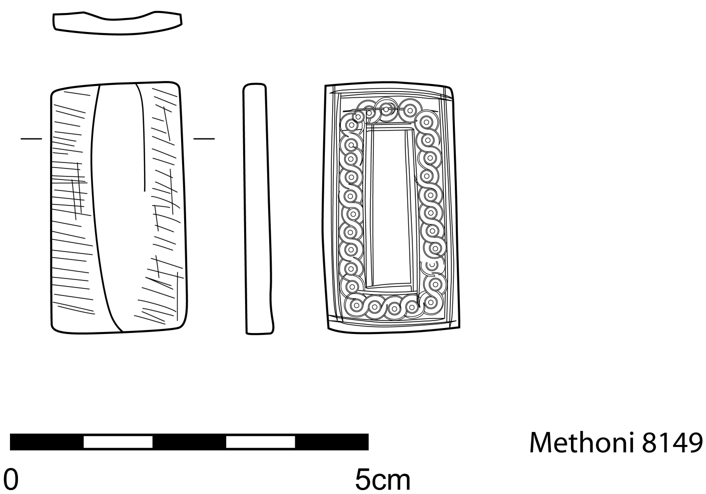
Drawing A.28: ID 196/MEΘ 2805



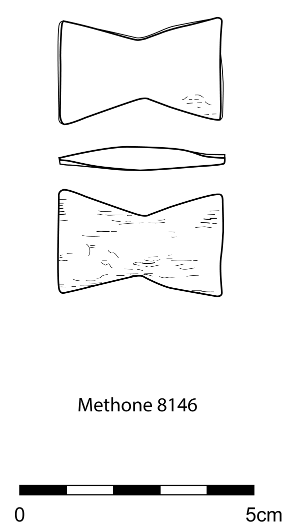
Drawing A.29: ID 198/MEΘ 6



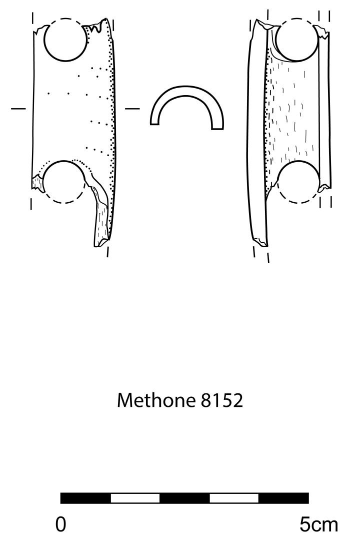
Drawing A.30: ID 200/MEΘ 1280



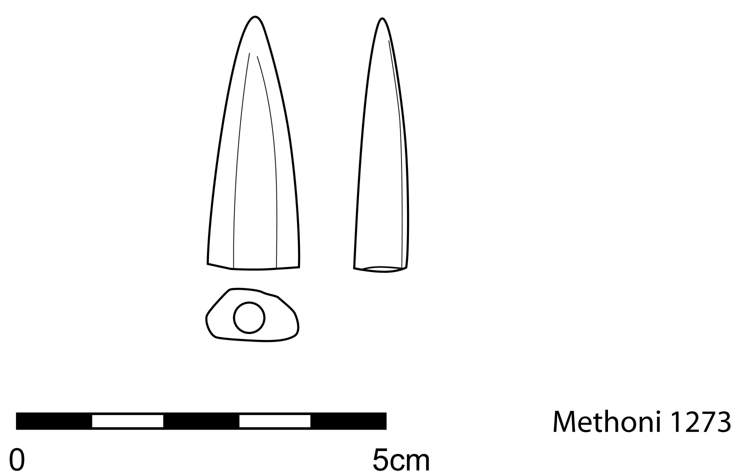
Drawing A.31: ID 252/ΜΕΘ 8149



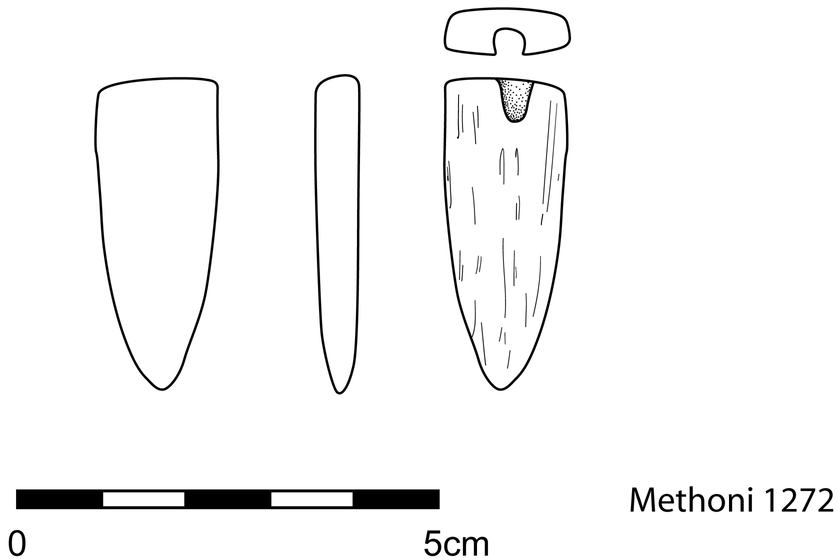
Drawing A.32: ID 256/ΜΕΘ 8146, drawing by Anne Hooton.



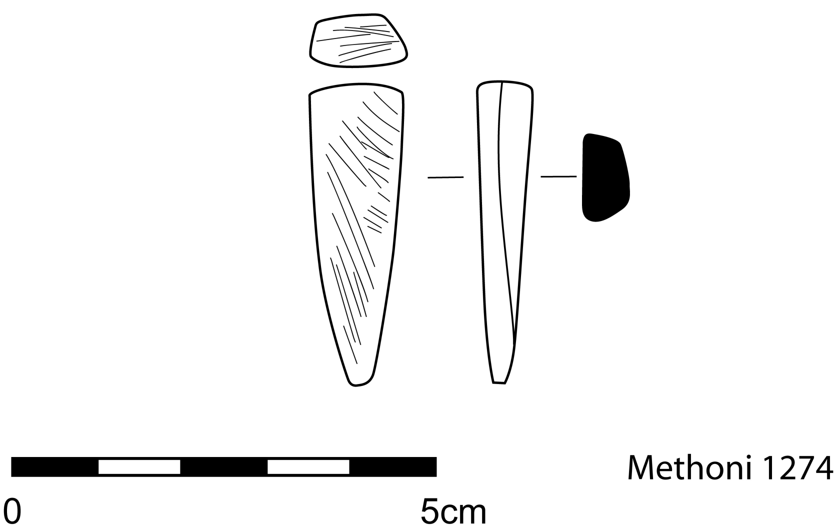
Drawing A.33: ID 258/MEΘ 8152, drawing by Anne Hooton.



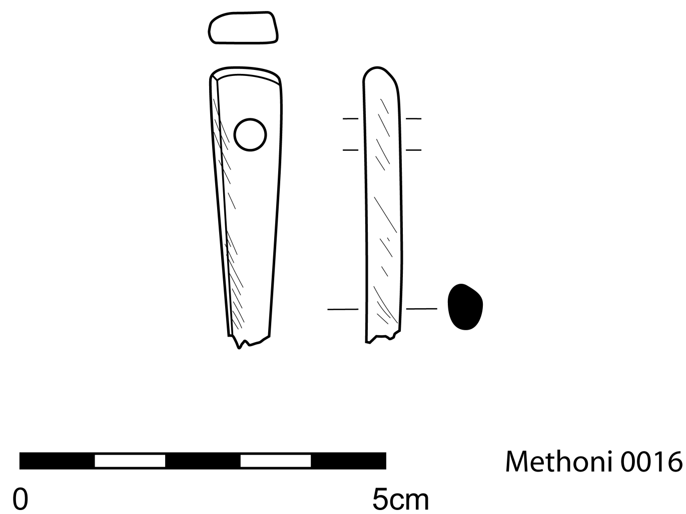
Drawing A.34: ID 259/MEΘ 1273



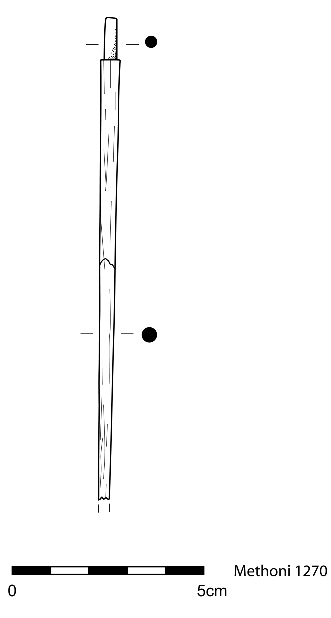
Drawing A.35: ID 261/MEΘ 1272



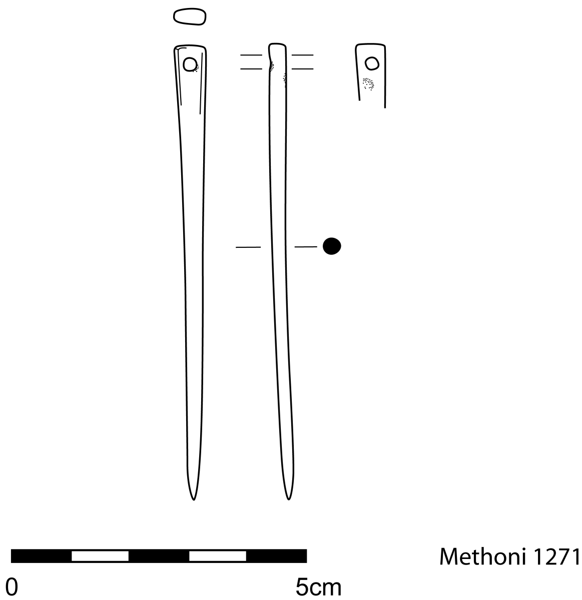
Drawing A.36: ID 262/MEΘ 1274



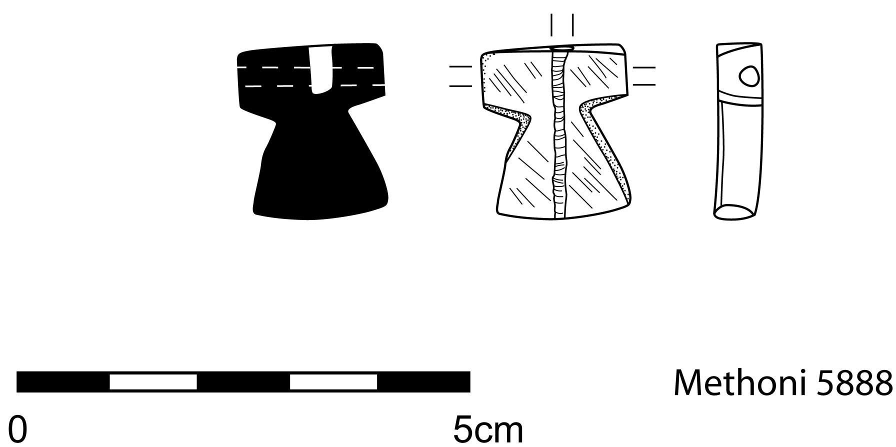
Drawing A.37: ID 290/ΜΕΘ 16



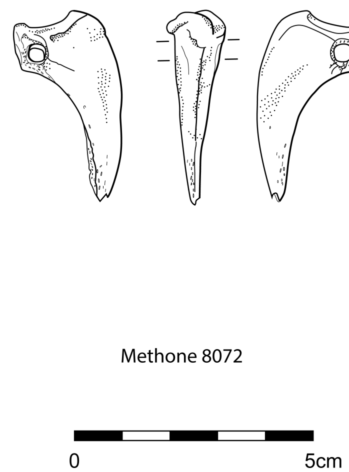
Drawing A.38: ID 291/ΜΕΘ 1270



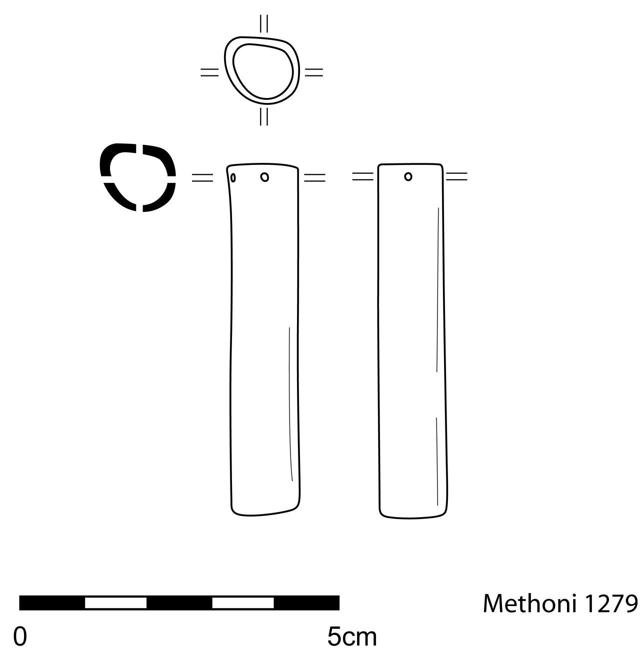
Drawing A.39: ID 292/ΜΕΘ 1271



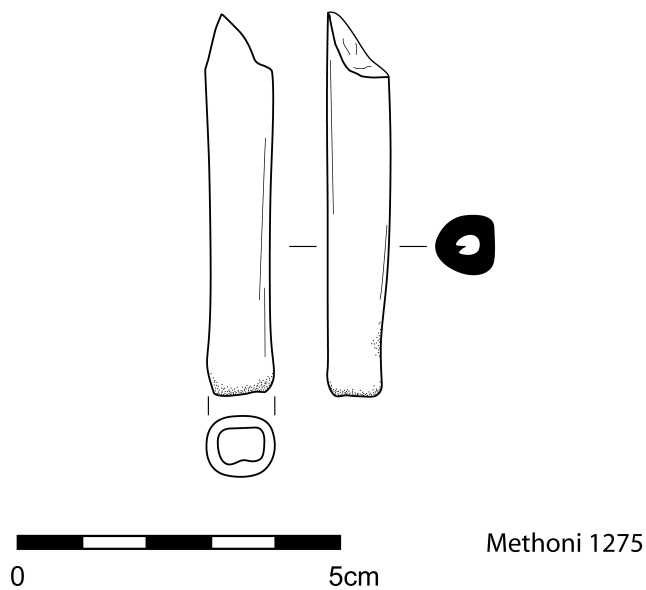
Drawing A.40: ID 298/ΜΕΘ 5888



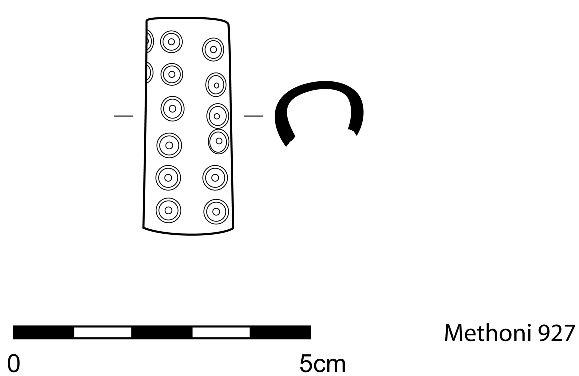
Drawing A.41: ID 299/MEΘ 8072, drawing by Anne Hooton.



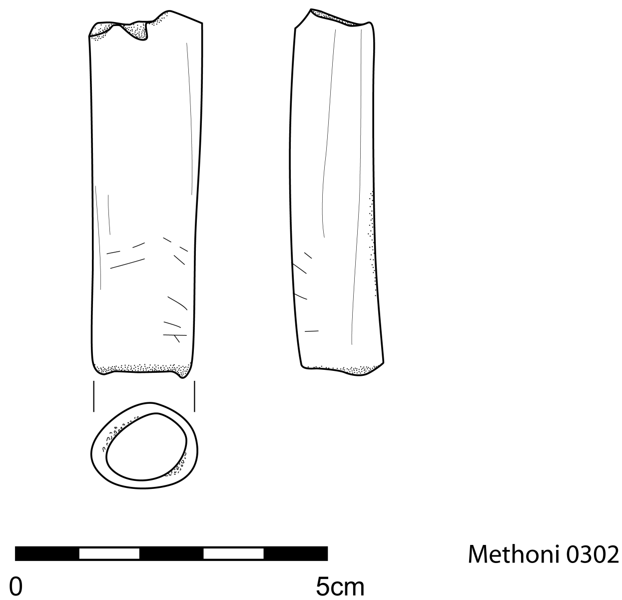
Drawing A.42: ID 300/MEΘ 1279



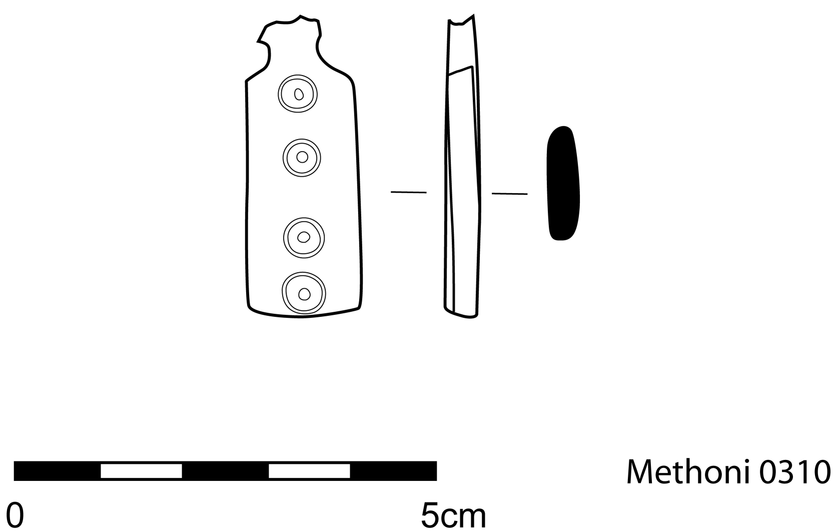
Drawing A.43: ID 301/ΜΕΘ 1275



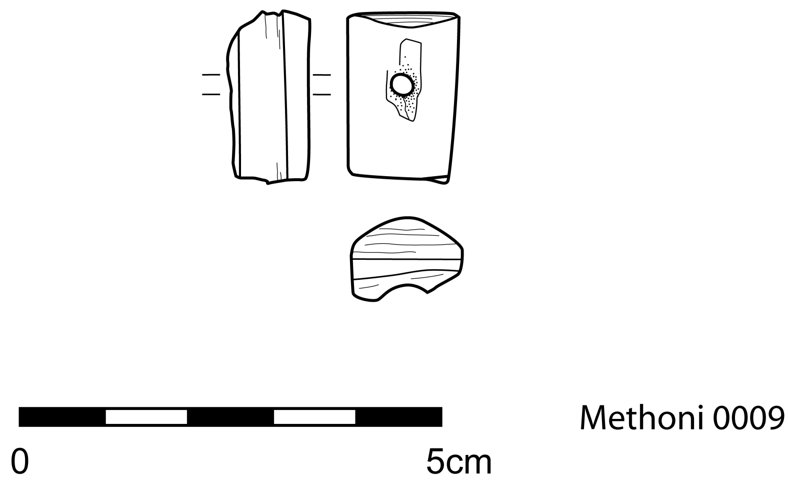
Drawing A.44: ID 302/ΜΕΘ 927



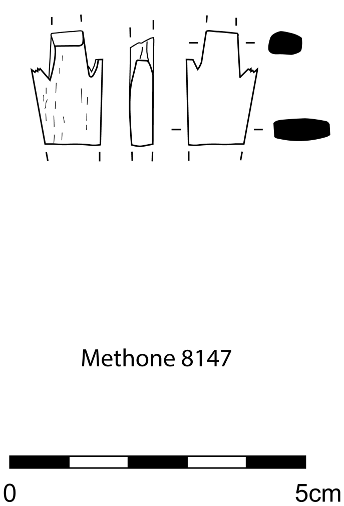
Drawing A.45: ID 303/ΜΕΘ 302



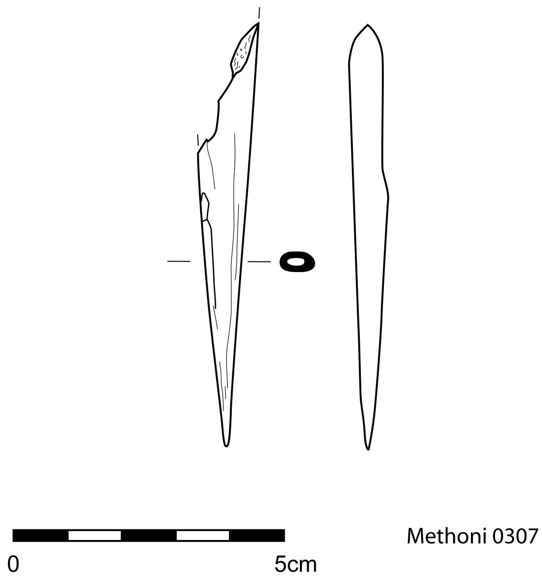
Drawing A.46: ID 313/ΜΕΘ 310



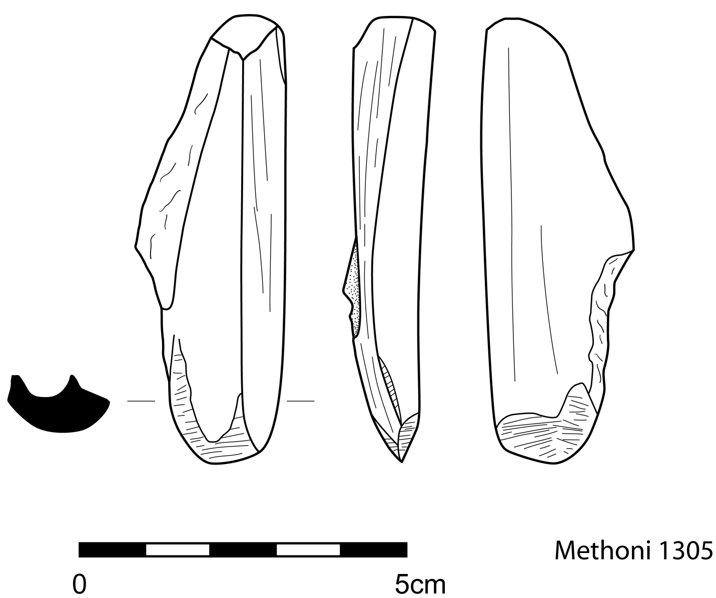
Drawing A.47: ID 315/ΜΕΘ 9



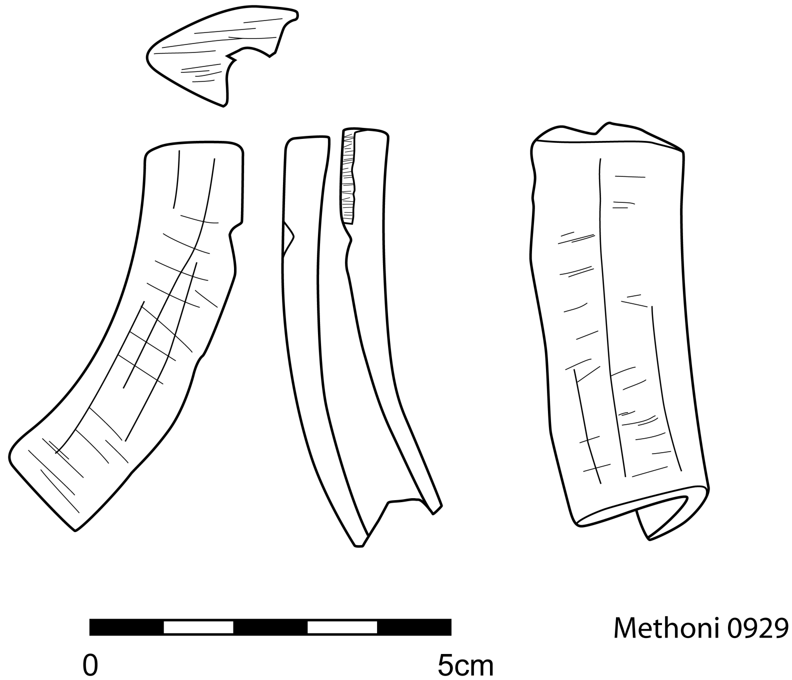
Drawing A.48: ID 318/ΜΕΘ 8147, drawing by Anne Hooton.



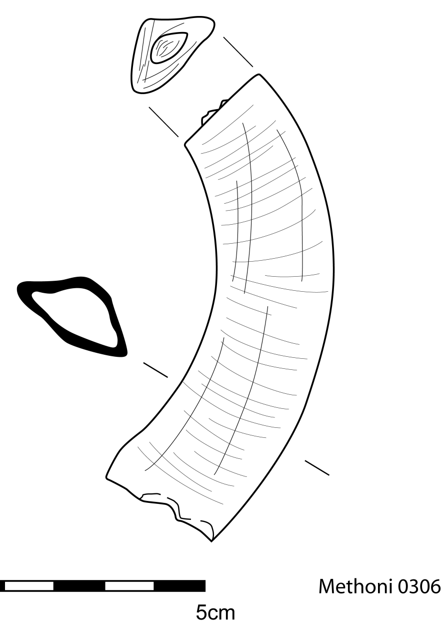
Drawing A.49: ID 447/MEΘ 307



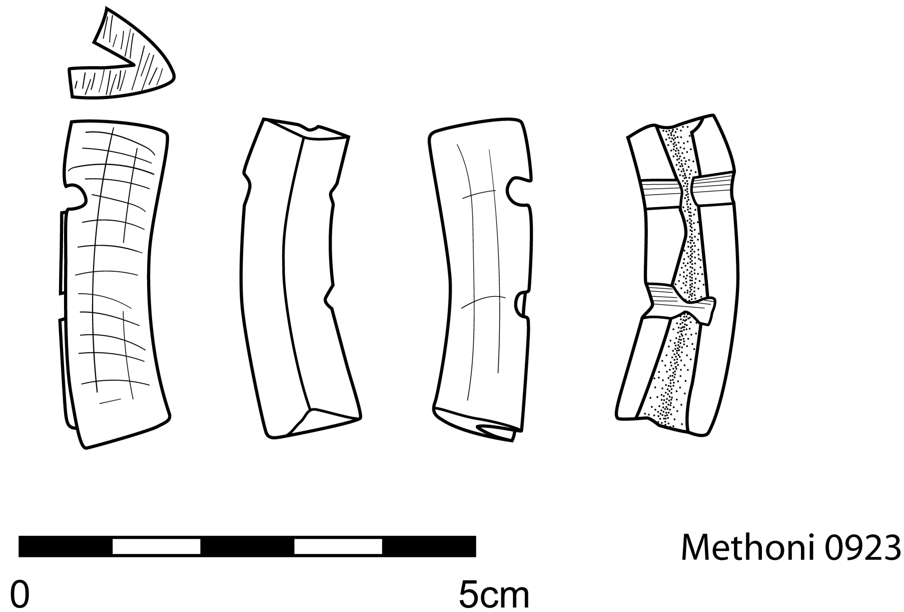
Drawing A.50: ID 448/MEΘ 1305



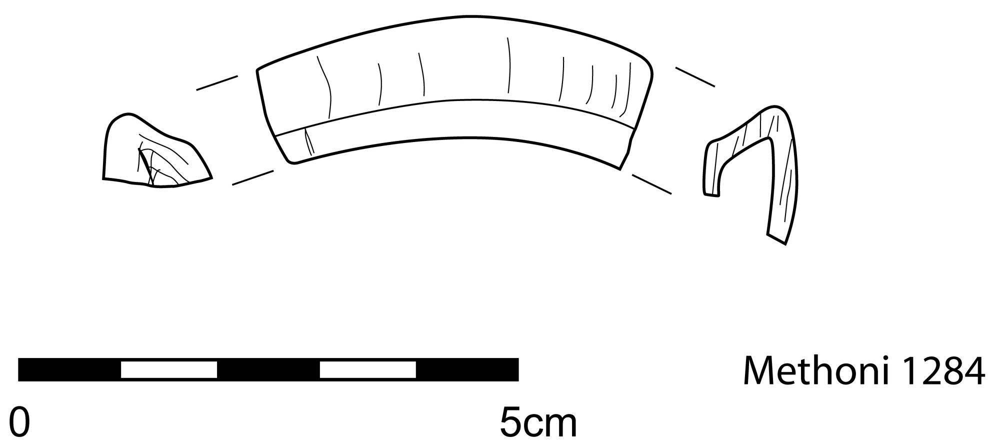
Drawing A.51: ID 454/ΜΕΘ 929



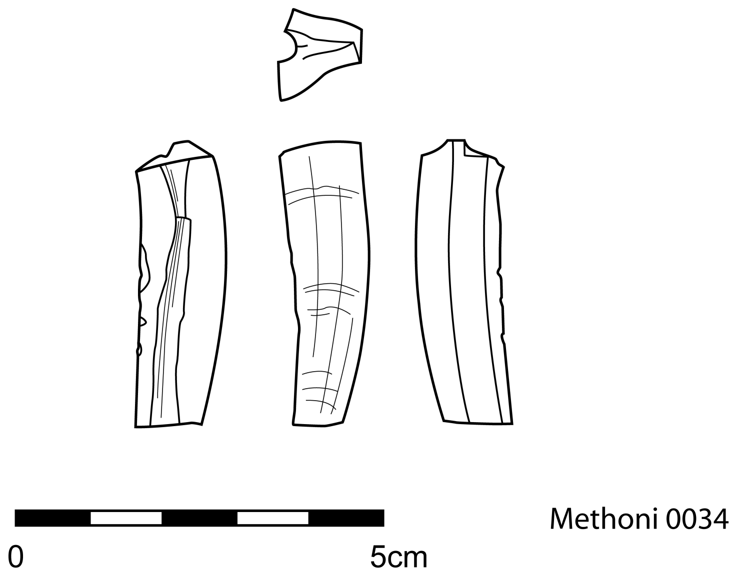
Drawing A.52: ID 455/ΜΕΘ 306



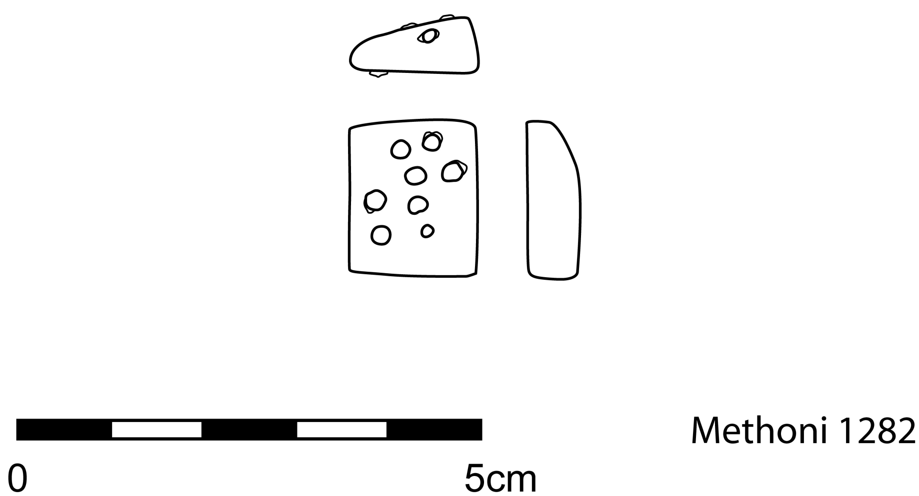
Drawing A.53: ID 456/ΜΕΘ 923



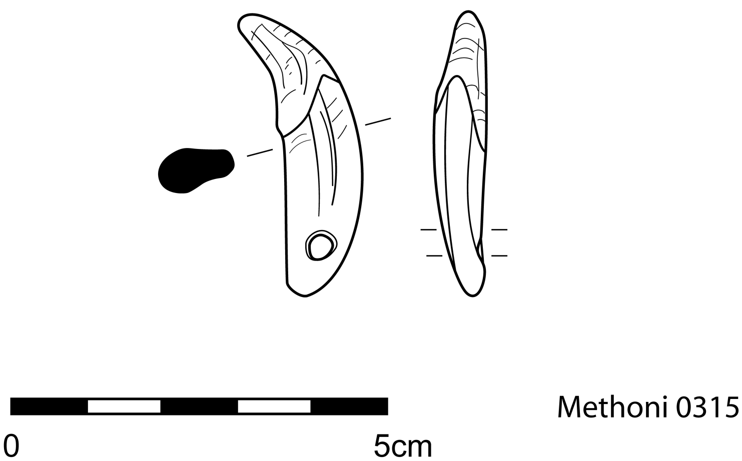
Drawing A.54: ID 457/ΜΕΘ 1284



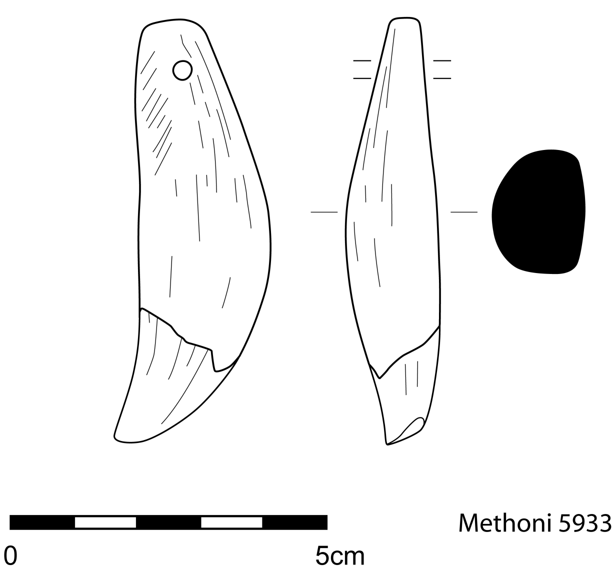
Drawing A.55: ID 459/MEΘ 34



Drawing A.56: ID 460/MEΘ 1282



Drawing A.57: ID 468/MEΘ 315



Drawing A.58: ID 470/MEΘ 5933

APPENDIX B

Sources for Worked Animal Objects Across the Greek World

Table B.1: Assemblages of worked animal objects

Site	Count	Assemblage Type	Citations
Aetos, Ithaca	78	Dedicatory	Heurtley and Robertson 1948; Anderson and Benton 1953
Aegina	6	Dedicatory	Furtwängler 1906, 426, nos. 1-4; Dunbabin 1940, 434
Antissa	3	Dedicatory	Lamb 1932, 63,66, figs. 11, 17
Argos	10	Funerary	Courbin 1974, 85, 87, nos. F. 75, Os 106; Alexandri 1960, 93; Kilian-Dirlmeier 1984, 74, nos. 277,278, pl. 11
Argos - The Argive Heraion	90	Dedicatory	Norton 1905
Asine	2	Funerary	Frödin and Persson 1938, 425
Assiros	1	Settlement	Wardle 1989, 449, pl. 68c
Athens - Kerameikos & Dipylon	13	Funerary	Perrot 1895; Kraiker and Kübler 1939, 25, 88, 101, 104, pl. 31; Kübler 1954, 239, no. 5289, pl. 161, 1970, 75. no. Griff. Kat, 2; Stauropoullos 1965, 79
Athens - Agora Cemeteries	10	Funerary	Papadopoulos and Smithson 2017, 100, 118, 174, 175, 212, 427, nos. T11-30, T13-20, T15-79, T15-80, T15-81, T20-11, T63-17, T63-18, T-63-19
Ayios Ioannis	1	Funerary	Coldstream and Hood 1968, 212, Fig. 4, Pl. 54
Azoria	19	Settlement	Stefanakis, West, Haggis, Mook, Fitzsimons, Scarry, and Snyder 2007, 288, fig. 35; Haggis, Mook, Fitzsimons, Scarry, and Snyder 2011, 466
Brauron	1	Dedicatory	Landels 1963
Corinth	5	Funerary	Blegen, Palmer, and Young 1964, 62, 178, 185, nos. 113-1 (T 2394), 154-1 (T 3594), 159-3 (T 3233), pl. 79; Pfaff 2007, 507, 520, no. 73, fig. 49
Delos	35	Dedicatory	Deonna 1938; Gallet de Santerre and Tréheux 1947, 197–207, nos. 29–47
Delphi	45	Dedicatory	Amandry 1939, 1944; Filippaki 1967
Dictaean Cave	16	Dedicatory	Hogarth 1900
Dreros	11	Dedicatory	Marinatos 1936, 244
Eleusis	3	Funerary	Skia 1898, 106; Blinkenberg 1926, 433; Coldstream 1977, 57
Eleutherna	4	Funerary	Stampolidis 1992, 2004, 295, no. 397
Emporio	35	Dedicatory	Boardman 1967a

Site	Count	Assemblage Type	Citations
Ephesus	374+	Dedicatory	Hogarth 1908a; Bammer 1992; Muss 2008
Eretria	10	Dedicatory	Blandin 2007a, 48, no. T10, 9, pl. 91; Huber 2003, 87, 94, 100, nos. 0156, 0196–0201, 0228, pls. 125, 129, 132; Verdan 2013, 26, no. 453, pl. 107
Halai	81	Dedicatory	Goldman 1940
Haliartos	1	Dedicatory	Austin 1932, 427, fig. 79, 3
Ialysos (Cemetery)	4	Funerary	Maiuri 1923, 322, no. 9, fig. 216; Laurenzi 1936, 164, no. 16
Ialysos (Sanctuary)	13	Dedicatory	Martelli 1988, 2000
Isthmia	1	Dedicatory	Sturgeon 1987, 61, no. 2
Kamiros (Well and Acropolis)	182	Dedicatory	Smith 1908, 179–181, nos. 1–28; Salmon 2019, 157–159
Kamiros - Papatislures Cemetery	37	Funerary	Jacopi 1932
Kastanas	2	Settlement	Hochstetter 1987, 61, nos. 77/17, 79/1179
Kastro Hill on Siphnos	19	Dedicatory	Brock and Young 1949
Kato Phana in Chios	6	Dedicatory	Lamb 1935
Kavousi	1	Settlement	Gesell and Day 1991, 156, no. V88.150
Knossos - Khaniale Tekke Tombs	8	Funerary	Hutchinson and Boardman 1954; Boardman 1967b
Knossos	1	Unknown	Boardman 1962
Knossos - North Cemetery	73	Funerary	Evely 1996; Coldstream and Catling 1997
Knossos - Fortetsa	5	Funerary	Brock 1957, 15, 22, 59 nos. 111, 195, 199, 204, 637, pl. 13
Kythnos	400	Dedicatory	Mazarakis Ainian 2005, 98; Varvarinou-Vai 2017
Lefkandi	15	Funerary	Sackett 1980; Popham, Sackett, and Themelis 1980, 123, no. S 38,14; Popham and Lemos 1996, pl. 56.8–9; Lemos 2002
Lindos	113	Dedicatory	Blinkenberg 1931
Lousoi - The sanctuary of Artemis Hemera in Lousoi	13	Dedicatory	Mitsopoulos-Leon 2012
Mandra - the sanctuary on Despotiko	4	Dedicatory	Kourayos and Burns 2004, 149–150, figs. 20–22
Methone	494	Production	Appendix A
Miletus	2	Dedicatory	Held 2000, 170, no. V 5, pl. 40
Mon Repos	1	Unknown	Dontas 1967
Mycenae	1	Dedicatory	Klein 1997, 319
Nauplion	1	Funerary	Kilian-Dirlmeier 1984, 74, no. 289, pl. 12
Old Smyrna	10	Dedicatory	Cook, Nicholls, and Pyle 1998, 26, nos. SF 730, SF 798, SF 800, SF 803, SF 804, SF 872, SF 1107, SF 1108, SF 1109, SF 1110
Olympia	3	Dedicatory	Furtwängler 1890, 120, 188, nos. 797, 1194; Kyrieleis 2006, 21, pl. 9, 1–4
Olynthus	10	Settlement	Robinson 1941, 100–102, 132, nos. 334–342, 443
Oropos	1	Funerary	Mazarakis Ainian 1998, 53, fig. 24
Paros - The Delion	12	Dedicatory	Rubensohn 1962, 71–72, nos. 35-46
Perachora	427	Dedicatory	Stubbings 1940
Pherai	6	Unknown	Blinkenberg 1926, 265–266, 268–269, nos. XV 1a, 2a, 5a/b, 6a/b
Philia	4	Unknown	Theocharis 1967, 295–96, pl. 194, 1-4
Praisos	1	Funerary	Hutchinson, Eccles, and Benton 1939, 57, pl. 30, 1
Samos - The Heraion	126+	Dedicatory	Ohly 1959; Walter 1959; Freyer-Schauenburg 1966b; Furtwängler 1981, 136, pl. 26–30; Kyrieleis 1980, 348, pl. 18; Sinn 1982; Brize 1992, 2020
Seraglio Cemetery	5	Funerary	Morricone 1978, 173, 255, figs. 312, 550
Sindos	3	Settlement	Gimatzidis 2010, 298, nos. 771–773, pl. 107

Site	Count	Assemblage Type	Citations
Sparta - The sanctuary of Artemis Orthia	658+	Dedicatory	Dawkins 1929a
Tegea - the sanctuary of Athena Alea	52	Dedicatory	Voyatzis 2014b,a
Thasos - The Artemision	364	Dedicatory	Salviat 1962; Prêtre 2016
The Corycian Cave	4072	Dedicatory	Amandry 1984c; Jacquemin 1984, 169–170, nos. 4–13
The Idaean Cave	210	Dedicatory	Kunze 1936; Sakellarakis 1993, 1992, 2013
Theotokou	2	Funerary	Wace and Droop 1906, 324, fig. e
Tiryns	7	Funerary	Walter Müller 1912, 128; Kilian-Dirlmeier 1984, 74, nos. 275–76, 279–82, pl. 11
Torone	4	Funerary	Papadopoulos 2005, 89, 112, 126, nos. T10-7 (84.405), T38-3 (81.1219), T52-4, pls. 468, 470
Zagora	1	Settlement	Cambitoglou 1988, 235, no. Inv. 1240, pl. 289

Table B.2: Site assemblages by material

Site	Bone	Ivory	Unknown	Antler	Horncore	Non-Ivory Tooth	Total
Aetos, Ithaca	26	31	21				78
Aegina	1	5					6
Antissa	3						3
Argos	9	1					10
Argos - The Argive Heraion	9	1	80				90
Asine	2						2
Assiros	1						1
Athens - Kerameikos & Dipylon	4	9					13
Athens - Agora Cemeteries	7	2	1				10
Ayios Ioannis		1					1
Azoria	18				1		19
Brauron	1						1
Corinth	1	1	3				5
Delos	7	26	2				35
Delphi		44	1				45
Dictaean Cave	12	1	3				16
Dreros					11		11
Eleusis	1	2					3
Eleutherna		4					4
Emporio	27	7				1	35
Ephesus	51	174	145		3	1	374+
Eretria	6	4					10
Halai	81						81
Haliartos	1						1
Ialysos (Cemetery)	1	3					4
Ialysos (Sanctuary)	1	8	4				13
Isthmia	1						1
Kamiros (Well and Acropolis)	154	13	11			4	182
Kamiros - Papatislures Cemetery	25	1	11				37
Kastanas	64			4		1	2
Kastro Hill on Siphnos	13	5	1				19
Kato Phana in Chios	5		1				6
Kavousi		1					1
Knossos - Khaniale Tekke Tombs	1	7					8

Site	Bone	Ivory	Unknown	Antler	Horncore	Non-Ivory Tooth	Total
Knossos		1					1
Knossos - North Cemetery	28	23			2	20	73
Knossos - Fortetsa	2	1	2				5
Kythnos	2	2	396				400
Lefkandi	6	5	2	2			15
Lindos	98	12				3	113
Lousoi - The sanctuary of Artemis Hemera in Lousoi	13						13
Mandra - the sanctuary on Despotiko			4				4
Methone							494
Miletus		2					2
Mon Repos		1					1
Mycenae		1					1
Nauplion			1				1
Old Smyrna		10					10
Olympia		2	1				3
Olynthus	6	2	2				10
Oropos		1					1
Paros - The Delion	11	1					12
Perachora	155	138	132	2			427
Pherai			6				6
Philia	2		2				4
Praisos		1					1
Samos - The Heraion	1	125					126+
Seraglio Cemetery	5						5
Sindos	2			1			3
Sparta - The sanctuary of Artemis Orthia	454	145	59				658+
Tegea - the sanctuary of Athena Alea	41	5	6				52
Thasos - The Artemision	233	99	2	29	1		364
The Corycian Cave	4072						4072
The Idaean Cave	22	56	132				210
Theotokou		2					2
Tiryns	6	1					7
Torone	3			1			4
Zagora	1						1

BIBLIOGRAPHY

Ábelová, M. 2008. "Schreger Pattern Analysis of *Mammuthus primigenius* Tusk: Analytical Approach and Utility." *Bulletin of Geosciences* 83(2): 225–32.

Adams, C. J. and J. Donovan, eds. 1995. *Animals and Women: Feminist Theoretical Explorations*. Durham: Duke University Press.

Affanni, G. 2008. "Astragalus Bone in Ancient Near East: Ritual Depositions in Iron Age I in Tell Afis." In: *Proceedings of the 5th International Congress on the Archaeology of the Ancient Near East: Madrid, April 3-8, 2006*, edited by J. M. Córdoba, M. Molist, M. C. Pérez, I. Rubio, and S. Martínez. Madrid: Universidad Autónoma de Madrid: 77–92.

Akkermans, P. M. M. G. and I. Rossmeisl. 1990. "Excavations at Tell Sabi Abyad, Northern Syria: a Regional Centre on the Assyrian Frontier." *Akkadica* 66: 13–60.

Akurgal, E. 1983. *Alt-Smyrna I: Wohnschichten und Athenatempel.* Ankara: Türk Tarih Kurumu Basımevi.

Albarella, U. and A. Trentacoste, eds. 2011. *EthnoZooArchaeology. The Present and Past of Human–Animal Relationships.* Oxford: Oxbow Books.

Albayrak, E. 2012. "Fossil Elephants of Turkey." *Hacettepe Journal of Biology and Chemistry* 40(4): 365–70.

— 2019. "The Ancient Asian Elephant of Turkey in the Light of New Specimens: Does It Have Regional Features?" *Quaternary Science Reviews* 218: 189–99.

Albayrak, E. and A. M. Lister. 2012. "Dental Remains of Fossil Elephants from Turkey." *Quaternary International* 276–277: 198–211.

Alexandri, O. 1960. "Αργολιδοκορινθία." *ArchDelt* 16: 93.

Amandry, P. 1939. "Rapport préliminaire sur les statues chryséléphantines de Delphes." *BCH* 63(1): 86–119.

— 1944. "Statuette d'ivoire d'un dompteur de lion: découverte à Delphes." *Syria* 24(3): 149–74.

Amandry, P. 1984a. “Céramique des époques archaïque, classique et hellénistique.” In: *L’Antre Corycien II. BCH* Suppl. 9. Paris: Ecole Française d’Athènes: 27–155.

— 1984b. “Le culte des Nymphes et de Pan à l’Antre corycien.” In: *L’Antre Corycien II. BCH* Suppl. 9. Paris: Ecole Française d’Athènes: 395–425.

— 1984c. “Os et Coquilles.” In: *L’Antre Corycien II. BCH* Suppl. 9. Paris: Ecole Française d’Athènes: 347–80.

— 1986. “Chios and Delphi.” In: *Chios: A Conference at the Homereion in Chios, 1984*, edited by J. Boardman and C. Vaphopoulou-Richardson. Oxford: Clarendon Press: 205–32.

— 1991. “Les Fosses De L’Aire.” In: *Guide de Delphes: Le musée*. Paris: Ecole française d’Athènes: 191–226.

Amory, A. 1966. “The Gates of Horn and Ivory.” *YCS* 20: 1–57.

Anderson, J. and S. Benton. 1953. “Further Excavations at Aetos.” *BSA* 48: 255–361.

André-Salvini, B. and S. Descamps-Lequime. 2005. “Remarques sur l’astragale en bronze de Suse.” *SMEA* 47: 15–25.

Andreopoulou, A. 2008. “Modeling the Greek Aulos.” MA thesis. The Steinhardt School.

Anghelina, C. 2010. “The Homeric Gates of Horn and Ivory.” *MusHelv* 67(2): 65–72.

Antonaccio, C. M. 1994. “Contesting the Past: Hero Cult, Tomb Cult, and Epic in Early Greece.” *AJA*: 389–410.

Apollonio, M., S. Focardi, S. Toso, and L. Nacci. 1998. “Habitat Selection and Group Formation Pattern of Fallow Deer *Dama dama* in a Submediterranean Environment.” *Ecography* 21(3): 225–34.

Appadurai, A., ed. 1986. *The Social Life of Things: Commodities in Cultural Perspective.* Cambridge Studies in Social and Cultural Anthropology. Cambridge: Cambridge University Press.

Arabatzis, C. 2016. “Bone Industry from the Prehistoric Settlement Anarghiri IXa, Florina, Greece.” In: *Close to the Bone: Current Studies in Bone Technologies*, edited by S. Vitezović. Belgrade: Institute of Archaeology, Belgrade: 9–17.

Archie, E. A. and P. I. Chiyo. 2012. “Elephant Behaviour and Conservation: Social Relationships, The Effects of Poaching, and Genetic Tools for Management.” *Molecular Ecology* 21(3): 765–78.

Arias-Maldonado, M. 2015. “What is Nature?” In: *Environment and Society: Socionatural Relations in the Anthropocene*. New York: Springer International Publishing: 17–32.

Armbruster, P., P. Fernando, and R. Lande. 1999. “Time Frames for Population Viability Analysis of Species with Long Generations: An Example with Asian Elephants.” *Animal Conservation* 2(1): 69–73.

Athanassiadou, A. 2012. “Phoenician Amphoras.” In: *Greeks and Phoenicians at the Mediterranean Crossroads*, edited by P. Adam-Veleni and E. Stefani: 161–62.

Austin, R. 1932. “Excavations at Haliartos, 1931.” *BSA* 32: 180–212.

Averbouh, A. and J.-M. Pétillon. 2011. “Identification of ‘Debitage by Fracturation’ on Reindeer Antler: Case Study of the Badegoulian Levels at the Cuzoul de Vers (Lot, France).” In: *Written in Bones: Studies on Technological and Social Contexts of Past Faunal Skeletal Remains*, edited by J. Baron and B. Kufel-Diakowska. Wrocław: Institute of Archaeology, University of Wrocław: 41–51.

Badinou, P. 2003. *La laine et le parfum. Epinetra et alabastres. Forme, iconographie et fonction. Recherche de céramique attique féminine*. Louvain: Peeters.

Baer, N., N. Indictor, J. H. Frantz, and B. Appelbaum. 1971. “The Effect of High Temperature on Ivory.” *Studies in Conservation* 16(1): 1–8.

Bammer, A. 1988. “Gold und Elfenbein von einer neuen Kultbasis in Ephesos.” *ÖJh* 58: 1–23.

— 1990. “A ‘Peripteros’ of the Geometric Period in the Artemision of Ephesus.” *AnatSt* 40: 137–60.

Bammer, A. 1992. “Ivories from the Artemision at Ephesus.” In: *Ivory in Greece and the Eastern Mediterranean from the Bronze Age to the Hellenistic Period*, edited by J. L. Fitton. *BMOP* 85. London: British Museum Press: 185–204.

— 2005. “Der Peripteros im Artemision von Ephesos.” *Anatolia Antiqua* 13: 177–221.

Bammer, A. and U. Muss. 1996. *Das Artemision von Ephesos: das Weltwunder Ioniens in archaischer und klassischer Zeit*. Mainz: Philipp von Zabern.

Bar-Oz, G. 2001. “An Inscribed Astragalus with a Dedication to Hermes.” *Near Eastern Archaeology* 64(4): 215–17.

Barclay, A. E. 2001. “The Potnia Theron: Adaptation of a Near Eastern Image.” In: *POTNIA. Deities and Religion in the Aegean Bronze Age, Proceedings of the 8th International Aegean Conference Göteborg, Göteborg University, 12-15*, edited by R. Laffineur and R. Hägg. *Aegaeum* 22: 373–81.

Barnett, R. D. 1935. “The Nimrud Ivories and the Art of the Phoenicians.” *Iraq* 2(2): 179–210.

— 1939. “Phoenician and Syrian Ivory Carving.” *PEQ* 71: 4–19.

— 1948. “Early Greek and Oriental Ivories.” *JHS* 68: 1–25.

— 1982. “Ancient Ivories in the Middle East.” *Qedem* 14: 1–99.

Barringer, J. M. 2003. *The Hunt in Ancient Greece*. Baltimore: Johns Hopkins University Press.

— 2013. “Hunters and Hunting on the François Vase.” In: *The François Vase: New Perspectives. Papers of International Symposium Villa Spelman, Florence 23–24 Mai, 2003*. Edited by H. A. Shapiro, M. Iozzo, and A. Lezzi-Hafter. Kilchberg: Akanthus: 153–67.

Baughan, E. P. 2016. “Burial *Klinai* and *Totenmahl?*” In: *Dining and Death: Interdisciplinary Perspectives on the Funerary Banquet in Ancient Art, Burial and Belief*, edited by C. M. Draycott and M. Stamatopoulou. Leuven: Peeters: 195–218.

Becker, C. 1994. “Elfenbein aus den syrischen Steppen? Gedanken zum Vorkommen von Elefanten in Nordostsyrien im Spätholozän.” In: *Beiträge zur Archäozoologie und prähis-*

torischen Anthropologie: 8. Arbeitstreffen der Osteologen, Konstanz 1993 im Andenken an Joachim Boessneck. Stuttgart: Konrad Theiss Verlag: 169–81.

Becker, C. 2005. "Small Numbers, Large Potential: New Prehistoric Finds of Elephant and Beaver from the Khabur River/Syria." *Munibe Antropologia-Arkeologia* (57): 445–56.

— 2008. "Die Tierknochenfunde aus Tall Šēḫ Ḥamad / Dūr-Katlimmu: Eine zoogeographisch-haustierkundliche Studie." In: *Umwelt und Subsistenz der assyrischen Stadt Dūr-Katlimmu am Unteren Ḫābūr*, edited by H. Kühne. Vol. 8. Wiesbaden: Otto Harrassowitz Verlag.

Bello, S. M., G. Delbarre, I. D. Groote, and S. A. Parfitt. 2016. "A Newly Discovered Antler Flintknapping Hammer and the Question of their Rarity in the Palaeolithic Archaeological Record: Reality or Bias?" *Quaternary International* 403: 107–17.

Benade, A. H. 1960. "The Physics of Wood Winds." *Scientific American* 203(4): 144–57.

Besios, M. 2010. *Πιερίδων στέφανος. Πύδνα, Μεθώνη και οι αρχαιότητες της βόρειας Πιερίας*. Κατερίνη: Εταιρεία Ανθρώπων και Φύσεως Έργα.

— 2012. "Η ανασκαφή του 'Υπογείου'." In: *Μεθώνη Πιερίας I: Επιγραφές, χαράγματα και εμπορικά σύμβολα στη Γεωμετρική και Αρχαϊκή κεραμική από το 'Υπόγειο' της Μεθώνης Πιερίας στη Μακεδονία*. Thessaloniki: Centre for the Greek Language: 41–111.

Besios, M., A. Athanassiadou, E. Gerofoka, and M. Tolia-Christakou. 2006. "Μεθώνη 2004." *AEMTh* 18: 367–76.

Besios, M., A. Athanassiadou, and K. Noulas. 2011. "Ανασκαφή Μεθώνης." *AEMTh* 22: 241–48.

Besios, M. and K. Noulas. 2012. "Archaic Pottery from the Acropolis of Ancient Methone." In: *Archaic Pottery of the Northern Aegean and its Periphery (700-480 BC). Proceedings of the Archaeological Meeting Thessaloniki, 19-22 May 2011*, edited by M. Tiverios, V. Misailidou-Despotidou, E. Manakidou, and A. Arvanitaki. Thessaloniki: Αρχαιολογικό Ινστιτούτο Μακεδονικών και Θρακικών Σπουδών: 399–407.

Besios, M., Y. Z. Tzifopoulos, and A. Kotsonas. 2012. *Μεθώνη Πιερίας Ι: Επιγραφές, χαράγματα και εμπορικά σύμβολα στη Γεωμετρική και Αρχαϊκή κεραμική από το 'Υπόγειο' της Μεθώνης Πιερίας στη Μακεδονία*. Thessaloniki: Centre for the Greek Language.

Betts, M. 2007. "The Mackenzie Inuit Whale Bone Industry: Raw Material, Tool Manufacture, Scheduling, and Trade." *Arctic* 60: 129–44.

Bevan, E. 1987. "The Goddess Artemis, and the Dedication of Bears in Sanctuaries." *BSA* 82: 17–21.

Biel, J. 1987. "Hochdorf." In: *Trésors des princes celtes: Galeries nationales du Grand Palais, 20 octobre 1987–15*. Paris: Editions de la Réunion des musées nationaux: 95–187.

Biere, A., J. van Andel, and J. van de Koppel. 2012. "Populations: Ecology and Genetics." In: *Restoration Ecology: The New Frontier*, edited by J. Aronson. West Sussex: John Wiley & Sons.

Biró, T., A. M. Choyke, L. Vass, and Á. Vecsey. 2012. *Aquincumi Csonttárgyak. Bone Objects in Aquincum.* Budapest: Az Aquincumi Múzeum Gyűjteménye.

Blandin, B. 2007a. *Les pratiques funéraires d'époque géométrique à Erétrie. Vol. I: Espace des Vivants, Demeures des Morts*. Eretria 17. Gollion: Infolio.

— 2007b. *Les pratiques funéraires d'époque géométrique à Erétrie. Vol. II: Catalogue, tableaux et planches*. Eretria 17. Gollion: Infolio.

Blegen, C. W., H. Palmer, and R. S. Young. 1964. *The North Cemetery. Corinth* 13. Princeton: The American School of Classical Studies at Athens.

Blinkenberg, C. 1926. *Lindiaka v: Fibules grecques et orientales*. Vol. 13. Det Kgl. danske videnskabernes selskab. Historisk-filologiske meddelelser 1. Copenhagen: Andr. Fred. Høst & søn.

— 1931. *Lindos. Fouilles de l'Acropole, 1902–1914, I: Les petits objets*. Berlin: Walter de Gruyter.

Boardman, J. 1962. "Archaic Finds at Knossos." *BSA* 57: 28–34.

Boardman, J. 1963. "Artemis Orthia and Chronology." *BSA* 58: 1–7.

— 1967a. *Excavations in Chios, 1952–1955: Greek Emporio*. *BSA* Suppl. 6. Oxford: British School of Archaeology at Athens.

— 1967b. "The Khaniale Tekke Tombs, II." *BSA* 62: 57–75.

— 1970. *Greek Gems and Finger Rings: Early Bronze Age to Late Classical*. New York: Harry N. Abrams Inc.

— 1978. *Greek Sculpture: The Archaic Period*. London: Thames and Hudson.

Boardman, J. and J. W. Hayes. 1966. *Excavations at Tocra, 1963–1965*. *BSA* Suppl. 4. Oxford: British School of Archaeology at Athens.

— 1973. *Excavations at Tocra: 1963–1965. The Archaic Deposits II and Later*. *BSA* Suppl. 10. Oxford: British School of Archaeology at Athens.

Boessneck, J. and J. Peters. 1988. "Tierknochen- und Molluskenfunde aus dem Grabungsbereich 'Kuppe' in Tall Munbāqa." *MDOG* 120: 51–58.

Boessneck, J. and A. von den Driesch. 1983. "Weitere exotischer Tiere aus dem Heraion von Samos." *AM* 98: 21–24.

— 1986. "Tierknochen- und Molluskenfunde aus Munbāqa." *MDOG* 118: 147–60.

Böhm, S. 1990. *Die nackte Göttin. Zur Ikonographie und Deutung unbekleideter weiblicher Figuren in der frühgriechischen Kunst*. Mainz: Phillip Von Zabern.

Bökönyi, S. 1985. "Subfossil Elephant Remains from Southwestern Syria." *Paléorient* 11(2).

— 1986. "Subfossile Elefantenknochen aus Vorderasien." In: *Kamid El-Loz 1977–81*, edited by R. Hachmann. Vol. 36. Saarbrücker Beiträge Zur Altertumskunde. Bonn: Rudolf Habelt.

— 1990. *Kāmid el-Lōz: Tierknochenfunde der Ausgrabungen 1964 bis 1981*. Bonn: Rudolf Habelt.

Borza, E. N. 1987. "Timber and Politics in the Ancient World: Macedon and the Greeks." *PAPS* 131(1): 32–52.

Boufalis, A. Forthcoming. "The Role of Methone in the Macedonian Timber Trade." In: *Excavations at Ancient Methone, 2003–2013*, edited by S. P. Morris and J. K. Papadopoulos.

Bourdieu, P. 1990. *The Logic of Practice*. Trans. by R. Nice. Stanford: Stanford University Press.

Bourogiannis, G. 2013. "Who Hides behind the Pots? a Reassessment of the Phoenician Presence in Early Iron Age Cos and Rhodes." *Ancient Near Eastern Studies* 50: 139–89.

Brandt, A. L., Y. Hagos, Y. Yacob, V. A. David, N. J. Georgiadis, J. Shoshani, and A. L. Roca. 2014. "The Elephants of Gash-Barka, Eritrea: Nuclear and Mitochondrial Genetic Patterns." *Journal of Heredity* 105(1): 82–90.

Braun-Holzinger, E. A. and H. Matthäus. 2000. "Schutzgenien in Mesopotamien und in den angrenzenden Gebieten: ihre Übernahme in Zypern, Kreta und Griechenland." In: *Images as Media: Sources for the Cultural History of the Near East and the Eastern Mediterranean (1st Millenium BCE)*, edited by C. Uehlinger. Orbis Biblicus et Orientalis 175.

Brea, M. B., P. Mazzieri, and R. Micheli. 2010. "People, Dogs and Wild Game: Evidence of Human-Animal Relations from Middle Neolithic Burials and Personal Ornaments in Northern Italy." *Documenta Praehistorica* 37: 125–46.

Brize, P. 1992. "New Ivories from the Samian Heraion." In: *Ivory in Greece and the Eastern Mediterranean from the Bronze Age to the Hellenistic Period*, edited by J. L. Fitton. *BMOP* 85. London: British Museum Press: 163–71.

— 2020. "Elfenbein." In: *Ausgrabungen im Südostgebiet des Heraion von Samos*. Samos 28. Wiesbaden: Reichert Verlag: 78–88.

Brock, J. K. 1957. *Fortetsa: Early Greek Tombs Near Knossos*. *BSA* Suppl. 2. Cambridge: Cambridge University Press.

Brock, J. K. and G. M. Young. 1949. "Excavations in Siphnos." *BSA* 44: 1–92.

Broecker, W. S., G. H. Denton, R. L. Edwards, H. Cheng, R. B. Alley, and A. E. Putnam. 2010. "Putting the Younger Dryas Cold Event into Context." *Quaternary Science Reviews* 29(9): 1078–81.

Brøns, C. 2014a. *Gods and Garments: Textiles in Greek Sanctuaries in the 7th–1st Centuries BC*. Oxford: Oxbow.

— 2014b. "Representation and Realities: Fibulas and Pins in Greek and Near Eastern Iconography." In: *Greek and Roman Textiles and Dress: An Interdisciplinary Anthology*, edited by M. Harlow and M.-L. Nosch. Oxford: Oxbow: 60–93.

Brückner, A. and E. Pernice. 1893. "Ein attischer Friedhof." *AM* 18: 6–191.

Brumfiel, E. M. and T. K. Earle, eds. 1987. *Specialization, Exchange and Complex Societies: An Introduction*. Cambridge: Cambridge University Press: 1–9.

Bubenik, A. B. 1990. "Epigenetical, Morphological, Physiological, and Behavioral Aspects of Evolution of Horns, Pronghorns, and Antlers." In: *Horns, Pronghorns, and Antlers*, edited by G. A. Bubenik and A. B. Bubenik: 3–113.

Buddhachat, K., C. Thitaram, J. L. Brown, S. Klinhom, P. Bansiddhi, K. Penchart, K. Ouitavon, K. Sriaksorn, C. Pa-In, B. Kanchanasaka, et al. 2016. "Use of Handheld X-Ray Fluorescence as a Non-invasive Method to Distinguish between Asian and African Elephant Tusks." *Scientific Reports* 6: 1–11.

Bulkeley, K. 1998. "Penelope as Dreamer: A Reading of Book 19 of *The Odyssey*." *Dreaming* 9: 229–42.

Bundrick, S. D. 2017. "Altars, *Astragaloi*, Achilles: Picturing Divination on Athenian Vases." In: *Gods, Objects, and Ritual Practice*, edited by S. Blakely. Atlanta: Lockwood Press: 53–74.

Burkert, W. 1987. "Offerings in Perspective: Surrender, Distribution, Exchange." In: *Gifts to the Gods: Proceedings of the Uppsala Symposium 1985*. Edited by T. Linders and G. Nordquist. *Boreas*. Uppsala: Academia Upsaliensis: 43–50.

Burkert, W. 1992. *The Orientalizing Revolution: Near Eastern Influence on Greek Culture in the Early Archaic Age*. Trans. by M. E. Pinder. Cambridge: Harvard University Press.

Burns, B. E. 2007. "Life outside a Mycenaean Palace: Elite Houses on the Periphery of Citadel Sites." *BSA Studies* 15: 111–19.

Çakırlar, C. and S. Ikram. 2016. "'When Elephants Battle, the Grass Suffers.' Power, Ivory and the Syrian Elephant." *Levant* 48(2): 167–83.

Caley, E. R. and J. F. C. Richards, trans. 1956. *Theophrastus: On Stones*. Columbus: Ohio State University.

Cambitoglou, A. 1988. *Zagora 2: Excavation of a Geometric Town on the Island of Andros*. Athens: Athens Archaeological Society.

Campana, D. V. 1989. *Natufian and Protoneolithic Bone Tools: The Manufacture and Use of Bone Implements in the Zagros and the Levant*. *BAR* 494. Oxford: British Archaeological Reports.

Campbell, R. B., Z. Li, Y. He, and Y. Jing. 2011. "Consumption, Exchange and Production at the Great Settlement Shang: Bone-Working at Tiesanlu, Anyang." *Antiquity* 85(330): 1279–1297.

Carè, B. 2012. "L'astragalo in tomba nel mondo greco: un indicatore infantile? Vecchi problemi e nuove osservazioni a proposito di un aspetto del costume funerario." In: *L'enfant et la mort dans l'Antiquité III. Le matériel associé aux tombes d'enfants: Actes de la table ronde internationale organisée à la Maison méditerranéenne des sciences de l'homme (MMSH) d'Aix-en-Provence, 20-22 janvier 2011*, edited by A. Hermary and C. Dubois. Bibliothèque d'Archéologie Méditerranéenne et Africaine. Aix-en-Provence: Publications du Centre Camille Jullian: 404–16.

Carlson, D. N. 2009. "Seeing the Sea: Ships' Eyes in Classical Greece." *Hesperia* 78(3): 347–365.

Carter, J. B. 1985. *Greek Ivory-Carving in the Orientalizing and Archaic Periods*. New York: Garland Publishing.

Carter, J. B. 1988. “Masks and Poetry in Early Sparta.” In: *Early Greek Cult Practice: Proceedings of the Fifth International Symposium at the Swedish Institute at Athens*, edited by R. Hägg, N. Marinatos, and G. Nordquist. *ActaAth*. Stockholm: Svenska Institutet i Athen: 89–98.

— 1989. “The Chests of Periander.” *AJA* 93(3): 355–78.

Casson, L. 1993. “Ptolemy II and the Hunting of African Elephants.” *TAPA* 123: 247–60.

Castor, A. Q. 2008. “Archaic Greek Earrings: An Interim Survey.” *AA*: 1–34.

Catling, E. and E. Catling. 1980. “Objects of Bronze, Iron and Lead.” In: *Lefkandi I: The Iron Age*, edited by M. R. Popham, L. Sackett, and P. Themelis. *BSA* Suppl. 11. London: The British School of Archaeology at Athens: 231–64.

Caubet, A. 2008. “Ivory, Shell, and Bone.” In: *Beyond Babylon: Art, Trade, and Diplomacy in the Second Millennium B.C.* Edited by J. Aruz, K. Benzel, and J. M. Evans. New York: Metropolitan Museum of Art: 406–18.

Caubet, A. and D. Gaborit-Chopin. 2004. “Origines et Diffusion.” In: *Ivoires: de l’Orient ancien aux temps modernes*, edited by A. Caubet and D. Gaborit-Chopin. Paris: Réunion des Musées Nationaux: 28–30.

Caubet, A. and F. Poplin. 1987. “Les objets de matière dure animale: étude du matériau.” In: *Ras Shamra-Ougarit, III, Le centre de la ville*, edited by M. Yon. Paris: Mission archéologique de Ras Shamra-Ougarit: 273–306.

— 1992. “La Place des Ivoires d’Ougarit dans la Production du Proche Orient Ancien.” In: *Ivory in Greece and the Eastern Mediterranean from the Bronze Age to the Hellenistic Period*, edited by J. L. Fitton. *BMOP* 85. London: British Museum Press: 91–100.

— 2010. “Réflexions sur la question de l’éléphant syrien.” In: *Dūr-Katlimmu 2008 and Beyond*, edited by H. Kühne. Vol. 1. Wiesbaden: Otto Harrassowitz Verlag.

Cecchini, S. M., S. Mazzoni, and E. Scigliuzzo, eds. 2009. *Syrian and Phoenician Ivories of the Early First Millennium BCE* (Aula Magna Storica - Palazzo La Sapienza, Università degli Studi di Pisa, Dec. 9–11, 2004). Pisa: Edizioni ETS.

Charitonidis, S. 1966. “Αργολιδοκορινθία.” *ArchDelt* 21: 121–32.

Chechushkov, I. V., A. V. Epimakhov, and A. G. Bersenev. 2018. “Early Horse Bridle with Cheekpieces as a Marker of Social Change: An Experimental and Statistical Study.” *Journal of Archaeological Science* 97: 125–36.

Choyke, A. M. 2013. “Hidden Agendas: Ancient Raw Material Choice for Worked Osseous Objects in Central Europe and Beyond.” In: *From These Bare Bones: Raw Materials and the Study of Worked Osseous Objects*, edited by A. M. Choyke and S. O’Connor. Oxford: Oxbow Books.

Choyke, A. M. and L. Bartosiewicz. 2009. “Telltale Tools from a Tell: Bone and Antler Manufacturing at Bronze Age Jászdózsa–Kápolnahalom, Hungary.” *Tiscium XX*: 357–76.

Choyke, A. M., M. Vretemark, and S. Sten. 2004. “Levels of Social Identity Expressed in the Refuse and Worked Bone from Middle Bronze Age Százhalombatta-Földvár, Vatya Culture, Hungary.” In: *Behaviour Behind Bones: The Zooarchaeology of Ritual, Religion, Status and Identity*, edited by S. J. O’Day, W. V. Neer, and A. Ervynck. Oxford: Oxbow Books: 177–189.

Christidou, R. 2008. “An Application of Micro-Wear Analysis to Bone Experimentally Worked Using Bronze Tools.” *JAS* 35(3): 733–51.

Clark, J. G. D. and M. W. Thompson. 1954. “The Groove and Splinter Technique of Working Antler in Upper Palaeolithic and Mesolithic Europe.” *Proceedings of the Prehistoric Society* 19(2): 148–60.

Clark, J. E. 1995. “Craft Specialization as an Archaeological Category.” *Research in Economic Anthropology* 16: 267–96.

— 2007. “In Craft Specialization’s Penumbra: Things, Persons, Action, Value, and Surplus.” *Archaeological Papers of the American Anthropological Association* 17(1): 20–35.

Clark, J. E. and W. J. Parry. 1990. “Craft Specialization and Cultural Complexity.” *Research in Economic Anthropology* 12: 289–346.

Clark, S. R. L. 1988. “Is Humanity a Natural Kind?” In: *What is an Animal?* Edited by T. Ingold. London: Routledge: 17–34.

Clason, A. T. 1983. “Spoolde. Worked and Unworked Antlers and Bone Tools from Spoolde, De Gaste, the IJsselmeerpolders and Adjacent Areas.” *Palaeohistoria* 25: 77–130.

Clay, J. S., I. Malkin, and Y. Z. Tzifopoulos, eds. 2017. *Panhellenes at Methone: Graphê in Late Geometric and Protoarchaic Methone, Macedonia (ca 700 BCE).* Trends in Classics 44. Berlin: Walter de Gruyter.

Clutton-Brock, J. 1994. “The Unnatural World: Behavioural Aspects of Humans and Animals in the Process of Domestication.” In: *Animals and Human Society: Changing Perspectives*, edited by A. Manning and J. Serpell. London: Routledge: 23–35.

Clutton-Brock, T., S. Albon, R. Gibson, and F. Guinness. 1979. “The Logical Stag: Adaptive Aspects of Fighting in Red Deer (*Cervus elaphus L.*)” *Animal Behaviour* 27: 211–25.

Coldstream, J. N. 1969. “The Phoenicians of Ialysos.” *BICS* (16): 1–8.

— 1976. “Hero-Cults in the Age of Homer.” *JHS* 96: 8–17.

— 1977. *Geometric Greece: 900–700 BC.* 2nd ed. London: Routledge.

— 1984. “A Protogeometric Nature Goddess from Knossos.” *BICS* (31): 93–104.

— 1994. “Warriors, Chariots, Dogs and Lions: a New Attic Geometric Amphora.” *BICS* 39: 85–94.

Coldstream, J. N. and M. S. F. Hood. 1968. “A Late Minoan Tomb at Ayios Ioannis near Knossos.” *BSA* 63: 205–18.

Coldstream, J. N. and H. W. Catling, eds. 1997. *Knossos North Cemetery: Early Greek Tombs.* Vol. 1. London: British School of Athens.

Collon, D. 1977. “Ivory.” *Iraq* 39(2): 219–22.

Conkey, M. 1993. “Humans as Materialists and Symbolists: Image Making in the Upper Paleolithic.” In: *The Origin and Evolution of Humans and Humanness*, edited by D. T. Rasmussen. Toronto: Jones and Bartlett: 95–118.

Conneller, C. 2004. "Becoming Deer. Corporeal Transformations at Star Carr." *Archaeological Dialogues* 11(1): 37–56.

— 2012. *An Archaeology of Materials: Substantial Transformations in Early Prehistoric Europe*. Routledge Studies in Archaeology. New York: Taylor & Francis.

Connor, W. R. 1988. "Seized by the Nymphs: Nympholepsy and Symbolic Expression in Classical Greece." *ClAnt* 7(2): 155–89.

Cook, J. M., R. V. Nicholls, and D. M. Pyle. 1998. *Old Smyrna Excavations: The Temples of Athena*. *BSA* Suppl. 30. London: British School at Athens.

Corbett, P. E. 1949. "Attic Pottery of the Later Fifth Century from the Athenian Agora." *Hesperia* 18(4): 298–351.

Cornelius, I. 2004. *The Many Faces of the Goddess: The Iconography of the Syro-Palestinian Goddesses Anat, Astarte, Qedeshet, and Asherah c. 1500-1000 BCE*. 2nd ed. Orbis Biblicus et Orientalis 204. Fribourg: Academic Press Fribourg.

Costin, C. L. 1991. "Craft Specialization: Issues in Defining, Documenting, and Explaining the Organization of Production." *Archaeological Method and Theory* 3: 1–56.

— 1998. "Introduction: Craft and Social Identity." In: *Craft and Social Identity*, edited by C. L. Costin and R. P. Wright. Washington, DC: American Anthropological Association.

— 2001. "Craft Production Systems." In: *Archaeology at the Millennium: A Sourcebook*, edited by G. M. Feinman and T. D. Price. New York: Kluwer Academic/Plenum: 273–327.

— 2007. "Thinking about Production: Phenomenological Classification and Lexical Semantics." *Archaeological Papers of the American Anthropological Association* 17(1): 143–62.

Courbin, P. 1974. *Tombes géométriques d'Argos*. Vol. 7. Études Péloponnésiennes. Paris: J. Vrin.

Crabtree, P. J. 1990. "Zooarchaeology and Complex Societies: Some Uses of Faunal Analysis for the Study of Trade, Social Status, and Ethnicity." *Archaeological Method and Theory* 2: 155–205.

Crielaard, J. P. 2012. “Powerful Things in Motion: A Biographical Approach to Eastern Elite Goods in Greek Sanctuaries.” In: *Sanctuaries and the Power of Consumption: Networking and the Formation of Elites in the Archaic Western Mediterranean World. Proceedings of the International Conference in Innsbruck* (Mar. 20–23, 2012). Edited by M. M. Erich Kistler Birgit Öhlinger and M. Hoernes. Wiesbaden: Harrassowitz Verlag: 351–70.

Cristiani, E. and F. Alhaique. 2005. “Flint vs. Metal: The Manufacture of Bone Tools in the Eneolithic Site of Conelle di Arcevia (Central Italy).” In: *From Hooves to Horns, from Mollusc to Mammoth. Manufacture and Use of Bone Artefacts from Prehistoric Times to the Present, Proceedings of the Fourth Meeting of the (ICAZ) Worked Bone Research Group, 26–31 August 2003, Tallinn, Estonia*, edited by H. Luik, A. M. Choyke, C. E. Batey, and L. Lõugas. Vol. 15. Muinasaja teadus. Tallinn, Estonia: Cultural Endowment of Estonia: 397–403.

Croissant, F. 1983. *Les protomés féminines archaïques: recherches sur les représentations du visage dans la plastique grecque de 550 à 480 av. J.-C.* Paris: J.-C. Paris, De Boccard.

— 1986. “Observations sur le style des têtes chryséléphantines de Delphes (avec projections).” *RÉG* 99(472/474): XXII–XXV.

— 1988. “Tradition et innovation dans les ateliers corinthiens archaïques: matériaux pour l’histoire d’un style.” *BCH* 112.

Crowley, J. L. 1989. *The Aegean and the East: An Investigation into the Transference of Artistic Motifs Between the Aegean, Egypt, and the Near East in the Bronze Age. SIMA* 51. Jonsered: Paul Åström Förlag.

Csornai-Kovács, T. 2000. “Mongolian Urban Games.” *Acta Ethnographica Hungarica* 44(1–2): 177–87.

Cultraro, M. 2004. “Exercise of Dominance. Boar Hunting in Mycenaean Religion and Hittite Royal Rituals.” In: *Offizielle Religion, lokale Kulte und individuelle Religiositat: Akten des religionsgeschichtlichen Symposiums “Kleinasien und angrenzende Gebiete vom Beginn* *des 2. bis zur Mitte des 1. Jahrtausends v. Chr." (Bonn, 20.-22. Februar 2003)*, edited by M. Hutter and S. Hutter-Braunsar. *AOAT* 318. Munster: Ugarit-Verlag.

Cutler, A. and A. Götherström. 2008. "African or Asian? DNA Analysis of Byzantine and Western Medieval Ivories." In: *Elfenbein und Artenschutz. Ivory and Species Conservation: Proceedings of INCENTIVS – Meetings (2004 - 2007)*. Bundesamt für Naturschutz: 73–80.

Cutler, A. 2011. "Carving, Recarving, and Forgery: Working Ivory in the Tenth and Twentieth Centuries." *West 86th: A Journal of Decorative Arts, Design History, and Material Culture* 18(2): 182–95.

D'Acunto, M. 2017. "The Protogeometric and Geometric Necropolis of Ialysos (Rhodes): Burial Customs, Commerce and Society." In: *Regional Stories Towards a New Perception of the Early Greek World*, edited by A. Mazarakis Ainian, A. Alexandridou, and X. Charalambidou. Volos: University of Thessaly Press: 437–86.

Davidson, G. R. 1952. *The Minor Objects. Corinth* 12. Cambridge: Harvard University Press.

Davidson, G. R. and D. B. Thompson. 1943. *Small Objects from the Pnyx: I.* Vol. 7. Princeton: American School of Classical Studies at Athens.

Davies, N. de Garis. 1943. *The tomb of Rekh-mi-Rē at Thebes: Volume I.* Publications of the Metropolitan Museum of Art Egyptian Expedition 11. New York: Metropolitan Museum of Art.

Davis, D. D., T. R. Kidder, and D. A. Barondess. 1983. "Reduction Analysis of Simple Bone Industries: An Example from the Louisiana Coastal Zone." *Archaeology of Eastern North America* 11: 98–108.

Dawkins, R. 1929a. "Objects in Carved Ivory and Bone." In: *The Sanctuary of Artemis Orthia at Sparta. Excavated and Described by Members of the British School at Athens, 1906–1910*, edited by R. Dawkins. London: Macmillan & Company.

— ed. 1929b. *The Sanctuary of Artemis Orthia at Sparta. Excavated and Described by Members of the British School at Athens, 1906–1910*. London: Macmillan & Company.

Dawkins, R., J. P. Droop, A. M. Woodward, P. Giles, A. J. B. Wace, and M. S. Thompson. 1908. "Laconia: I. Excavations at Sparta, 1909." *BSA* 15: 1–157.

De Flamingh, A., A. Coutu, J. Sealy, S. Chirikure, A. D. Bastos, N. M. Libanda-Mubusisi, R. S. Malhi, and A. L. Roca. 2020. "Sourcing Elephant Ivory from a Sixteenth-Century Portuguese Shipwreck." *Current Biology.*

de Genouillac, H. 1924. *Premières recherches archéologiques à Kich: Mission d'Henri de Genouillac 1911–1912. Rapport sur les travaux et inventaires, facsimilés, dessins, photographies et plans.* Vol. 2. Paris: Edouard Champion.

De Polignac, F. 1995. *Cults, Territory, and the Origins of the Greek City-State.* Trans. by J. Lloyd. Chicago: University of Chicago Press.

deFrance, S. D. 2009. "Zooarchaeology in Complex Societies: Political Economy, Status, and Ideology." *Journal of Archaeological Research* 17(2): 105–68.

Deleuze, G. and F. Guattari. 1987. *A Thousand Plateaus: Capitalism and Schizophrenia.* Trans. by B. Massumi. Minneapolis: University of Minnesota Press.

Demand, N. H. 2011. *The Mediterranean Context of Early Greek History.* West Sussex: John Wiley & Sons.

Demargne, P. 1964. *The Birth of Greek Art.* Trans. by S. Gilbert and J. Emmons. New York: Golden Press.

DeMello, M. 2011. "Blurring the Divide: Human and Animal Body Modifications." In: *A Companion to the Anthropology of the Body and Embodiment*, edited by F. E. Mascia-Lees. Chichester: Wiley-Blackwell: 338–52.

— 2012. *Animals and Society: An Introduction to Human-Animal Studies.* New York: Columbia University Press.

DeMello, M. and M. Mullin. 2010. *Human-Animal Studies: Anthropology.* New York: Lantern Books.

Deonna, W. 1938. *Le Mobilier délien.* Délos 18. Paris: de Boccard.

Dermitzakis, M., N. Symeonidis, L. De Boer, and P. Sondaar. 1982. "The Evolution of the Elephants." *Editions of the Laboratory of Geology and Palaeontology* 44.

Derrida, J. 2002. "The Animal That Therefore I Am (More to Follow)." Trans. by D. Wills. *Critical Inquiry* 28(2): 369–418.

Descartes, R. 1998. *Discourse on Method*. Trans. by D. A. Cress. Indiana: Hackett Publishing.

Descola, P. 2013. *Beyond Nature and Culture*. Trans. by J. Lloyd. Chicago: University of Chicago Press.

DeVries, K. and C. B. Rose. 2013. "The Throne of Midas? Delphi and the Power Politics of Phrygia, Lydia, and Greece." In: *The Archaeology of Phrygian Gordion, Royal City of Midas*, edited by C. B. Rose. Gordion Special Studies 7. Philadelphia: University of Pennsylvania Press: 189–200.

di Fraia, T. 2017. "Tablet Weaving in Prehistory and Proto-history: The Contribution of the Italian Record." In: *Material Chains in Late Prehistoric Europe and the Mediterranean: Time, Space and Technologies of Production*, edited by A. Gorgues, K. Rebay-Salisbury, and R. Salisbury. Bordeaux: Ausonius Éditions: 139–55.

Dickinson, O. 2006. *The Aegean from Bronze Age to Iron Age: Continuity and Change Between the Twelfth and Eighth centuries BC*. Routledge.

Dobres, M.-A. 2000. *Technology and Social Agency: Outlining a Practice Framework for Archaeology*. Social Archaeology. Oxford: Blackwell.

Dontas, G. 1967. "Αρχαιότητες και μνημεία των Ιονίων Νήσων." *ArchDelt* 22 B': 360–70.

Dörig, J. 1962. "Lysippe und Iphianassa." *AM* 77: 72–104.

Doukas, C. and A. Athanassiou. 2003. "Review of the Pliocene and Pleistocene Proboscidea (Mammalia) from Greece." *Deinsea* 9(1): 97–110.

Drake, A., T. L. H. Donahue, M. Stansloski, K. Fox, B. B. Wheatley, and S. W. Donahue. 2016. "Horn and Horn Core Trabecular Bone of Bighorn Sheep Rams Absorbs Impact Energy and Reduces Brain Cavity Accelerations during High Impact Ramming of the Skull." *Acta biomaterialia* 44: 41–50.

Driessen, J. and J. P. Crielaard. 1994. "The Hero's Home. Some Reflections on the Building at Toumba, Lefkandi." *Topoi* 4.

Droop, J. P. 1929a. "The Bronzes." In: *The Sanctuary of Artemis Orthia at Sparta. Excavated and Described by Members of the British School at Athens, 1906–1910*, edited by R. Dawkins. London: Macmillan & Company: 190–202.

— 1929b. "The Laconian Pottery." In: *The Sanctuary of Artemis Orthia at Sparta. Excavated and Described by Members of the British School at Athens, 1906–1910*, edited by R. Dawkins. London: Macmillan & Company: 52–116.

Dudley, J. P., A. Y. Mensah-Ntiamoah, and D. G. Kpelle. 1992. "Forest Elephants in a Rainforest Fragment: Preliminary Findings from a Wildlife Conservation Project in Southern Ghana." *African Journal of Ecology* 30(2): 116–26.

Dugas, C. 1921. "Le sanctuaire d'Aléa Athéna à Tégée avant le IVe siècle." *BCH* 45(1): 335–435.

Dunbabin, T., ed. 1940. *Perachora II: The Sanctuaries of Hera Akraia and Limenia; Excavations of the British School of Archaeology at Athens, 1930-1933. Pottery, Ivories, Scarabs, and Other Objects from the Votive Deposit of Hera Limenia.* Oxford: Clarendon Press.

Duplouy, A. 2006. *Le prestige des élites: recherches sur les modes de reconnaissance sociale en Grèce entre les Xe et Ve siècles avant J.-C.* Paris: Les Belles Lettres.

Duval, N. 2015. "Probability in the Ancient Greek World: New Considerations from Astragalomantic Inscriptions in South Anatolia." *Zeitschrift für Papyrologie und Epigraphik* 195: 127–41.

Dyggve, E. and F. Poulsen. 1948. *Das Laphrion der Tempelbezirk von Kalydon.* Copenhagen: I Kommission Hos Ejnar Munksgaard.

Ebert, W. 1997. *Forstner Bit.* US Patent 5,695,304.

Ebinger-Rist, N., S. Wolf, K. Wehrberger, and C.-J. Kind. 2018. "L'homme-lion d'Hohlenstein – Stadel." *L'Anthropologie* 122(3): 415–36.

Ekroth, G. 2007. "Meat in Ancient Greece: Sacrificial, Sacred or Secular?" *Food and History* 5(1): 249–72.

— 2017a. "Bare Bones: Zooarchaeology and Greek Sacrifice*." In: *Animal Sacrifice in the Ancient Greek World*, edited by S. Hitch and I. Rutherford. Cambridge: Cambridge University Press: 15–47.

— 2017b. "'Don't Throw Any Bones in the Sanctuary!' On the Handling of Sacred Waste in Ancient Greek Cult Places." In: *Ritual Matters: Material Remains and Ancient Religion. MAAR* Suppl. 13. Ann Arbor: University of Michigan Press: 33–55.

Ellingham, S. T., T. J. Thompson, M. Islam, and G. Taylor. 2015. "Estimating Temperature Exposure of Burnt Bone — a Methodological Review." *Science & Justice* 55(3): 181–88.

Emery, K. F. 2008. "Techniques of Ancient Maya Bone Working: Evidence from a Classic Maya Deposit." *Latin American Antiquity* 19(2): 204–221.

Eph'al, I. and J. Naveh. 1989. "Hazael's Booty Inscriptions." *IEJ* 39(3/4): 192–200.

Erickson, B. L. 2002. "Aphrati and Kato Syme: Pottery, Continuity, and Cult in Late Archaic and Classical Crete." *Hesperia* 71(1): 41–90.

Erlandson, J. M., D. J. Kennett, B. J. Culleton, T. Goebel, G. C. Nelson, and C. Skinner. 2014. "Eyed Bone Needles from a Younger Dryas Paleoindian Component at Tule Lake Rock Shelter, Northern California." *AmerAnt* 79(4): 776–81.

Espinoza, E. O. and M.-J. Mann. 1993. "The History and Significance of the Schreger Pattern in Proboscidean Ivory Characterization." *Journal of the American Institute for Conservation* 32(3): 241–48.

Evans, R. 2019. "Leopard in Kitten Heels: The Politics of Theresa May's Sartorial Choices." *Clothing Cultures* 6(2): 199–213.

Evely, D. 1992. "Towards an Elucidation of the Ivory-Worker's Tool-Kit in Neo-Palatial Crete." In: *Ivory in Greece and the Eastern Mediterranean from the Bronze Age to the Hellenistic Period*, edited by J. L. Fitton. *BMOP* 85. London: British Museum Press: 7–16.

Evely, D. 1993. *Minoan Crafts: Tools and Techniques, Vol. 1. SIMA* 92. Stockholm: Paul Åström Förlag.

— 1996. "Other Materials." In: *Knossos North Cemetery, Early Greek Tombs: Volume II. BSA* Suppl. 28. London: British School at Athens: 621–36.

Ewart, K. M., A. L. Lightson, F. T. Sitam, J. J. Rovie-Ryan, N. Mather, and R. McEwing. 2020. "Expediting the Sampling, Decalcification, and Forensic DNA Analysis of Large Elephant Ivory Seizures to Aid Investigations and Prosecutions." *Forensic Science International: Genetics* 44: 1–5.

Feldman, M. H. 2014. *Communities of Style: Portable Luxury Arts, Identity, and Collective Memory in the Iron Age Levant*. Chicago: University of Chicago Press.

Filippaki, B. 1967. "'Ερυσίχθονος 15'." *ArchDelt* 21 B': 55–57.

Finkelstein, J. J. 1955. "Subartu and Subarians in Old Babylonian Sources." *JCS* 9(1): 1–7.

Fischer, E. 2007. *Ägyptische und ägyptisierende Elfenbeine aus Megiddo und Lachisch: Inschriftenfunde, Flaschen, Löffel. AOAT* 47. Münster: Ugarit-Verlag.

Fitton, J. L., ed. 1992. *Ivory in Greece and the Eastern Mediterranean from the Bronze Age to the Hellenistic Period. BMOP* 85. London: British Museum Press.

Flad, R. K. and Z. X. Hruby. 2007. "'Specialized' Production in Archaeological Contexts: Rethinking Specialization, the Social Value of Products, and the Practice of Production." *Archaeological Papers of the American Anthropological Association* 17(1): 1–19.

Floren, J. 1987. *Die griechische Plastik: Die geometrische und archaische Plastik*. Munich: C.H. Beck.

Fouache, E., M. Ghilardi, K. Vouvalidis, G. Syrides, M. Styllas, S. Kunesch, and S. Stiros. 2008. "Contribution on the Holocene Reconstruction of Thessaloniki Coastal Plain, Greece." *Journal of Coastal Research* 24(5): 1161–1218.

Foxhall, L. 2013. *Studying Gender in Classical Antiquity*. Key Themes in Ancient History. Cambridge: Cambridge University Press.

Frank, S. M. 2012. *Ingenious Contrivances, Curiously Carved: Scrimshaw in the New Bedford Whaling Museum*. Boston: David R. Godine Publisher.

Freyer-Schauenburg, B. 1966a. *Elfenbeine aus dem Samischen Heraion: Figürliches, Gefässe und Siegel*. Hamburg: Walter de Gruyter.

— 1966b. "Kolaios und die westphönizischen Elfenbeine." *MM* 7: 1–17.

Frigo, A. 2012. "Can One Speak of Painting if One Cannot Hold a Brush?: Giulio Mancini, Medicine, and the Birth of the Connoisseur." *Journal of the History of Ideas* 73(3): 417–436.

Frödin, O. V. A. and A. W. Persson. 1938. *Asine: Results of the Swedish Excavations, 1922–1930*. Stockholm: Generalstabens litografiska anstalts förlag i distribution.

Fuchs, W. and J. Floren. 1987. *Die griechische Plastik: Die geometrische und archaische Plastik*. Munich: CH Beck.

Furtwängler, A. 1890. *Die Bronzen und die übrigen kleineren Funde von Olympia*. Olympia: die Ergebnisse der von dem Deutschen Reich veranstalteten Ausgrabung. Berlin: A. Asher.

— 1906. *Aegina: das Heiligtum der Aphaia*. Munich: Akademie der Wissenschaften.

Furtwängler, A. E. 1981. "Heraion von Samos: Grabungen im Südtemenos 1977, II. Kleinfunde." *AM* 96: 73–138.

Gabolde, M. 2000. "Les éléphants de Niyi d'après les sources égyptiennes." In: *Des ivoires et des cornes dans les mondes anciens (Orient-Occident)*, edited by J.-C. G. J.-C. Béal. Coll. de l'Institut d'Archéologie et d'Histoire de l'Antiquité. Lyon: Université Lumière: 129–40.

Gallet de Santerre, H. and J. Tréheux. 1947. "Rapport sur le dépôt égéen et géométrique de l'Artémision à Délos." *BCH* 71–72: 148–254.

Gambacurta, G. and A. R. Serafini. 2007. "Dal fuso al telaio. Profili di donne nella società di Este nell'età del ferro." In: *Le ore e i giorni delle donne. Dalla quotidianità alla sacralità tra viii e vii secolo a.C.* Edited by P. von Eles. Verucchio: Pazzini: 45–33.

Gambín, P., F. Ceacero, A. J. Garcia, T. Landete-Castillejos, and L. Gallego. 2017. "Patterns of Antler Consumption Reveal Osteophagia as a Natural Mineral Resource in Key Periods for Red Deer (*Cervus elaphus*)." *European Journal of Wildlife Research* 63(2).

Gansell, A. R., J.-W. van de Meent, S. Zairis, and C. H. Wiggins. 2014. "Stylistic Clusters and the Syrian/South Syrian Tradition of First-Millennium BCE Levantine Ivory Carving: A Machine Learning Approach." *JAS* 44: 194–205.

Gardiner, A. H. 1947. *Ancient Egyptian Onomastica I.* Oxford: Oxford University Press.

Garlan, Y., R. Martin, O. Picard, H. Koukouli, Y. Grandjean, and B. Holtzmann. 1978. "Thasos." *BCH* 102(2): 803–30.

Gautier, A., R. Schild, F. Wendorf, and T. W. Stafford Jr. 1994. "One Elephant Doesn't Make a Savanna. Palaeoecological Significance of *Loxodonta africana* in the Holocene Sahara." *Sahara* (6): 7–20.

Geary, P. 1986. "Sacred Commodities: The Circulation of Medieval Relics." In: *The Social Life of Things: Commodities in Cultural Perspective*, edited by A. Appadurai. Cambridge Studies in Social and Cultural Anthropology. Cambridge: Cambridge University Press: 169–92.

Gerasimidis, A. and N. Athanasiadis. 1995. "Woodland History of Northern Greece from the Mid Holocene to Recent Time Based on Evidence from Peat Pollen Profiles." *Vegetation History and Archaeobotany* 4(2): 109–16.

Gerasimidis, A., S. Panajiotidis, and N. Athanasiadis. 2008. "Five Decades of Rapid Forest Spread in the Pieria Mountains (N. Greece) Reconstructed by Means of High-Resolution Pollen Analysis and Aerial Photographs." *Vegetation History and Archaeobotany* 17(6): 639–52.

Gesell, G. C. and L. P. Day. 1991. "Excavations at Kavousi, Crete, 1988." *Hesperia* 60(2): 145–77.

Gifford-Gonzalez, D. 1989. "Ethnographic Analogues for Interpreting Modified Bones: Some Cases from East-Africa." In: *Bone Modification*, edited by R. Bonnichsen and M. H. Sorg.

Orono, Maine: Orono: Center for the Study of the First Americans, University of Maine: 179–246.

Gilmour, G. H. 1997. "The Nature and Function of Astragalus Bones from Archaeological Contexts in the Levant and Eastern Mediterranean." *OJA* 16(2): 167–75.

Gimatzidis, S. 2010. *Die Stadt Sindos: eine Siedlung von der späten Bronze- bis zur klassischen Zeit am Thermaischen Golf in Makedonien.* Prähistorische Archäologie in Südosteuropa 26. Rahden: Marie Leidorf.

Girdland-Flink, L., E. Albayrak, and A. Lister. 2018. "Genetic Insight into an Extinct Population of Asian Elephants (*Elephas maximus*) in the Near East." *Open Quaternary* 4: 1–9.

Gkotsinas, A. and A. Gardeisen. Forthcoming. "A Worked Antler Assemblage from Room L8 of Argilos Northern Greece (400-350 BC)." In: *Argilos 25 Years of Research. Organization of City and Country in the Colonies of North Aegean 8th–3rd cent. BC - Conference Proceedings, Thessaloniki 25-27 May 2017.*

Glacken, C. J. 1967. *Traces on the Rhodian Shore: Nature and Culture in Western Thought from Ancient Times to the End of the Eighteenth Century.* Berkeley: University of California Press.

Gleba, M. 2008. *Textile Production in Pre-Roman Italy.* Ancient Textiles 4. Oxford: Oxbow.

Gobush, K. S., B. M. Mutayoba, and S. K. Wasser. 2008. "Long-Term Impacts of Poaching on Relatedness, Stress Physiology, and Reproductive Output of Adult Female African Elephants." *Conservation Biology* 22(6): 1590–99.

Gobush, K. S. and S. K. Wasser. 2009. "Behavioural Correlates of Low Relatedness in African Elephant Core Groups of a Poached Population." *Animal Behaviour* 78(5): 1079–86.

Golani, A. 2013. *Jewelry from the Iron Age II Levant.* Orbis Biblicus et Orientalis 34. Fribourg: Academic Press/Vandenhoeck & Ruprecht.

Goldman, H. 1940. "The Acropolis of Halae." *Hesperia* 9(4): 381–514.

Goss, R. J. 1983. *Deer Antlers. Regeneration, Function and Evolution.* New York: Academic Press.

Goutas, N. 2009. "Réflexions sur une innovation technique gravettienne importante: le double rainurage longitudinal." *Bulletin de la Société préhistorique française* 106(3): 437–56.

Gowers, W. 1948. "African Elephants and Ancient Authors." *African Affairs* 47(188): 173–80.

Graburn, N. H. 1979. "Introduction: Art of the Fourth World." In: *Ethnic and Tourist Arts: Cultural Expressions from the Fourth World*, edited by N. H. Graburn. Berkeley: University of California Press: 1–22.

Graf, F. 2005. "Rolling the Dice for an Answer." In: *Mantikê: Studies in Ancient Divination.* Religions in the Graeco-Roman World 155. Leiden: Brill: 51–97.

Graham, A. J. 1978. "The Foundation of Thasos." *BSA* 73: 61–98.

— 1999. *Colony and Mother City in Ancient Greece.* Manchester: Manchester University Press.

— 2001. "Thasian Controversies." In: *Collected Papers on Greek Colonization. Mnemosyne* Suppl. 214. Leiden: Brill: 365–402.

Grayson, A. K. 1982. "Assyria: Ashur-Dan II to Ashur-Nirari V (954–745 B.C.)" In: *The Cambridge Ancient History*, edited by J. Boardman, I. E. S. Edwards, N. G. L. Hammond, and E. Sollberger. Vol. 3. Cambridge: Cambridge University Press: 238–81.

— 1991. *Assyrian Rulers of the Early First Millennium BC I (1114–859 BC).* Vol. 2. The Royal Inscriptions of Mesopotamia, Assyrian Periods. Toronto: University of Toronto Press.

— 1996. *Assyrian Rulers of the Early First Millennium BC II (858–745 BC).* Vol. 3. The Royal Inscriptions of Mesopotamia, Assyrian Periods. Toronto: University of Toronto Press.

Grayson, A. K. and J. Novotny. 2012. *The Royal Inscriptions of Sennacherib, King of Assyria (704–-681 BC), Part 1.* Vol. 3/1. The Royal Inscriptions of the Neo-Assyrian Period. Winona Lake: Eisenbrauns.

Greaves, A. M. 2012. "Divination at Archaic Branchidai-Didyma: A Critical Review." *Hesperia* 81(2): 177–206.

— 2013. "Divine Things: The Ivories from the Artemision and the Luwian Identity of Ephesos." In: *Luwian Identities: Culture, Language and Religion Between Anatolia and the Aegean*, edited by M.-T. L. Roland Étienne. 64. Leiden: Brill: 509–38.

Greenfield, H. J. 1999. "The Origins of Metallurgy: Distinguishing Stone from Metal Cutmarks on Bones from Archaeological Sites." *Journal of Archaeological Science* 26(7): 797–808.

— 2006. "Slicing Cut Marks on Animal Bones: Diagnostics for Identifying Stone Tool Type and Raw Material." *Journal of Field Archaeology* 31(2): 147–63.

Guérin, S. M. 2013. "Meaningful Spectacles: Gothic Ivories Staging the Divine." *The Art Bulletin* 95(1): 53–77.

Gündem, C. Y. and H.-P. Uerpmann. 2003. "Erste Beobachtungen an den Tierknochenfunden aus Emar (Syrien): Grabungen bis 2002." *BaM* 34: 119–28.

Haggis, D. C., M. S. Mook, R. D. Fitzsimons, C. M. Scarry, and L. M. Snyder. 2011. "The Excavation of Archaic Houses at Azoria in 2005–2006." *Hesperia* 80(3): 431–89.

Haila, Y. 2000. "Beyond the Nature-Culture Dualism." *Biology and Philosophy* 15(2): 155–75.

Hall, J. M. 2008. "Foundation Stories." In: *Greek Colonisation, Volume 2*. Leiden: Brill: 383–426.

Haller, B. 2009. "The Gates of Horn and Ivory in *Odyssey* 19: Penelope's Call for Deeds, Not Words." *CP* 104(4): 397–417.

Halstead, P. 1996. "Pastoralism or Household Herding? Problems of Scale and Specialization in Early Greek Animal Husbandry." *WorldArch* 28(1): 20–42.

Hamilakis, Y. 2003. “The Sacred Geography of Hunting: Wild Animals, Social Power and Gender in Early Farming Societies.” *BSA Studies* 9: 239–47.

Hampe, R. 1976. “Tönerner Phormiskos aus Metapont.” *AA* 91: 192–202.

Hans-Günter Buchholz Gerhard Jöhrens, I. M. 1973. *Jagd und Fischfang*. ArchHom 2. Göttingen: Vandenhoeck & Ruprecht.

Haraway, D. J. 1989. *Primate Visions: Gender, Race, and Nature in the World of Modern Science*. New York: Routledge.

— 2003. *The Companion Species Manifesto: Dogs, People, and Significant Otherness*. Chicago: Prickly Paradigm Press.

— 2008. *When Species Meet*. Posthumanities 3. Minneapolis: University of Minnesota Press.

— 2016. “A Cyborg Manifesto.” In: *Manifestly Haraway*. Minneapolis: University of Minnesota Press. Originally published in *Socialist Review* 80 (1985), 65–108.

Harris, K. 2014. “Cervid Exploitation and Symbolic Significance in Prehistoric and Early Historic Periods Hunting, Performance and Incorporation: Human-Deer Encounter in Late Bronze Age Crete.” In: *Deer and People*, edited by R. M. Karis Baker Ruth Carden. Oxford: Oxbow: 48–58.

Hatzivassiliou, E. 2001. “The Attic Phormiskos: Problems of Origin And Function.” *BICS* 45(1): 113–48.

Hearne, V. 1987. *Adam’s Task: Calling Animals by Name*. New York: Skyhorse.

Held, W. 2000. *Das Heiligtum der Athena in Milet*. Vol. 2. Milesische Forschungen. Mainz: Philipp von Zabern.

Hendon, J. A. 1996. “Archaeological Approaches to the Organization of Domestic Labor: Household Practice and Domestic Relations.” *Annual Review of Anthropology* 25(1): 45–61.

Herrmann, G. 1986. *Ivories from Room SW 37 Fort Shalmaneser*. Vol. IV/1. Ivories from Nimrud. London: British School of Archaeology in Iraq.

Herrmann, G. 2000. “Ivory Carving of First Millennium Workshops, Traditions and Diffusion.” In: *Images as Media: Sources for the Cultural History of the Near East and the Eastern Mediterranean (1st Millenium BCE)*, edited by C. Uehlinger. Fribourg: Vandenhoeck und Ruprecht: 267–82.

— 2005. “Naming, Defining, Explaining: A View from Nimrud.” In: *Crafts and Images in Contact: Studies on Eastern Mediterranean Art of the First Millennium BCE*, edited by C. E. Suter and C. Uehlinger. Orbis Biblicus et Orientalis 210. Vandenhoeck und Ruprecht, Fribourg: 11–21.

Herrmann, G. and S. Laidlaw. 2013. “Ivories from Rooms SW11/12 and T10 Fort Shalmaneser.” Ivories from Nimrud VII.

Herrmann, G., S. Laidlaw, and H. Coffey. 2009. *Ivories from the North West Palace (1845–1992)*. Vol. VI. Ivories from Nimrud. London: British Institute for the Study of Iraq.

Herrmann, G. and M. Mallowan. 1974. *Ivories from Nimrud, Vol III: Furniture from SW7, Fort Shalmaneser*. London: British School of Archaeology in Iraq.

Herrmann, H.-V. 1966. “Der ‘Grafenbühl’ auf der Markung Asperg Kr. Ludwigsburg - ein Fürstenhügel der späten Hallstattzeit.” *Germania* 44(1): 74–102.

Heurtley, W. A. and H. L. Lorimer. 1932. “Excavations in Ithaca, I. LH III: Protogeometric Cairns at Aetós.” *The Annual of the British School at Athens* 33: 22–65.

Heurtley, W. A. and M. Robertson. 1948. “Excavations in Ithaca, V: The Geometric and Later Finds from Aetos.” *BSA* 43: 1–124.

Higbie, C. 1997. “The Bones of a Hero, the Ashes of a Politician: Athens, Salamis, and the Usable Past.” *ClAnt* 16(2): 278–307.

Highbarger, E. L. 1940. *The Gates of Dreams: An Archaeological Examination of Vergil, Aeneid VI, 893-899*. 30. Baltimore: The Johns Hopkins Press.

Hill, E. 2011. “Animals as Agents: Hunting Ritual and Relational Ontologies in Prehistoric Alaska and Chukotka.” *CAJ* 21(3): 407–26.

— 2013. “Archaeology and Animal Persons.” *Environment and Society* 4(1): 117–36.

Hochstetter, A. 1987. *Die Kleinfunde*. Vol. 6. Kastanas: Ausgrabungen in einem Siedlungshügel der Bronze- und Eisenzeit Makedoniens, 1975–1979. Berlin: Verlag Volker Spiess.

Hodder, I. 1982a. *Symbolic and Structural Archaeology*. Cambridge: Cambridge University Press.

— 1982b. *Symbols in Action: Ethnoarchaeological Studies of Material Culture*. Cambridge: Cambridge University Press.

Hodos, T. 2020. "Eggstraordinary Artefacts: Decorated Ostrich Eggs in the Ancient Mediterranean World." *Humanities and Social Sciences Communications* 7(1): 1–7.

Hoffman, G. L. 1997. *Imports and Immigrants: Near Eastern Contacts with Iron Age Crete*. Ann Arbor: University of Michigan Press.

— 2005. "Defining Identities: Greek Artistic Interaction with the Near East." In: *Crafts and Images in Contact: Studies on Eastern Mediterranean Art of the First Millennium BCE*, edited by C. E. Suter and C. Uehlinger. Orbis Biblicus et Orientalis 210. Fribourg: Vandenhoeck und Ruprecht: 351–89.

Hoffmann, H. 1997. *Sotades: Symbols of Immortality on Greek Vases*. Oxford: Oxford University Press.

Hogarth, D. 1900. "The Dictaean Cave." *BSA* 6: 94–116.

— ed. 1908a. *Excavations at Ephesus: The Archaic Artemisia*. London: British Museum.

— 1908b. "Other Ivory and Bone Objects." In: *Excavations at Ephesus: The Archaic Artemisia*, edited by D. Hogarth. London: British Museum: 186–98.

Homolle, T. 1891. "Nouvelles et correspondances." *BCH* 15(1): 441–58.

Horden, P. and N. Purcell. 2000. *The Corrupting Sea: A Study of Mediterranean History*. Oxford: Blackwell.

Houby-Nielsen, S. 1995. "'Burial language' in Archaic and Classical Kerameikos." *Proceedings of the Danish Institute at Athens* 1(1): 129–92.

— 2017. "Archaic Chalkis in Aetolia. Evidence for a Specialised Textile Production Developed in the Adriatic-Ionian Region." In: *Material Koinai in the Greek Early Iron Age and*

Archaic Period: Acts of an International Conference at the Danish Institute at Athens, 30 January – 1 February 2015, edited by S. Handberg and A. Gadolou. Monographs of the Danish Institute at Athens 22. Aarhus: Aarhus University Press: 245–88.

Howe, J. 1981. "Fox Hunting as Ritual." *American Ethnologist* 8(2): 278–300.

Hrnčiarik, E. 2017. "Bone and Antler Artefacts from the Roman Fort at Iža." Archaeologica Slovaca Monographiae.

Hruby, V. 1957. "Slovanské kostěné předměty a jejich výroba na Moraě." *Pamatky archeologicke* 48(1): 118–217.

Huber, S. 2003. *L'aire sacrificielle au nord du sanctuaire d'Apollon Daphnephoros. Un rituel des époques géométrique et archaïque. Vol. 1: Texte.* Eretria 14. Gollion: Infolio.

Huber, S. and F. Poplin. 2009. "Les sceaux en os dans la glyptique égéenne à l'époque archaïque." *BCH* 133(2): 627–32.

Hugh of St. Cher. 1703. *Postilla Hugonis de Sancto Charo, Vol. 2.* Edited by N. Pezzana. Venice: N. Pezzana.

Hutchinson, R. W., E. Eccles, and S. Benton. 1939. "Unpublished Objects from Palaikastro and Praisos. II." *BSA* 40: 38–59.

Hutchinson, R. and J. Boardman. 1954. "The Khaniale Tekke Tombs." *BSA* 49: 215–28.

Huxley, G. 1975. *Pindar's Vision of the Past.* Belfast.

— 1979. "Bones for Orestes." *GRBS* 20(2): 145–48.

Ingold, T. 1988a. "The Animal in the Study of Humanity." In: *What is an Animal?* Edited by T. Ingold. London: Routledge: 84–99.

— ed. 1988b. *What is an Animal?* London: Routledge.

— 1993. "The Reindeerman's Lasso." In: *Technological Choices: Transformation in Material Cultures Since the Neolithic*, edited by P. Lemonnier. London: Routledge: 108–25.

— 1994. "From Trust to Domination: An Alternative History of Human-Animal Relations." In: *Animals and Human Society: Changing Perspectives*, edited by A. Manning and J. Serpell. London: Routledge: 1–22.

Ingold, T. 2000. "Hunting and Gathering as Ways of Perceiving the Environment." In: *The Perception of the Environment: Essays on livelihood, dwelling and skill*. London: Routledge.

— 2013. *Making: Anthropology, Archaeology, Art and Architecture*. London: Routledge.

— 2016. "A Naturalist Abroad in the Museum of Ontology: Philippe Descola's Beyond Nature and Culture." *Anthropological Forum* 26(3): 301–320.

Ishida, Y., P. J. Van Coeverden de Groot, K. E. A. Leggett, A. S. Putnam, V. E. Fox, J. Lai, P. T. Boag, N. J. Georgiadis, and A. L. Roca. 2016. "Genetic Connectivity across Marginal Habitats: The Elephants of the Namib Desert." *Ecology and Evolution* 6(17): 6189–6201.

Işık, F. 2001. "Elfenbeinfiguren aus dem Artemision von Ephesos." In: *Der Kosmos der Artemis von Ephesos*, edited by U. Muss. Vienna: Österreichisches Archäologisches Institut: 85–100.

Jacobsthal, P. 1951. "The Date of the Ephesian Foundation-Deposit." *JHS* 71: 85–95.

Jacopi, G. 1932. "Sepolcreto di Papatislures." *ClRh* 6-7: 17–103.

Jacquemin, A. 1984. "Petits Objets Divers." In: *L'Antre Corycien II. BCH* Suppl. 9. Paris: Ecole Française d'Athènes: 166–75.

Jha, D. K., N. T. Kshetry, B. R. Pokharel, S. K. Lal, and R. Panday. 2017. "Identification and Differentiation of the Asian Elephant Ivory by Using Schreger Lines." *Journal of Institute of Science and Technology* 22(1): 99–103.

Jin, J. J. and P. Shipman. 2010. "Documenting Natural Wear on Antlers: A First Step in Identifying Use-Wear on Purported Antler Tools." *Quaternary International* 211(1–2): 91–102.

Joffe, A. 2002. "The Rise of Secondary States in the Iron Age Levant." *JESHO* 45(4): 425–67.

Johansen, K. F. 1938. *Corpus Vasorum Antiquorum*. Edited by C. Blinkenberg. Copenhagen: Librairie Einar Munksgaard.

Jones, A. 1998. “Where Eagles Dare: Landscape, Animals and the Neolithic of Orkney.” *Journal of Material Culture* 3(3): 301–24.

Jonuks, T. and E. Rannamäe. 2017. “Animals and Worldviews: A Diachronic Approach to Tooth and Bone Pendants from Mesolithic to the Medieval Period in Estonia.” In: *The Bioarchaeology of Ritual and Religion*, edited by A. Livarda, R. Madgwick, and S. R. Mora. Oxford: Oxbow Books: 162–78.

Jordan, J. M. 2016. “‘Ancient Episteme’ and the Nature of Fossils: A Correction of a Modern Scholarly Error.” *History and Philosophy of the Life Sciences* 38(1): 90–116.

Kahil, L. 1977. “L’Artémis de Brauron: Rites et Mystère.” *AntK* 20(2): 86–98.

Kaplan, P. 2006. “Dedications to Greek Sanctuaries by Foreign Kings in the Eighth through Sixth Centuries BCE.” *Historia* 55(2): 129–52.

Karageorgis, A. P., M. S. Skourtos, V. Kapsimalis, A. D. Kontogianni, N. T. Skoulikidis, K. Pagou, N. P. Nikolaidis, P. Drakopoulou, B. Zanou, H. Karamanos, Z. Levkov, and C. Anagnostou. 2005. “An Integrated Approach to Watershed Management within the DPSIR framework: Axios River Catchment and Thermaikos Gulf.” *Regional Environmental Change* 5(2): 138–60.

Karamanlidis, A. A., M. de Gabriel Hernando, L. Krambokoukis, and O. Gimenez. 2015. “Evidence of a Large Carnivore Population Recovery: Counting Bears in Greece.” *Journal for Nature Conservation* 27.

Karoglou, K. 2010. *Attic Pinakes: Votive Images in Clay. BAR-IS* 2104. Oxford: Archaeopress.

Kasseri, A. 2012. “Φοινικικοί εμπορικοί αμφορείς από τη Μεθώνη Πιερίας.” In: *Κεραμέως παῖδες Αντίδωρο στον Καθηγητή Μιχάλη Τιβέριοαπό τους μαθητές του*, edited by Ευρυδίκη Κεφαλίδου, Δέσποινα Τσιαφάκη. Εταιρεία Ανδρίων Επιστημόνων: 299–318.

Kefalidou, E. 2004. “On Phormiskoi Again.” *BICS* 47(1): 23–44.

Kennell, N. and N. Luraghi. 2009. “Laconia and Messenia.” In: *A Companion to Archaic Greece*, edited by K. A. Raaflaub and H. van Wees. West Sussex: John Wiley & Sons: 239–54.

Kerschner, M. and W. Prochaska. 2011. “Die Tempel und Altäre der Artemis in Ephesos und ihre Baumaterialien.” *ÖJh* 80: 73–153.

Kilian-Dirlmeier, I. 1984. *Nadeln der frühhelladischen bis archaischen Zeit von der Peloponnes*. Prähistorische Bronzefunde 13(8). Munich: C.H. Beck.

— 1993. “Die Schwerter in Griechenland (außerhalb der Peloponnes), Bulgarien und Albanien.” Prähistorische Bronzefunde (12(4)).

Kivisalo, N. 2008. “The Late Iron Age Bear-Tooth Pendants in Finland: Symbolic Mediators between Women, Bears, and Wilderness?” *Temenos-Nordic Journal of Comparative Religion* 44(2).

Klein, N. L. 1997. “Excavation of the Greek Temples at Mycenae by the British School at Athens.” *BSA* 92: 247–322.

Knigge, U. 1976. *Der Südhügel. Kerameikos* 9. Berlin: Walter de Gruyter.

Knudsen, L. R. 2012. “Case Study: The Tablet-woven Borders of Verucchio.” Edited by M. Gleba and U. Mannering: 254–63.

Kokkou-Vyridē, K. 1979. “Τέσσερεις πρωτογεωμετρικοι ταφοι στό Άργος.” *ArchEph*: 171–94.

Kopanias, K. 2009. “Some Ivories from the Geometric Stratum at the Sanctuary of Artemis Orthia, Sparta: Interconnections between Sparta, Crete and the Orient during the Late Eighth Century BC.” *BSA* 16: 123–31.

Kopcke, G. 1967. “Neue Holzfunde aus dem Heraion von Samos.” *AM* 82: 100–48.

— 1977. “Figures in Pot-Painting before, during, and after the Dark Age.” In: *Symposium on the Dark Ages in Greece*, edited by E. M. Davis. New York: Hunter College: 32–50.

Kopytoff, I. 1986. “The Cultural Biography of Things: Commoditization as Process.” In: *The Social Life of Things: Commodities in Cultural Perspective*, edited by A. Appadurai. Cambridge Studies in Social and Cultural Anthropology. Cambridge: Cambridge University Press: 64–91.

Kosmin, P. J. 2014. *The Land of the Elephant Kings*. Cambridge: Harvard University Press.

Kotsonas, A. 2012. "Η ενεπίγραφη κεραμική του 'Υπογείου': προέλευση, τυπολογία, χρονολόγηση και ερμηνεία." In: *Μεθώνη Πιερίας Ι: Επιγραφές, χαράγματα και εμπορικά σύμβολα στη Γεωμετρική και Αρχαϊκή κεραμική από το 'Υπόγειο' της Μεθώνης Πιερίας στη Μακεδονία*. Thessaloniki: Centre for the Greek Language: 113–304.

Koukoulidou, C., A. Mazarakis Ainian, T. Theodoropoulou, A. Touloumtzidou, D. Varvarinou-Vai, E. Zimi, and Z. Papadopoulou. 2017. "The Small Finds From the Sanctuary of Kythnos." In: *Les sanctuaires archaïques des Cyclades*, edited by A. Mazarakis Ainian. Rennes: Presses universitaires de Rennes: 193–256.

Kourayos, Y. and B. Burns. 2004. "Exploration of the Archaic Sanctuary at Mandra on Despotiko." *BCH* 128–129(1): 133–174.

Kraiker, W. and K. Kübler. 1939. *Die Nekropole des 12. bis 10. Jahrhunderts*. Kerameikos 1. Berlin: Walter de Gruyter.

Kramer-Hajos, M. 2016. *Mycenaean Greece and the Aegean World: Palace and Province in the Late Bronze Age*. Cambridge: Cambridge University Press.

Krzyszkowska, O. 1984. "Ivory from Hippopotamus Tusk in the Aegean Bronze Age." *Antiquity* 58(223): 123–25.

— 1988. "Ivory in the Aegean Bronze Age: Elephant Tusk or Hippopotamus Ivory?" *BSA* 83: 209–34.

— 1990. *Ivory and Related Materials: An Illustrated Guide. BICS* Suppl. 59. London: Institute of Classical Studies.

— 2005. *Aegean Seals: An Introduction. BICS* Suppl. 85. London: Institute of Classical Studies, School of Advanced Studies, University of London.

Krzyszkowska, O. 2007. *The Ivories and Objects of Bone, Antler and Boars Tusk*. Well Built Mycenae 24. Oxford: Oxbow Books.

Krzyszkowska, O. and R. Morkot. 2009. "Ivory and Related Materials." In: *Ancient Egyptian Materials and Technology*, edited by P. T. Nicholson and I. Shaw. Cambridge: Cambridge University Press: 320–31.

Kübler, K. 1954. *Die Nekropole des 10. bis 8. Jahrhunderts. Kerameikos* 5(1). Berlin: Walter de Gruyter.

— 1970. *Die Nekropole des Späten 8. bis frühen 6. Jahrhunderts. Kerameikos* 6(2). Berlin: Walter de Gruyter.

Kunze, E. 1930. "Zu den Anfängen der griechischen Plastik." *AM* 55: 141–62.

— 1936. "Orientalische Schnitzereien aus Kreta." *AM* 60: 218–33.

Kurke, L. 1999. *Coins, Bodies, Games, and Gold: The Politics of Meaning in Archaic Greece.* Princeton: Princeton University Press.

Kyrieleis, H. 1980. "Ausgrabungen im Heraion von Samos." *AA*: 336–50.

— 1981. *Führer durch das Heraion von Samos.* Athens: Krene Verlag.

— 1988. "Offerings of 'the Common Man' in the Heraion at Samos." In: *Early Greek Cult Practice: Proceedings of the Fifth International Symposium at the Swedish Institute at Athens*, edited by R. Hägg, N. Marinatos, and G. Nordquist. *ActaAth.* Stockholm: Svenska Institutet i Athen: 215–21.

— 1993. "The Heraion at Samos." In: *Greek Sanctuaries: New Approaches*, edited by N. Marinatos and R. Hägg. London: Routledge: 99–122.

— 2006. *Anfänge und Frühzeit des Heiligtums von Olympia: die Ausgrabungen am Pelopion 1987–1996. OlForsch* 31. Berlin: Walter de Gruyter.

— 2020. *Ausgrabungen im Südostgebiet des Heraion von Samos.* Samos 28. Wiesbaden: Reichert Verlag.

Lafrenz, K. A. 2003. “Tracing the Source of the Elephant and Hippopotamus Ivory from the 14th Century B.C. Uluburun Shipwreck; The Archaeological, Historical and Isotopic Evidence.” PhD thesis. University of South Florida.

Lamb, W. 1932. “Antissa.” *BSA* 32: 41–67.

— 1935. “Excavations at Kato Phana in Chios.” *BSA* 35: 138–64.

Landels, J. G. 1963. “The Brauron Aulos.” *BSA* 58: 116–19.

— 1999. *Music in Ancient Greece and Rome*. London: Routledge.

Lane, E. A. 1933. “Lakonian Vase-Painting.” *BSA* 34: 99–189.

Lang, M. L. and M. Crosby. 1964. *Weights, Measures and Tokens*. *Agora* 10. Princeton: The American School of Classical Studies at Athens.

Langlotz, E. 1975. *Studien zur nordostgriechischen Kunst*. Mainz: Philipp von Zabern.

Lapatin, K. D. 1997. “Pheidias ἐλεφαντουργός.” *AJA* 101(4): 663–82.

— 2001. *Chryselephantine Statuary in the Ancient Mediterranean World*. Oxford Monographs on Classical Archaeology. Oxford: Oxford University Press.

Latimer, J. and M. Miele. 2013. “Naturecultures? Science, Affect and the Non-human.” *Theory, Culture & Society* 30(7–8): 5–31.

Latour, B. 2009. “Perspectivism: ‘Type’ or ‘Bomb’?” *Anthropology Today* 25(2): 1–2.

Laurenzi, L. 1936. “Sepolcreto di Papatislures.” *ClRh* 8: 7–207.

Lave, J. and E. Wenger. 1991. *Situated Learning: Legitimate Peripheral Participation*. Cambridge University Press.

Le Guen, B. 1991. “Espace sacrificiel et corps des bêtes immolées. Remarques sur le vocabulaire désignant la part du prêtre dans la Grèce antique, de l’époque classique à l’époque impériale.” In: *L’espace sacrificiel dans les civilisations méditerranéennes de l’Antiquité. Actes du Colloque tenu à la Maison de l’Orient, Lyon, 4-7 juin 1988*, edited by M.-T. L. Roland Étienne. Paris: de Boccard: 13–23.

Leichty, E. 2011. *The Royal Inscriptions of Esarhaddon, King of Assyria (680–669 BC)*. Vol. 4. The Royal Inscriptions of the Neo-Assyrian Period. Winona Lake: Eisenbrauns.

LeMoine, G. M. and C. M. Darwent. 1998. “The Walrus and the Carpenter: Late Dorset Ivory Working in the High Arctic.” *Journal of Archaeological Science* 25(1): 73–83.

Lemonnier, P. 1990. “Topsy Turvy Techniques: Remarks on the Social Representation of Techniques.” *Archaeological Review from Cambridge* 9(1): 27–37.

Lemos, I. S. 2002. *The Protogeometric Aegean: The Archaeology of the Late Eleventh and Tenth Centuries BC*. Oxford: Oxford University Press.

— 2012. “The Missing Dead: Late Geometric Burials at Lefkandi.” *MeditArch* 25: 159–72.

Lerat, L. 1984. “Epoque mycénienne.” fre. In: *L’Antre Corycien II*. *BCH* Suppl. 9. Paris: Ecole Française d’Athènes: 3–25.

Limmer, A. S. 2020. “The Social Functions and Ritual Significance of Jewelry in the Iron Age II Southern Levant.” PhD thesis. The University of Arizona.

Linders, T. 1972. *Studies in the Treasure Records of Artemis Brauronia Found in Athens*. Stockholm: Swedish Institute at Athens.

Lister, A. M. 1996. “The Morphological Distinction between Bones and Teeth of Fallow Deer (*Dama dama*) and Red Deer (*Cervus elaphus*).” *International Journal of Osteoarchaeology* 6(2): 119–43.

Lister, A. M., W. Dirks, A. Assaf, M. Chazan, P. Goldberg, Y. H. Applbaum, N. Greenbaum, and L. K. Horwitz. 2013. “New Fossil Remains of Elephas from the Southern Levant: Implications for the Evolutionary History of the Asian Elephant.” *Palaeogeography, Palaeoclimatology, Palaeoecology* 386: 119–30.

Liston, M. A. and J. K. Papadopoulos. 2004. “The ‘Rich Athenian Lady’ was Pregnant: The Anthropology of a Geometric Tomb Reconsidered.” *Hesperia*: 7–38.

Liston, M. A. 2017. “Human Skeletal Remains.” In: *The Early Iron Age: The Cemeteries. Agora* 36. Princeton: American School of Classical Studies at Athens: 503–60.

Livarda, A., R. Veropoulidou, A. Vasileiadou, and L. P. Gelabert. Forthcoming. “Lifeways, Foodways In Iron Age Methone: A Perishable Material Culture Approach.” In: *Excavations at Ancient Methone, 2003–2013*, edited by S. P. Morris and J. K. Papadopoulos.

Liveri, A. 2018. "Musical Instruments and their Miniature Models as Votive Offerings to Female Deities in Sanctuaries In Ancient Greece." In: *Musical Instruments as Votive Gifts in the Ancient World*, edited by A. Bellia and S. D. Bundrick. Pisa: Fabrizio Serra editore: 39–50.

Lobban Jr., R. A. and V. de Liedekerke. 2000. "Elephants in Ancient Egypt and Nubia." *Anthrozoös* 13(4): 232–44.

Locke, M. 2008. "Structure of Ivory." *Journal of Morphology* 269(4): 423–50.

Lonsdale, S. 1990. *Creatures of Speech. Lion, Herding, and Hunting Similes in the Iliad.* Beiträge zur Altertumskunde 5. Stuttgart: BG Teubner.

López-Ruiz, C. 2009. "Tarshish and Tartessos Revisited: Textual Problems and Historical Implications." In: *Colonial Encounters in Ancient Iberia: Phoenician, Greek, and Indigenous Relations*, edited by M. Dietler and C. López-Ruiz. Chicago: University of Chicago Press: 255–80.

Lovari, S., P. Cuccus, A. Murgia, C. Murgia, F. Soi, and G. Plantamura. 2007. "Space Use, Habitat Selection and Browsing Effects of Red Deer in Sardinia." *Italian Journal of Zoology* 74(2): 179–89.

Luik, H. 2011. "Material, Technology and Meaning: Antler Artefacts and Antler Working on the Eastern Shore of the Baltic Sea in the Late Bronze Age." *Estonian Journal of Archaeology* 15(1): 32–55.

Luik, H. and L. Maldre. 2007. "Bronze Age Bone Artefacts from Narkûnai, Nevieriðkë and Kereliai Fortified Settlements. Raw Materials and Manufacturing Technology." *Archaeologia Lituana* 8: 5–39.

Luik, H., M. Ots, and L. Maldre. 2011. "From the Neolithic to the Bronze Age: Continuity and Changes in Bone Artefacts in Saaremaa, Estonia." In: *Written in Bones: Studies on Technological and Social Contexts of Past Faunal Skeletal Remains*, edited by J. Baron and B. Kufel-Diakowska. Wrocław: Institute of Archaeology, University of Wrocław: 243–62.

Lupo, K. D., J. M. Fancher, and D. N. Schmitt. 2013. "The Taphonomy of Resource Intensification: Zooarchaeological Implications of Resource Scarcity among Bofi and AKA Forest Foragers." *Journal of Archaeological Method and Theory* 20(3): 420–47.

Ma, J. 2016. "Elites, Elitism, and Community in the Archaic Polis." *Annales (English ed.)* 71(3): 395–418.

Macalister, R. A. S. 1911. *The Excavation Of Gezer 1902–1905 and 1907–1909*. Vol. I. London: Hassell, Watson, & Viney.

— 1912. *The Excavation Of Gezer 1902–1905 and 1907–1909*. Vol. III. London: Hassell, Watson, & Viney.

MacGregor, A. 1985. *Bone, Antler, Ivory and Horn*. Totowa, NJ: Barnes & Noble Books.

Maehle, A.-H. 1994. "Cruelty and Kindness to the 'Brute Creation' Stability and Change in the Ethics of the Man-animal Relationship, 1600–1850." In: *Animals and Human Society: Changing Perspectives*, edited by A. Manning and J. Serpell. London: Routledge: 81–105.

Maeir, A. M., H. J. Greenfield, J. Lev-Tov, and L. K. Horwitz. 2009. "Macro- and Microscopic Aspects of Bone Tool Manufacture and Technology in the Levantine Iron Age: A 9th Century BCE Workshop from Tell es-Safi/Gath, Israel." In: *Techniques and People - Anthropological Perspectives on Technology in the Archaeology of the Proto-Historic and Early Historic Periods in the Southern Levant*, edited by S. A. Rosen and V. Roux. Paris: De Boccard: 41–68.

Maffre, J.-J. and A. Tichit. 2011. "Quelles offrandes faisait-on à Artémis dans son sanctuaire de Thasos?" *Kernos* 24: 137–64.

Maglio, V. J. 1973. "Origin and Evolution of the Elephantidae." *TAPS* 63(3): 1–149.

Maire, J. 1998. "Innovation technologique dans le travail de l'os à Strasbourg au XV^{e} siècle." In: *L'innovation technique au Moyen Âge. Actes du VIe Congrès international d'Archéologie Médiévale (1-5 Octobre 1996, Dijon - Mont Beuvray - Chenôve - Le Creusot - Montbard)*. 6. Caen: Société d'Archéologie Médiévale: 275–76.

Maiuri, A. 1923. “Jalisos: Scavi della missione archeologica Italiana a Rodi.” *ASAtene* 6–7: 83–341.

Malkin, I. 2003. *Myth and Territory in the Spartan Mediterranean*. Cambridge: Cambridge University Press.

— 2011. *A Small Greek World: Networks in the Ancient Mediterranean*. Oxford: Oxford University Press.

Mallowan, M. 1966a. *Nimrud and Its Remains, Volume I*. Aberdeen: The University Press.

— 1966b. *Nimrud and Its Remains, Volume II*. Aberdeen: The University Press.

Mallowan, M. and L. G. Davis. 1970. *Ivories in Assyrian Style*. London: British School of Archaeology in Iraq.

Manning, A. and J. Serpell, eds. 1994. *Animals and Human Society: Changing Perspectives*. London: Routledge.

Maran, J. and A. Van de Moortel. 2014. “A Horse-Bridle Piece with Carpatho-Danubian Connections from Late Helladic I Mitrou and the Emergence of a Warlike Elite in Greece During the Shaft Grave Period.” *AJA* 118(4): 529–48.

Marangou, L. I. 1969. *Lakonische Elfenbein- und Beinschnitzereien*. Tübingen: Ernst Wasmuth.

Marinatos, S. 1936. “Le temple géométrique de Dréros.” *BCH* 60(1): 214–85.

— 1937. “Ausgrabungen und Funde auf Kreta 1936/37.” *AA* 52: 222–234.

Marshall, F. H. 1905. “Tombs of Hellenic Date at Praesos.” *The Annual of the British School at Athens* 12: 63–70.

Martelli, M. 1988. “La stipe votiva dell’Athenaion di Jalysos: Un primo bilancio.” In: *Archaeology in the Dodecanese*, edited by S. Dietz and I. Papachristodoulou. Copenhagen: National Museum of Denmark: 104–20.

— 2000. “La stipe di Ialysos. Avori orientali e greci.” In: *Un ponte fra l’Italia e la Grecia: atti del Simposio in onore di Antonino Di Vita (Ragusa, 13–15 febbraio 1998)*, edited by A. D. Vita. Padua: Bottega d’Erasmo: 105–18.

Marx, K. 1964. *Pre-Capitalist Economic Formations*. Edited by E. Hobsbawm. Trans. by J. Cohen. London: Lawrence & Wishart.

Mattingly, H. B. 1961. "The Methone Decrees." *CQ* 11(2): 154–65.

Mauss, M. 2000. *The Gift: The Form and Reason for Exchange in Archaic Societies*. Trans. by W. Halls. New York: W.W. Norton.

— 2006. "Techniques of the Body." In: *Techniques, Technology and Civilization*, edited by N. Schlanger. Trans. by B. Brewster. New York: Berghahn Books. Originally published in *Journal de psychologie* 32 (1935), 271–93, subsequently in translation by Ben Brewster in *Economy and Society* 2(1) (1973): 70–80.

Mayor, A. 2000. *The First Fossil Hunters*. 2nd ed. Princeton: Princeton University.

Mazarakis Ainian, A. 1997. *From Rulers' Dwellings to Temples: Architecture, Religion and Society in Early Iron Age Greece (1100-700 BC)*. *SIMA* 121. Stockholm: Paul Åström Förlag.

— 1998. "Oropos in the Early Iron Age." In: *Euboica: L'Eubea e la presenza euboica in Calcidica e in Occidente*, edited by M. Bats and B. d'Agostino. Naples: Centre Jean Bérard.

— 2005. "Inside the Adyton of a Greek Temple: Excavations on Kythnos (Cyclades)." In: *Colloquium in Honour of J.J. Coulton, Oxford University, Lincoln College, April 16–17, 2004*, edited by M. Geroulanou and M. Stamatopoulou. Oxford: Archaeopress: 87–103.

— 2007. "Architecture and Social Structure in Early Iron Age Greece." *BSA Studies* 15: 157–68.

Mazur, S. 2016. *The Midas Throne Row*. URL: https://www.huffpost.com/entry/the-midas-throne-row_b_11307068.

Mazzorin, J. D. G. and C. Minniti. 2013. "Ancient Use of the Knuckle-Bone for Rituals and Gaming Piece." *Anthropozoologica* 48(2): 371–80.

McCauley, B. 1998. "The Transfer of Hippodameia's Bones: A Historical Context." *CJ* 93(3): 225–39.

McClellan, T. L. 1986. “A Syrian Fortress of the Bronze Age, El-Qitar.” *NatGeogRes* 2: 418–40.

McGuire, J. E. 2007. “A Dialogue with Descartes: Newton’s Ontology of True and Immutable Natures.” *Journal of the History of Philosophy* 45(1): 103–25.

McK Elderkin, K. 1928. “Buttons and Their Use on Greek Garments.” *AJA* 32(3): 333–45.

— 1930. “Jointed Dolls in Antiquity.” *AJA* 34(4): 455–79.

McNiven, I. J. 2010. “Navigating the Human-Animal Divide: Marine Mammal Hunters and Rituals of Sensory Allurement.” *WorldArch* 42(2): 215–30.

McNiven, I. J. and R. Feldman. 2003. “Ritually Orchestrated Seascapes: Hunting Magic and Dugong Bone Mounds in Torres Strait, NE Australia.” *Cambridge Archaeological Journal* 13(2): 169–94.

Medvedskaya, I. N. 2017. “The Ancient Iranian Horse Bridle: Questions of Chronology, Origins, and Development.” *Iranica Antiqua* 52: 159–95.

Meiggs, R. 1982. *Trees and Timber in the Ancient Mediterranean World*. Oxford: Oxford University Press.

Mertzanis, G. A. 1994. “Brown Bear in Greece: Distribution, Present Status: Ecology of a Northern Pindus Subpopulation.” *Bears: Their Biology and Management* 9: 187–97.

Merz, G. 1986. “Counting Elephants (*Loxodonta africana cyclotis*) in Tropical Rain Forests with Particular Reference to the Tai National Park, Ivory Coast.” *African Journal of Ecology* 24(2): 61–68.

Midgley, M. 1988. “Beasts, Brutes and Monsters.” In: *What is an Animal?* Edited by T. Ingold. London: Routledge: 35–46.

Miller, R. 1986. “Elephants, Ivory, and Charcoal: An Ecological Perspective.” *BASOR* (264): 29–43.

Mitchell, T. C. 2000. “Camels in the Assyrian Bas-Reliefs.” *Iraq* 62: 187–94.

Mitsopoulos-Leon, V. 2012. *Das Heiligtum der Artemis Hemera in Lousoi: Kleinfunde aus den Grabungen 1986–2000*. Sonderschriften (Österreichisches Archäologisches Institut). Vienna: Österreichisches Archäologisches Institut.

Mokrišová, J. 2017. "On the Move: Mobility in Southwest Anatolia and the Southeast Aegean during the Late Bronze to Early Iron Age Transition." PhD thesis. University of Michigan.

Moorey, P. 1999. *Ancient Mesopotamian Materials and Industries: The Archaeological Evidence*. Oxford: Clarendon Press.

Morgan, C. 1988. "Corinth, the Corinthian Gulf and Western Greece during the Eighth Century BC." *BSA* 83: 313–38.

— 1998. "Euboians and Corinthians in the Area of the Corinthian Gulf?" In: *Euboica: L'Eubea e la presenza euboica in Calcidica e in Occidente*, edited by B. D'Agostino and M. Bats. Naples: Centre Jean Bérard: 281–302.

— 2007. "From Odysseus to Augustus. Ithaka from the Early Iron Age to Roman Times." *Pallas* (73): 71–86.

— 2009. "The Early Iron Age." In: *A Companion to Archaic Greece*, edited by K. A. Raaflaub and H. van Wees. West Sussex: John Wiley & Sons: 43–63.

Morgan, C. H. 1937. "Excavations at Corinth, 1936–37." *AJA* 41(4): 539–52.

Morgan, L. 1995. "Of Animals and Men: The Symbolic Parallel." In: *Klados: Essays in Honour of J.N. Coldstream*. *BICS* Suppl. 63. London: Institute of Classical Studies, School of Advanced Studies, University of London: 171–84.

Morricone, L. 1978. *Sepolture della prima etá del ferro a Coo*. *ASAtene* 56. Rome: L'Erma di Bretschneider.

Morris, C. 1990. "In Pursuit of the White Tusked Boar: Aspects of Hunting in Mycenaean Society." In: *Celebrations of Death and Divinity in the Bronze Age Argolid. Proceedings of the Sixth International Symposium at the Swedish Institute at Athens* (June 11–13, 1988). Edited by R. Hägg and G. Nordquist. *ActaAth*. Stockholm: Paul Åström Förlag: 149–56.

Morris, I. 1987. *Burial and Ancient Society: The Rise of the Greek City-State*. Cambridge: Cambridge University Press.

— 1988. “Tomb Cult and the ‘Greek Renaissance’: The Past in the Present in the 8th Century BC.” *Antiquity* 62(237): 750–61.

— 1989. “Circulation, Deposition and the Formation of the Greek Iron Age.” *Man* 24(3): 502–19.

— 1997. “The Art of Citizenship.” In: *New Light on a Dark Age, Exploring the Culture of Geometric Greece*, edited by S. Langdon. Columbia: University of Missouri Press.

— 1998. “Archaeology and Archaic Greek history.” In: *Archaic Greece: New Evidence and New Approaches*, edited by N. Fisher and H. van Wees. London: Duckworth/The Classical Press of Wales: 1–91.

— 2009. “The Eighth-Century Revolution.” In: *A Companion to Archaic Greece*, edited by K. A. Raaflaub and H. van Wees. West Sussex: John Wiley & Sons.

Morris, S. P. 1997. “Greek and Near Eastern Art in the Age of Homer.” In: *New Light on a Dark Age, Exploring the Culture of Geometric Greece*, edited by S. Langdon. Columbia: University of Missouri Press: 56–71.

— 2006. “The View from East Greece: Miletus, Samos and Ephesus.” In: *Debating Orientalization: Multidisciplinary Approaches to Change in the Ancient Mediterranean*, edited by C. Riva and N. Vella. London: Equinox.

Morris, S. P., J. K. Papadopoulos, M. Bessios, A. Athanassiadou, and K. Noulas. 2020. “The Ancient Methone Archaeological Project (AMAP): A Preliminary Report on Fieldwork, 2014-2017.” *Hesperia* 89(4): 593–657.

Morrison, D. 1986. “Inuit and Kutchin Bone and Antler Industries in Northwestern Canada.” *Canadian Journal of Archaeology / Journal Canadien d’Archéologie* 10: 107–25.

Mosso, A. 1907. *The Palaces of Crete and Their Builders*. London: T. Fisher Unwin.

Moundréa-Agrafioti, A. 1987. “Problèmes d’emmanchement dans le Néolithique grec: les gaines et manches en bois de cervidé.” In: *La Main et l’Outil. Manches et emmanchements* *préhistoriques. Table ronde CNRS tenue à Lyon du 26 au 29 novembre 1984*, edited by D. Stordeur. Travaux de la Maison de l'Orient méditerranéen 15. Lyon: Maison de l'Orient et de la Méditerranée Jean Pouilloux: 247–56.

Muscarella, O. W. 2016. "An Ivory Statuette from Delphi—Not from King Midas's Throne." *Source: Notes in the History of Art* 35(1/2): 182–93.

Muss, U. 2008. "Elfenbein und Bein aus dem Artemision von Ephesos." In: *Die Archäologie der ephesischen Artemis: Gestalt und Ritual eines Heiligtums*, edited by U. Muss. Vienna: Phoibos Verlag: 103–16.

Naude, V. N., G. A. Balme, M. S. Rogan, M. D. Needham, G. Whittington-Jones, T. Dickerson, X. Mabaso, N. Nattrass, J. M. Bishop, L. Hunter, and M. J. O'Riain. 2020. "Longitudinal Assessment of Illegal Leopard Skin Use in Ceremonial Regalia and Acceptance of Faux Alternatives among Followers of the Shembe Church, South Africa." *Conservation Science and Practice* 2(11): e289.

Negahban, E. O. 1991. *Excavations at Haft Tepe, Iran.* Philadelphia: The University Museum of Archaeology and Anthropology, University of Pennsylvania.

Neils, J. 1992. "The Morgantina Phormiskos." *AJA* 96(2): 225–35.

Neils, J., J. H. Oakley, K. Hart, and L. A. Beaumont. 2003. *Coming of Age in Ancient Greece: Images of Childhood from the Classical Past.* Edited by J. Neils. New Haven: Yale University Press.

Newcomer, M. H. 1974. "Study and Replication of Bone Tools from Ksar Akil (Lebanon)." *World Archaeology* 6(2): 138–53.

Newman, L. 2001. "Unmasking Descartes's Case for the Bête Machine Doctrine." *Canadian Journal of Philosophy* 31(3): 389–425.

Nolan, L. 2020. "Descartes' Ontological Argument." In: *The Stanford Encyclopedia of Philosophy*, edited by E. N. Zalta. Spring 2020. Metaphysics Research Lab, Stanford University.

Nordquist, G. C. 1991. "Some Notes on Musicians in Greek Cult." In: *Ancient Greek Cult Practice from the Epigraphical Evidence*, edited by R. Hägg. Stockholm: Paul Åström Förlag: 81–93.

Norton, R. 1905. "Engraved Stones, Gems, and Ivories." In: *The Argive Heraeum II: Terra-cotta Figurines, Terra-cotta Reliefs, Vases and Vase Fragments, Bronzes, Engraved Stones, Gems, and Ivories, Coins, Egyptian, or Graeco-Egyptian Objects*, edited by C. Waldstein. Boston: Houghton Mifflin: 343–54.

Noske, B. M. 2005. "Horse Image and the Human Self-Image in Equine Research." In: *The Human-Animal Relationship: Forever and a Day*, edited by F. H. de Jonge and R. van den Bos. Assen: Royal Van Gorcum: 38–50.

O'Connor, S., C. Solazzo, and M. Collins. 2015. "Advances in Identifying Archaeological Traces of Horn and Other Keratinous Hard Tissues." *Studies in Conservation* 60(6): 393–417.

O'Neill, K., W. Yielding, J. Near, J. E. Coleman, P. S. Wren, and K. M. Quinn. 1999. "Halai: The 1992-1994 Field Seasons." *Hesperia* 68(3): 285–341.

O'Day, S. J., W. V. Neer, and A. Ervynck, eds. 2004. *Behaviour Behind Bones: The Zooarchaeology of Ritual, Religion, Status and Identity (Proceedings of the 9th ICAZ Conference)*. Oxford: Oxbow Books.

Ohly, D. 1956. "Holz." *AM* 82: 77–126.

— 1959. "Zur Rekonstruktion des Samischen Geräts mit dem Elfenbeinjüngling." *AM* 74: 48–68.

— 1967. "Neue Holzfunde aus dem Heraion von Samos: Befund und Rekonstruktion der Herastatuette." *AM* 82: 89–99.

Ohnesorg, A. 2007. *Der Kroisos-Tempel: Neue Forschungen zum archaischen Dipteros der Artemis von Ephesos. Ephesos*. Vienna: Der Verlag der Österreichischen Akademie der Wissenschaften.

Olsen, S. L. 1979. "A Study of Bone Artifacts from Grasshopper Pueblo, Az P:14:1." *KIVA* 44(4): 341–73.

— 1988. "Scanning Electron Microscopy and Microwear of Bone Artifacts." In: *Scanning Electron Microscopy in Archaeology*, edited by S. L. Olsen. *BAR-IS* 452. Paris: De Boccard: 337–60.

Oma, K. A. 2010. "Between Trust and Domination: Social Contracts between Humans and Animals." *WorldArch* 42(2): 175–87.

Ormerod, H. A. 1912. "A New Astragalos-Inscription from Pamphylia." *JHS* 32: 270–76.

Osborne, R. 2004. "Hoards, Votives, Offerings: The Archaeology of the Dedicated Object." *World Archaeology* 36(1): 1–10.

Osipowicz, G. 2007. "Bone and Antler: Softening Techniques in Prehistory of the North Eastern Part of the Polish Lowlands in the Light of Experimental Archaeology and Micro Trace Analysis." *euroREA* 4: 1–22.

Østby, E., J.-M. Luce, G. Nordquist, C. Tarditi, and M. E. Voyatzis. 1994. "The Sanctuary of Athena Alea at Tegea: First Preliminary Report (1990-1992)." *OpAth* 20: 89–141.

Østby, E. 2014. "The Sanctuary of Athena Alea in the Pre-Classical Period." In: *Tegea I. Investigations in the Temple of Athena Alea 1991–94*, edited by E. Østby. Athens: Norwegian Institute at Athens: 11–56.

Pabst, S. 2012. *Die Brillenfibeln: Untersuchungen zu spätbronze- und ältereisenzeitlichen Frauentrachten zwischen Ostsee und Mittelmeer*. Rahden: Marie Leidorf GmbH.

Palacio-Pérez, E. and A. R. Redondo. 2014. "Imaginary Creatures in Palaeolithic Art: Prehistoric Dreams or Prehistorians' Dreams?" *Antiquity* 88(339): 259–66.

Palmer, R. 2019. "Mycenaean Hornworking, Wealth Finance, and Linear B Commodity *189." Paper read at the 120th Annual Meeting of the Archaeological Institute of America, 3–6 January, San Diego.

Papadopoulos, J. K. 2005. *The Early Iron Age Cemetery at Torone*. Los Angeles: Cotsen Institute of Archaeology at UCLA.

Papadopoulos, J. K. 2014. “Greece in the Early Iron Age: Mobility, Commodities, Polities, and Literacy.” In: *The Cambridge Prehistory of the Bronze and Iron Age Mediterranean*, edited by B. A. Knapp and P. van Dommelen. Cambridge: Cambridge University Press: 178–95.

— 2016a. “The Early History of the Greek Alphabet: New Evidence from Eretria and Methone.” *Antiquity* 90(353): 1238–54.

— 2016b. “The Natural History of a Caeretan Hydria.” *BABesch* 91: 69–85.

— 2017. “An Epirote Pastoral: Wind Instruments in Tombs in Epirus.” In: *Speira: Festschrift for Angelika Douzougli and Konstantinos Zachos*. Athens: Ministry of Culture.

Papadopoulos, J. K. and D. Ruscillo. 2002. “A *Ketos* in Early Athens: An Archaeology of Whales and Sea Monsters in the Greek World.” *AJA* 106(2): 187–227.

Papadopoulos, J. K. and E. L. Smithson. 2017. *The Early Iron Age: The Cemeteries*. *Agora* 36. Princeton: American School of Classical Studies at Athens.

Papadopoulos, T. J. and L. Kontorli-Papadopoulou. 2001. “Death, Power and Troubles in Late Mycenaean Peloponnese: The Evidence of Warrior-Graves.” In: *Contributions to the Archaeology and History of the Bronze Age and Iron Age in the Eastern Mediterranean: Studies in Honour of Paul Åström*, edited by P. M. Fischer. Sonderschriften (Österreichisches Archäologisches Institut) 39. Vienna: Österreichisches Archäologisches Institut.

Papini, R. 2004. “Dance Uniform History in the Church of Nazareth Baptists: The Move to Tradition.” English. *African Arts* 37(3): 48–61.

Páral, V., F. Tichỳ, and M. Fabiš. 2004. “Functional Structure of Metapodial Bones of Cattle.” *Acta Veterinaria Brno* 73(4): 413–20.

Parker, B. 1949. “Cylinder Seals from Palestine.” *Iraq* 11(1): 1–43.

Payne, M. 2014. “The Natural World in Greek Literature and Philosophy.” In: Oxford Handbooks Online in Classical Studies. Oxford: Oxford University Press. DOI: 10.1093/oxfordhb/9780199935390.013.001.

Peirce, S. 1993. “Death, Revelry, and *Thysia*.” *ClAnt* 12(2): 219–66.

Perlman, P. 1983. "Plato Laws 833C-834D and the Bears of Brauron." *GRBS* 24(2): 115–30.

— 1989. "Acting the She-Bear for Artemis." *Arethusa* 22(2): 111–33.

Perrot, G. 1895. "Figurines d'ivoire trouvées dans une tombe du Céramique à Athènes." *BCH* 19(1): 273–95.

Petsalis-Diomidis, A. 2018. "Undressing For Artemis: Sensory Approaches to Clothes Dedications in Hellenistic Epigram and in the Cult Of Artemis Brauronia." In: *Gaze, Vision, and Visuality in Ancient Greek Literature*, edited by A. Kampakoglou and A. Novokhatko. Berlin: Walter De Gruyter: 419–63.

Pfaff, C. A. 2007. "Geometric Graves in the Panayia Field at Corinth." *Hesperia*: 443–537.

Pfälzner, P. 2013. "The Elephant Hunters of Bronze Age Syria." In: *Cultures in Contact: From Mesopotamia to the Mediterranean in the Second Millennium BC*, edited by J. Aruz, S. B. Graff, and Y. Rakic. New York: Metropolitan Museum of Art: 112–31.

— 2016. "The Elephants of the Orontes." *Syria* IV: 159–82.

Phillips, D. 2003. "The Bones of Orestes and Spartan Foreign Policy." In: *Gestures: Essays in Ancient History, Literature, and Philosophy Presented to Alan L. Boegehold*, edited by G. Bakewell and J. Sickinger. Oxford: Oxbow Books.

Philo, C. and C. Wilbert, eds. 2000. *Animal Spaces, Beastly Places: New Geographies of Human-Animal Relations*. London: Taylor & Francis.

Pickenpaugh, T. E. 1997. "Symbols of rank, leadership, and power in traditional cultures." *International Journal of Osteoarchaeology* 7(5): 525–541.

Pini, I., N. Platon, and G. Salies. 1977. *Iraklion, Archäologisches Museum: Die Siegel der Altpalastzeit*. CMS 2(2). Berlin: Gebr. Mann Verlag.

Pinney, G. 1986. "Money-Bags?" *AJA* 90(2): 218.

Platon, N. 1969. *Iraklion, Archäologisches Museum: Die Siegel der Vorpalastzeit*. CMS 2(1). Berlin: Gebr. Mann Verlag.

Platt, E. E. 1978. "Bone Pendants." *The Biblical Archaeologist* 41(1): 23–28.

Podlecki, A. J. 1971. "Cimon, Skyros and 'Theseus' Bones'." *JHS* 91: 141–43.

Polzer, M. E. 2014. “The Bajo de la Campana Shipwreck and Colonial Trade in Phoenician Spain.” In: *Assyria to Iberia at the Dawn of the Classical Age*, edited by J. Aruz, S. B. Graff, and Y. Rakic. New York: Metropolitan Museum of Art: 230–42.

Pomeroy, S. B. 2002. *Spartan Women*. Oxford: Oxford University Press.

Popham, M. R. 1993. “The Main Excavation of the Building (1981–3).” In: *Lefkandi II.2 The Protogeometric Building at Toumba: The Excavation, Architecture and Finds*, edited by M. R. Popham, P. Calligas, and L. Sackett. *BSA* Suppl. 23. London: The British School at Athens: 7–31.

Popham, M. R. and I. Lemos. 1996. *Lefkandi III: The Toumba Cemetery: The Excavations of 1981, 1984, 1986 and 1992–4: Plates*. *BSA* Suppl. 29. Oxford: British School at Athens.

Popham, M. R., L. Sackett, and P. Themelis. 1980. “The Tombs, Pyres and their Contents.” In: *Lefkandi I: The Iron Age*, edited by M. R. Popham, L. Sackett, and P. Themelis. *BSA* Suppl. 11. London: The British School of Archaeology at Athens: 109–96.

Poplin, F. 1984. “Contribution ostéo-archéologique à la connaissance des astragales de l’Antre corycien.” In: *L’Antre Corycien II*. *BCH* Suppl. 9. Paris: Ecole Française d’Athènes: 381–93.

Potts, R. and P. Shipman. 1981. “Cutmarks Made by Stone Tools on Bones from Olduvai Gorge, Tanzania.” *Nature* 291(5816): 577–80.

Poulsen, F. 1912. *Der Orient und die frühgriechische Kunst*. Leipzig: BG Teubner.

Poursat, J.-C. 1977. *Catalogue des ivoires mycéniens du Musée National d’Athènes: Essai sur la Formation d’un Art Mycénien*. *BÉFAR* 230. Paris: de Boccard.

Prent, M. 2005. *Cretan Sanctuaries and Cults: Continuity and Change from Late Minoan IIIC to the Archaic Period*. Leiden: Brill.

Prêtre, C. 2016. *La fibule et le clou: ex-voto et instrumentum de l’Artémision*. Études Thasiennes 23. Paris: De Boccard.

Price, T. H. 1973. “Hero-Cult and Homer.” *Historia* 22(2): 129–44.

Priestley, J. M. 2007. “The φαρος of Alcman’s ‘Partheneion’ 1.” *Mnemosyne* 60(2): 175–95.

Pulak, C. 1998. "The Uluburun Shipwreck: An Overview." *The International Journal of Nautical Archaeology* 27(3): 188–224.

Pülz, A. M. 2009. *Goldfunde aus dem Artemision von Ephesos. Ephesos.* Vienna: Der Verlag der Österreichischen Akademie der Wissenschaften.

Raaflaub, K. A. 1998. "A Historian's Headache: How to Read 'Homeric Society'?" In: *Archaic Greece: New Approaches and New Evidence*, edited by N. Fisher, H. van Wees, and D. D. Boedeker. London: Duckworth: 169–93.

Rashke, W. J. 1985. "Aulos and Athlete: The Function of the Flute-Player in Greek Athletics." *Arete: The Journal of Sport Literature* 2(2): 177.

Raubenheimer, E. J. 1999. "Morphological Aspects and Composition of African Elephant (*Loxodonta africana*) Ivory." *Journal of Morphology* 42(2): 57–64.

— 2000. "Early Development of the Tush and the Tusk of the African Elephant (*Loxodonta africana*)." *Archives of Oral Biology* 45(11): 983–86.

Reade, J. E. 1980. "The Rassam Obelisk." *Iraq* 42(1): 1–22.

Reese, D. S. 1985. "Appendix VIII: Shells, Ostrich Eggshells and Other Exotic Faunal Remains from Kition." In: *Excavations at Kition: V. The Pre-Phoenician Levels, Part II*, edited by V. Karageorghis. Nicosia: Department of Antiquities, Cyprus: 340–415.

— 1998. "Appendix III: A Hippopotamus Tooth from Hala Sultan Tekke." In: *Hala Sultan Tekke: The Wells*, edited by P. Åström. *SIMA* 45. Stockholm: Paul Åström Förlag.

Rehm, E. 2003. "Abschied von der Heiligen Hure. Zum Bildmotiv der 'Frau am Fenster' in der phönizisch-nordsyrischen Elfenbeinschnitzkunst." *Ugarit-Forschungen* 35: 487–519.

Reichel, W. and A. Wilhelm. 1901. "Das Heiligtum der Artemis zu Lusoi." *ÖJh* 4: 1–89.

Reuther, O. 1926. *Die Innenstadt von Babylon (Merkes).* Ausgrabungen der Deutschen Orient-Gesellschaft in Babylon. Leipzig: J. C. Hinrichs.

Richards, G. C. 1891. "Archaic Reliefs at Dhimitzana." *JHS* 12: 41–45.

Ridgway, B. S. 1977. *The Archaic Style in Greek Sculpture.* 2nd ed. Chicago: Ares Publishers.

Rizza, G. 1969. "Nuove ricerche sulla Patela e nel territorio di Prinias." *Cronache dl archeologia e di storla dell'arte.* 8: 7–32.

Robinson, D. M. 1941. *Metal and Minor Miscellaneous Finds.* Olynthos 10. Baltimore: The Johns Hopkins Press.

Roca, A. L., N. Georgiadis, J. Pecon-Slattery, and S. J. O'Brien. 2001. "Genetic Evidence for Two Species of Elephant in Africa." *Science* 293(5534): 1473–77.

Roesch, P. 1985. "Les taureaux de bronze du Kabirion de Thèbes et l'écriture archaïque béotienne." In: *Actes du Troisième congrès international sur la Béotie antique*, edited by J. M. Fossey and H. Giroux. Amsterdam: J.C. Gieben: 135–51.

Rolley, C. 1994. *La Sculpture Grecque I: Des origines au milieu du V^e^ siècle.* Paris: Picard.

Röllig, W. 1998. "Niḫi, Ni'i, Nija." *RLA* 9: 313–14.

Rombauer, I. S., M. R. Becker, E. Becker, J. Becker, and M. Scott. 1931. *Joy of Cooking.* 9th ed. New York: Scribner.

Ron, H., N. Porat, A. Ronen, E. Tchernov, and L. K. Horwitz. 2003. "Magnetostratigraphy of the Evron Member—Implications for the Age of the Middle Acheulian site of Evron Quarry." *Journal of Human Evolution* 44(5): 633–39.

Rostoker, W. 1986. "Ancient Techniques for Making Holes in Sheet Metal." *AJA* 90(1): 93–94.

Rubensohn, O. 1962. *Das Delion von Paros.* Wiesbaden: Franz Steiner.

Russell, N. 2011. *Social Zooarchaeology: Humans and Animals in Prehistory.* Cambridge: Cambridge University Press.

Sackett, L. H. 1980. "Objects of Ivory, Bone and Antler." In: *Lefkandi I: The Iron Age*, edited by M. R. Popham, L. Sackett, and P. Themelis. *BSA* Suppl. 11. London: The British School of Archaeology at Athens: 225–26.

— 1993. "Objects in Metal, Clay, Stone and Other Materials." In: *Lefkandi II.2: The Protogeometric Building at Toumba, The Excavation, Architecture and Finds. BSA* Suppl. 29. Oxford: British School at Athens.

Şahin, S. 1983. "Eine Archaische Weihinschrift Für Athena." In: *Alt-Smyrna I: Wohnschichten und Athenatempel*, edited by E. Akurgal. Ankara: Türk Tarih Kurumu Basımevi: 129–30.

Sakellarakis, Y. A. 1992. "The Idaean Cave Ivories." In: *Ivory in Greece and the Eastern Mediterranean from the Bronze Age to the Hellenistic Period*, edited by J. L. Fitton. *BMOP* 85. London: British Museum Press: 113–40.

— 1993. "Ivory Trade in the Aegean in the 8th Century B.C.E." In: *Biblical Archaeology Today, 1990: Proceedings of the Second International Congress on Biblical Archaeology, Jerusalem, June-July 1990*, edited by J. A. Avraham Biran. Jeruslaem: The Israel Exploration Society: 345–66.

— 2013. *Το Ιδαιο Αντρο: ιερο και μαντειο, Β Τομος*. Βιβλιοθήκη της εν Αθήναις Αρχαιολογικής Εταιρείας. Athens: Hē en Athēnais Archaiologikē Hetaireia.

Salapata, G. 2002. "Greek Votive Plaques: Manufacture, Display, Disposal." *BABesch* 77: 19–42.

Salmon, J. 1972. "The Heraeum at Perachora, and the Early History of Corinth and Megara." *BSA* 67: 159–204.

Salmon, N. 2019. "The Culture of Connectivity on Archaic and Classical Rhodes." PhD thesis. Birkbeck, University of London.

Salviat, F. 1962. "Lions d'ivoire orientaux à Thasos." *BCH* 86(1): 95–116.

Salzman-Mitchell, P. 2008. "A Whole Out Of Pieces: Pygmalion's Ivory Statue In Ovid's Metamorphoses." *Arethusa* 41(2): 291–311.

Sandars, N. K. 1963. "Later Aegean Bronze Swords." *AJA* 67(2): 117–53.

Santiapillai, C. and P. Jackson. 1990. *The Asian Elephant: An Action Plan for Its Conservation*. Gland, Switzerland: IUCN.

Sanz, P. Q. 2014. "Phoenician and Orientalizing 'Ivories' in the Iberian Peninsula." In: *Assyria to Iberia at the Dawn of the Classical Age*, edited by J. Aruz, S. B. Graff, and Y. Rakic. New York: Metropolitan Museum of Art: 228–29.

Şare, T. 2010. "An Archaic Ivory Figurine from a Tumulus near Elmalı: Cultural Hybridization and a New Anatolian Style." *Hesperia*: 53–78.

Sauvage, C. 2014. "Spindles and Distaffs: Late Bronze and Early Iron Age Eastern Mediterranean Use of Solid and Tapered Ivory/Bone Shafts." In: *Interdisciplinary Studies in Textiles and Dress in Antiquity*, edited by M. Harlow, C. Michel, and M.-L. Nosch. Oxford: Oxbow: 184–226.

Schaeffer, C. F. 1962. *Ugaritica. IV: Découvertes des XVIII^{e} et XIX^{e} campagnes, 1954–1955: fondements préhistoriques d'Ugarit et nouveaux sondages, études anthropologiques, poteries grecques et monnaies islamiques de Ras Shamra et environs. BAHBeyrouth* 74. Paris: Imprimerie Nationale.

Scharfe, H. 1971. "The Maurya Dynasty and the Seleucids." *Zeitschrift für vergleichende Sprachforschung* 85(2): 211–25.

Schiering, W. 1991. *Die Werkstatt des Pheidias in Olympia: Zweiter Teil: Werkstattfunde. OlForsch* 18. Berlin: Walter de Gruyter.

Schlesinger, K. 1939. *The Greek Aulos: A Study of Its Mechanism and of Its Relation to the Modal System of Ancient Greek Music, Followed by a Survey of the Greek Harmoniai in Survival or Rebirth in Folk-Music.* Groningen: Bouma's Boekhuis N.V.

Schramm, W. 1973. *Einleitung in die assyrischen Königsinschriften 2. 934–722 v. Chr.* Leiden: Brill.

Scullard, H. H. 1974. *The Elephant in the Greek and Roman World.* Ithaca: Cornell University Press.

Sebeok, T. A. 1988. "'Animal' in Biological and Semiotic Perspective." In: *What is an Animal?* Edited by T. Ingold. London: Routledge: 63–76.

Sethe, K. 1906. *Urkunden der 18. Dynastie: Historisch-biographische Urkunden 1906.* Leipzig: JC Hinrichs.

Shanks, M. 1999. *Art and the Early Greek State.* Cambridge: Cambridge University Press.

Shaw, J. 1973. *Minoan Architecture: Materials and Techniques. ASAtene* 49. Rome: Istituto Poligrafico dello Stato.

Shear, J. P. 1933. "The Coins of Athens." *Hesperia* 2(2): 231–78.

Sherratt, A. 1981. "Plough and Pastoralism: Aspects of the Secondary Products." In: *Pattern of the Past: Studies in Honour of David Clarke*, edited by I. Hodder, G. Isaac, and N. Hammond. Cambridge: Cambridge University Press: 261–305.

— 1983. "The Secondary Exploitation of Animals in the Old World." *World Archaeology* 15(1): 90–104.

Sherratt, S. and A. Sherratt. 1993. "The Growth of the Mediterranean Economy in the Early First Millennium BC." *World Archaeology* 24(3): 361–78.

Shibata, D. 2011. "The Toponyms, 'the Land of Māri', in the Late Second Millennium BC." *RAssyr* 105(1): 95–108.

Shipman, P., G. Foster, and M. Schoeninger. 1984. "Burnt Bones and Teeth: An Experimental Study of Color, Morphology, Crystal Structure and Shrinkage." *JAS* 11(4): 307–25.

Singh, R. R., S. P. Goyal, P. P. Khanna, P. K. Mukherjee, and R. Sukumar. 2006. "Using Morphometric and Analytical Techniques to Characterize Elephant Ivory." *Forensic Science International* 162(1): 144–51.

Sinn, U. 1982. "Ein Elfenbeinkopf aus dem Heraion von Samos. Zur ostionischen Plastik im 3. Viertel des 6. Jh. v. Chr." *AM* 97: 35–55.

Skia, A. N. 1898. "Panarxaia Eleusiniake Nekropolis." *ArchEph*: 29–122.

Smardon, R. 2009. "The Axios River Delta – Mediterranean Wetland Under Siege." In: *Sustaining the World's Wetlands: Setting Policy and Resolving Conflicts*. Heidelberg: Springer: 57–92.

Smith, C. 1908. "The Ivory Statuettes." In: *Excavations at Ephesus: The Archaic Artemisia*, edited by D. Hogarth. London: British Museum: 155–85.

Smithson, E. L. 1961. "The Protogeometric Cemetery at Nea Ionia, 1949." *Hesperia* 30(2): 147–78.

Smithson, E. L. 1968. "The Tomb of a Rich Athenian Lady, ca. 850 B.C." *Hesperia* 37(1): 77–116.

Sneed, D. 2018. "Early Iron Age (8th and Early 7th century BCE) Posthole Structure." Excavation Report.

Snodgrass, A. M. 1971. *The Dark Age of Greece: An Archaeological Survey of the Eleventh to the Eighth Centuries BC*. Edinburgh: Edinburgh University Press.

— 1980a. *Archaic Greece: The Age of Experiment*. Berkeley: University of California Press.

— 1980b. "Iron and Early Metallurgy in the Mediterranean." In: *The Coming of the Age of Iron*, edited by T. Wertime and J. Muhly. Berkeley: University of California Press: 335–74.

— 2006a. "The Coming of the Iron Age in Greece: Europe's Earliest Bronze/Iron Transition." In: *Archaeology and the Emergence of Greece*. Ithaca: Cornell University Press: 126–43. Originally published in M. L. Stig Sørensen and R. Thomas eds., *The Bronze Age–Iron Age Transition in Europe: Aspects of Continuity and Change in European Societies c. 1200 to 500 BC, BAR-IS 483* (Oxford: BAR Press).

— 2006b. "The Economics of Dedication at Greek Sanctuaries." In: *Archaeology and the Emergence of Greece*. Ithaca: Cornell University Press. Originally published in *Scienze dell'Antichita* (1989–1990) 3-4, 287–94.

Sofaer, J. R. 2006. *The Body as Material Culture: A Theoretical Osteoarchaeology*. Cambridge: Cambridge University Press.

Sofaer, J. R., L. B. Jørgensen, and A. Choyke. 2013. "Craft Production: Ceramics, Textiles, and Bone." In: *Oxford Handbook of the European Bronze Age*, edited by H. Fokkens and A. Harding. Oxford: Oxford University Press: 469–91.

Spalinger, A. 1978. "A New Reference to an Egyptian Campaign of Thutmose III in Asia." *JNES* 37(1): 35–41.

Spartz, E. 1962. "Das Wappenbild des Herrn und der Herrin der Tiere in der minoisch-mykenischen und frühgriechischen Kunst." PhD thesis. University of Munich.

St. Clair, A. 2003. *Carving as Craft: Palatine East and the Greco-Roman Bone and Ivory Carving Tradition*. Baltimore: Johns Hopkins University Press.

Staermose Nielsen, K.-H. 2005. "A Preliminary Classification of Shapes of Loomweights." In: *Northern Archaeological Textiles: NESAT VII. Textile Symposium in Edinburgh, 5th–7th May 1999*. Edited by J. P. W. Frances Pritchard. Oxford: Oxbow: 129–35.

Stampolidis, N. C. 1992. "Four Ivory Heads from the Geometric/Archaic Cemetery at Eleutherna." In: *Ivory in Greece and the Eastern Mediterranean from the Bronze Age to the Hellenistic Period*, edited by J. L. Fitton. *BMOP* 85. London: British Museum Press: 141–61.

— ed. 2004. *Eleutherna: Polis, Acropolis, Necropolis*. Athens: Museum of Cycladic Art.

Stanzel, M. 1991. "Die Tierreste aus dem Artemis-/Apollon-Heiligtum bei Kalapodi in Böotien/Griechenland." PhD thesis. Ludwig-Maximilians-Universität zu München.

Starr, R. F. S. 1939. *Nuzi: Report on the Excavation at Yorgan Tepa near Kirkuk, Iraq: Text*. Vol. 1. Cambridge: Harvard University Press.

Stauropoullos, P. D. 1965. "Οδού Καβαλόττι." *ArchDelt* 20: 75–80.

Stefanakis, M. I., W. C. West, D. C. Haggis, M. S. Mook, R. D. Fitzsimons, C. M. Scarry, and L. M. Snyder. 2007. "Excavations at Azoria, 2003–2004, Part 1: The Archaic Civic Complex." *Hesperia* 76(2): 243–321.

Sterckx, R. 2002. *The Animal and the Daemon in Early China*. Albany: SUNY Press.

Stern, W. 2007. *Ivory, Bone, and Related Wood Finds*. Kenchreai. Eastern Port of Corinth 6. Leiden: Brill.

Strathern, M. 1980. "No Nature, No Culture: The Hagen Case." In: *Nature, Culture and Gender*, edited by C. P. MacCormack and M. Strathern. Cambridge University Press.

— 1988. *The Gender of the Gift: Problems with Women and Problems with Society in Melanesia*. Berkeley: University of California Press.

Stubbings, J. 1940. "Ivories." In: *Perachora II: The Sanctuaries of Hera Akraia and Limenia; Excavations of the British School of Archaeology at Athens, 1930-1933. Pottery,* *Ivories, Scarabs, and Other Objects from the Votive Deposit of Hera Limenia*, edited by T. Dunbabin. Oxford: Clarendon Press: 403–51.

Sturgeon, M. C. 1987. *Sculpture I, 1952–1967*. Isthmia 4. Princeton: American School of Classical Studies at Athens.

Sukumar, R. 1989. *The Asian Elephant: Ecology and Management*. Cambridge: Cambridge University Press.

Suter, C. E. 1992. "Die Frau am Fenster in der orientalischen Elfenbeinschnitzkunst des frühen 1. Jahrtausends v. Chr." *Jahrbuch der Staatlichen Kunstsammlungen in Baden-Württemberg* 29: 7–28.

Suter, I. C., G. P. Maurer, and G. Baxter. 2014. "Population Viability of Captive Asian Elephants in the Lao PDR." *Endangered Species Research* 24(1): 1–7.

Sutton-Smith, B. 1951. "The Meeting of Maori and European Cultures and Its Effects upon the Unorganized Games of Maori Children." *The Journal of the Polynesian Society* 60(2/3): 93–107.

Sykes, N. 2014. *Beastly Questions: Animal Answers to Archaeological Issues*. New York: Bloomsbury Publishing.

Symes, S. A., E. N. Chapman, C. W. Rainwater, L. L. Cabo, and S. M. Myster. 2010. *Knife and Saw Toolmark Analysis in Bone: A Manual Designed for the Examination of Criminal Mutilation and Dismemberment*. Tech. rep. National Institute of Justice.

Tadmor, H. 1961. "Que and Muṣri." *IEJ* 11(3): 143–50.

Tangley, L. 1997. "In Search of Africa's Forgotten Forest Elephant." *Science* 275(5305): 1417–19.

Tanner, A. 1979. *Bringing Home Animals: Religious Ideology and Mode of Production of the Mistassini Cree Hunters*. Newfoundland Social and Economic Studies 23. St. John's: Institute of Social and Economic Research, Memorial University of Newfoundland.

Tapper, R. 1988. "Animality, Humanity, Morality, Society." In: *What is an Animal?* Edited by T. Ingold. London: Routledge: 47–62.

Taylor, N. 2012. "Animals, Mess, Method: Post-Humanism, Sociology and Animal Studies." In: *Crossing Boundaries: Investigating Human-Animal Relationships*, edited by L. Birke and J. Hockenhull. Human-Animal Studies 14. Leiden: Brill: 37–50.

Taylor, V. J. and T. B. Poole. 1998. "Captive Breeding and Infant Mortality in Asian Elephants: A Comparison between Twenty Western Zoos and Three Eastern Elephant Centers." *Zoo Biology* 17(4): 311–32.

Tchernov, E., L. K. Horwitz, A. Ronen, and A. Lister. 1994. "The Faunal Remains from Evron Quarry in Relation to Other Lower Paleolithic Hominid Sites in the Southern Levant." *Quaternary Research* 42(3): 328–39.

Theocharis, D. 1967. "Θεσσαλία." *ArchDelt* 22 B': 295–96.

— 1961/1962. "Θεσσαλία." *ArchDelt* 17 B': 175–79.

Thomas, J. 2002. "Archaeology's Humanism and the Materiality of the Body." In: *Thinking through the Body: Archaeologies of Corporeality*, edited by S. T. Yannis Hamilakis Mark Pluciennik. New York: Kluwer Academic/Plenum Publishers.

Tlili, S. 2018. "Animal Ethics in Islam: A Review Article." *Religions* 9(9).

Todd, N. E. 2010. "Qualitative Comparison of the Cranio-Dental Osteology of the Extant Elephants, *Elephas Maximus* (Asian Elephant) and *Loxodonta africana* (African Elephant)." *The Anatomical Record* 293(1): 62–73.

Touchais, G., C. Perlès, L.-C. Courtois, and E. Dimou. 1981. "Le matériel néolithique." In: *L'Antre Corycien I. BCH* Suppl. 7. Paris: Ecole Française d'Athènes: 95–172.

Tournavitou, I. 1995. *The "Ivory Houses" at Mycenae. BICS* Suppl. 24. London: British School at Athens.

— 2020. "Ivories." In: *A Companion to the Archaeology of Early Greece and the Mediterranean*, edited by I. S. Lemos and A. Kotsonas. Hoboken: Wiley-Blackwell: 627–45.

Trantalidou, K. and I. Kavoura. 2007. "Astragali in Caves: The Contribution of the Archaeozoology in the Understanding of Some Ancient Greek Cult Practices." In: *Cult and Sanctuary through the Ages: Anodos. Studies of the Ancient World, 6-7/2006–2007*

(Častá-Papiernička). Edited by M. D. Mária Novotná Werner Jobst. Bratislava: Ministry of Education of the Slovak Republic: 459–73.

Trapani, J. and D. C. Fisher. 2003. "Discriminating Proboscidean Taxa Using Features of the Schreger Pattern in Tusk Dentin." *JAS* 30(4): 429–38.

Tsachalidis, E. P. and E. Hadjisterkotis. 2009. "Current Distribution and Population Status of Wild Boar (*Sus scrofa L.*) in Greece." *Acta Silvatica et Lignaria Hungarica* 5: 153–57.

Tsantsanoglou, K. 2012. *Of Golden Manes and Silvery Faces: The Partheneion 1 of Alcman.* Trends in Classics 16. Berlin: Walter de Gruyter.

Tsing, A. 2012. "Unruly Edges: Mushrooms as Companion Species." *Environmental Humanities* 1(1): 141–54.

Tsoukala, E., D. Mol, S. Pappa, E. Vlachos, W. van Logchem, M. Vaxevanopoulos, and J. Reumer. 2011. "*Elephas antiquus* in Greece: New Finds and a Reappraisal of Older Material (Mammalia, Proboscidea, Elephantidae)." *Quaternary International* 245(2): 339–49.

Tsoukala, V. 2009. "Honorary Shares of Sacrificial Meat in Attic Vase Painting: Visual Signs of Distinction and Civic Identity." *Hesperia* 78(1): 1–40.

Tuan, Y.-F. 1984. *Dominance and Affection: The Making of Pets.* New Haven: Yale University Press.

Turner, V. W. 1962. "Themes in the Symbolism of Ndembu Hunting Ritual." *Anthropological Quarterly* 35(2): 37–57.

Turvey, S. T., H. Tong, A. J. Stuart, and A. M. Lister. 2013. "Holocene Survival of Late Pleistocene Megafauna in China: A Critical Review of the Evidence." *Quaternary Science Reviews* 76: 156–66.

Tzifopoulos, Y. Z. 2012. "Ιστορικό διάγραμα Μεθώνης." In: *Μεθώνη Πιερίας Ι: Επιγραφές, χαράγματα και εμπορικά σύμβολα στη Γεωμετρική και Αρχαϊκή κεραμική από το 'Υπόγειο' της Μεθώνης Πιερίας στη Μακεδονία.* Thessaloniki: Centre for the Greek Language: 15–40.

Ustinova, Y. 2009. *Caves and the Ancient Greek Mind: Descending Underground in the Search for Ultimate Truth*. Oxford: Oxford University Press.

— 2017. *Divine Mania: Alteration of Consciousness in Ancient Greece*. London: Routledge.

Van Damme, T. and M. Nikolaidou. 2017. "Ancient Methone Ceramic Report 2014-2017."

Van Straten, F. T. 1995. *Hierà kalá: Images of Animal Sacrifice in Archaic and Classical Greece*. Religions in the Graeco-Roman World 127. Leiden: Brill.

Vareltzidou, S. and L. Strixner. 2009. *Recommended Strategic Plan for Maintaining Favourable Conservation Status of Natura 2000 Areas in the Axios Delta in Greece (2009–2013)*. Tech. rep. Axios Loudias Aliakmonas Estuaries Management Authority, Greece.

Varvarinou-Vai, D. 2017. "The Small Finds: The Bone and Ivory Jewelery." In: *Les sanctuaires archaïques des Cyclades*, edited by A. Mazarakis Ainian. Rennes: Presses universitaires de Rennes: 193–200.

Velitzelos, E. and H. Schneider. 1973. "Beiträge zur Geologie West-Makedoniens 1. Elephantiden - Reste aus dem Pleistozän der Provinz Florina." *Annales Musei Goulandris* 1: 251–56.

Verdan, S. 2013. *Le sanctuaire d'Apollon Daphnéphoros à l'époque géométrique. Vol. 1: Texte*. Eretria 22. Gollion: Infolio.

Vesna Bikić, S. V. 2016. "Bone Working and the Army: An Early Eighteenth–Century Button Workshop at the Belgrade Fortress." In: *Close to the Bone: Current Studies in Bone Technologies*, edited by S. Vitezović. Belgrade: Institute of Archaeology, Belgrade: 57–65.

Vidya, T., R. Sukumar, and D. J. Melnick. 2009. "Range-Wide mtDNA Phylogeography Yields Insights into the Origins of Asian Elephants." *Proceedings of the Royal Society B: Biological Sciences* 276 (1658): 893–902.

Vierneisel-Schlörb, B. 1966. "Eridanos-Nekropole." *AM* 81: 4–111.

Virág, A. 2012. "Histogenesis of the Unique Morphology of Proboscidean Ivory." *Journal of Morphology* 273(12): 1406–23.

Vitezović, S., ed. 2016. *Close to the Bone: Current Studies in Bone Technologies*. Belgrade: Institute of Archaeology, Belgrade.

— 2017. “Antler Exploitation and Management in the Vinča Culture: An Overview of Evidence from Serbia.” *Quaternary International* 450: 209–23.

Viveiros De Castro, E. 2004. “Exchanging Perspectives: The Transformation of Objects into Subjects in Amerindian Ontologies.” *Common Knowledge* 10(3): 463–84.

Vives, A. 1917. *Estudio de arqueología cartaginesa: la necrópoli de Ibiza*. Madrid: Blass.

Vogler, U. 1997. “Faunenhistorische Untersuchungen am Sirkeli Höyük/Adana, Türkei (4.-1. Jahrtausend v. Chr.)” PhD thesis. Ludwig-Maximilians-Üniversität, München.

von den Driesch, A. 1996. “Faunenhistorische untersuchungen am prähistorischen tierknochenmaterial vom Sirkeli Höyük, Adana-Türkei.” *IstMitt* 46: 27–39.

von Luschan, F. 1943. *Die Kleinfunde von Sendschirli*. Ausgrabungen in Sendschirli 5. Berlin: Walter de Gruyter.

Voyatzis, M. E. 1990. *The Early Sanctuary of Athena Alea at Tegea and Other Archaic Sanctuaries in Arcadia*. *SIMA* 97. Stockholm: Paul Åström Förlag.

— 1995. “Geometric Arcadia.” *BICS* 40(63): 271–83.

— 2004. “The Cult of Athena Alea at Tegea and Its Transformation over Time.” In: *Celebrations. Sanctuaries and the Vestiges of Cult Activity: Selected Papers and Discussions from the Tenth Anniversary Symposion of the Norwegian Institute at Athens, 12–16 May 1999*, edited by M. Wedde. Bergen: Grieg Medialog: 187–206.

— 2014a. “Objects from the Northern Sector.” In: *Tegea II. Investigations in the Sanctuary of Athena Alea 1990-94 and 2004*, edited by E. Østby. Athens: Norwegian Institute at Athens: 163–262.

— 2014b. “Objects from the Temple Excavation.” In: *Tegea I. Investigations in the Temple of Athena Alea 1991–94*, edited by E. Østby. Athens: Norwegian Institute at Athens: 467–538.

Wace, A. J. B. and J. P. Droop. 1906. “Excavations at Theotokou, Thessaly.” *BSA* 13: 309–27.

Walker, K. G. 2004. *Archaic Eretria: A Political and Social History from the Earliest Times to 490 BC*. London: Routledge.

Wallace, R. W. 2003. “An Early Fifth-Century Athenian Revolution in Aulos Music.” *HSCP* 101: 73–92.

Wallenstein, K. 1971. *Korinthische Plastik Des 7. Und 6. Jahrhunderts Vor Christus*. Bonn: Bouvier Verlag Herbert Grundmann.

Walter, H. 1959. “Elfenbeinjüngling.” *AM* 74: 43–47.

Walter Müller, F. O. 1912. “Die ‘Geometrische’ Nekropole.” In: *Tiryns: die Ergebnisse der Ausgrabungen des Instituts*. Vol. 1. Athens: Eleutheroudakis und Barth.

Walter-Karydi, E. 1970. “Äolische Kunst.” *AntK-BH* 7: 1–17.

Wardle, K. 1989. “Excavations at Assiros Toumba 1988: A Preliminary Report.” *BSA* 84: 447–63.

Weiner, S. and H. D. Wagner. 1998. “The Material Bone: Structure-Mechanical Function Relations.” *Annual Review of Materials Science* 28(1): 271–98.

Weissengruber, G., M. Egerbacher, and G. Forstenpointner. 2005. “Structure and Innervation of the Tusk Pulp in the African Elephant (*Loxodonta africana*).” *Journal of Anatomy* 206(4): 387–93.

Weißl, M. 2003. “Grundzüge der Bau- und Schichtenfolge im Artemision von Ephesos.” *ÖJh* 71: 313–46.

— 2003/2004. “Kontextualisierung im Artemision von Ephesos.” *Hephaistos* 21/22: 169–200.

Wells, P. J., M. A. P. Renouf, and T. Rast. 2014. “Dorset Culture Bone and Antler Tool Reproductions Using Replica Lithics: Report on the Identification of Some Possible Manufacture Traces on Osseous Tools from Phillip’s Garden, Newfoundland.” *Canadian Journal of Archaeology / Journal Canadien d’Archéologie* 38(2): 394–423.

Wendrich, W. 2013. “Body Knowledge, Identity, and Communities of Practice.” In: *Archaeology and Apprenticeship: Body Knowledge, Identity, and Communities of Practice*, edited by W. Wendrich. Tucson: University of Arizona Press: 1–19.

White, L. J. T., C. E. G. Tutin, and M. Fernandez. 1993. “Group Composition and Diet of Forest Elephants, *Loxodonta africana cyclotis* Matschie 1900, in the Lopé Reserve, Gabon.” *African Journal of Ecology* 31(3): 181–99.

Whitley, A. J. M. 2002. “Objects with Attitude: Biographical Facts and Fallacies in the Study of the Late Bronze Age and Early Iron Age Warrior Graves.” *Cambridge Archaeological Journal* 12(2): 217–32.

Wicke, D. 2005. “‘Roundcheeked and Ringletted’: Gibt es einen nordwestsyrischen Regionalstil in der altorientalischen Elfenbeinschnitzerei?” In: *Crafts and Images in Contact: Studies on Eastern Mediterranean Art of the First Millennium BCE*, edited by C. E. Suter and C. Uehlinger. Orbis Biblicus et Orientalis 210. Vandenhoeck und Ruprecht, Fribourg: 67–110.

— 2009. “«Intermediate Tradition» - dreifach Problematisch.” In: *Syrian and Phoenician Ivories of the Early First Millennium BCE: Chronology, Regional Styles and Iconogrpahic Repertoires Patterns of Inter-regional Distribution*, edited by S. M. Cecchini, S. Mazzoni, and E. Scigliuzzo. Pisa: Edizioni ETS.

Willerslev, R. 2007. *Soul Hunters: Hunting, Animism, and Personhood among the Siberian Yukaghirs*. Berkeley: University of California Press.

Wilson, E., trans. 2017. *The Odyssey*. New York: W. W. Norton.

Winter, I. J. 1973. “North Syria in the Early First Millennium B.C., with Special Reference to Ivory Carving.” PhD thesis. Columbia University.

— 1976a. “Carved Ivory Furniture Panels from Nimrud: A Coherent Subgroup of the North Syrian Style.” *Metropolitan Museum Journal* 11: 25–54.

— 1976b. “Phoenician and North Syrian Ivory Carving in Historical Context: Questions of Style and Distribution.” *Iraq* 38(1): 1–22.

Winter, I. J. 1981. “Is There a South Syrian style of Ivory Carving in the Early First Millennium BC?” *Iraq* 43(02): 101–30.

— 2005. “Establishing Group Boundaries: Toward Methodological Refinement in the Determination of Sets as a Prior Condition to the Analysis of Cultural Contact and/or Innovation in First Millennium BCE Ivory Carving.” In: *Crafts and Images in Contact: Studies on Eastern Mediterranean Art of the First Millennium BCE*, edited by C. E. Suter and C. Uehlinger. Orbis Biblicus et Orientalis 210. Vandenhoeck und Ruprecht, Fribourg: 23–42.

— 2016. “The ‘Woman at the Window’: Iconography and Inferences of a Motif in First-Millennium B.C. Levantine Ivory Carving.” In: *Assyria to Iberia: Art and Culture in the Iron Age*, edited by J. Aruz and M. Seymour. New York: Metropolitan Museum of Art.

Winters, M., A. Torkelson, R. Booth, C. Mailand, Y. Hoareau, S. Tucker, and S. Wasser. 2018. “Isolation of DNA from Small Amounts of Elephant Ivory: Sampling the Cementum with Total Demineralization Extraction.” *Forensic Science International* 288: 131–39.

Woodward, A. M. 1929. “Inscriptions.” In: *The Sanctuary of Artemis Orthia at Sparta. Excavated and Described by Members of the British School at Athens, 1906–1910*, edited by R. Dawkins. London: Macmillan & Company: 285–377.

Woolley, L. 1955. *Alalakh: An Account of the Excavations at Tell Atchana in the Hatay, 1937–1949.* Oxford: Oxford University Press.

Wynn, T., F. Coolidge, and M. Bright. 2009. “Hohlenstein-Stadel and the Evolution of Human Conceptual Thought.” *Cambridge Archaeological Journal* 19(1): 73–84.

Yamada, S. 2000. *The Construction of the Assyrian Empire: A Historical Study of the Inscriptions of Shalmanesar III (859–824 BC) Relating to His Campaigns to the West.* Vol. 3. Culture and History of the Ancient Near East. Leiden: Brill.

Yeniasir, M., B. Gökbulut, and Ö. Yaraşir. 2017. “Knowledge and Opinions of Families Regarding Games—Toy Selection for 6 to 12 Year Old Children (the Case of Northern Cyprus).” *Journal of Human Behavior in the Social Environment* 27(6): 546–58.

Younger, J. G. 1998. *Music in the Aegean Bronze Age*. Stockholm: Paul Åströms Förlag.

Zaccarini, M. 2015. "The Return of Theseus to Athens: A Case Study in Layered Tradition and Reception." *Histos. The Online Journal of Ancient Historiography* 9: 174–98.

Zadok, R. 1985. "Zur Geographie Babyloniens während des sargonidischen, chaldäischen, achämenidischen und hellenistischen Zeitalters." *Die Welt des Orients* 16: 19–79.

Zosi, E. 2012. "An Enigmatic Female Burial." In: *"Princesses" of the Mediterranean in the Dawn of History*, edited by N. C. Stampolidis and M. Giannopoulou. Athens: Museum of Cycladic Art: 147–57.

Żurowski, K. 1974. "Zmiękczanie poroża i kości stosowane przez wytwórców w Starożytności i we wczesnym średniowieczu." *Acta Universitatis Nicolai Copernici, Archeologia* 4: 3–23.