The Late Roman Amphoras of Thrace: The Perspective from the Molyvoti Peninsula

by

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A Thesis submitted to the Faculty of Graduate Studies of

The University of Manitoba

in partial fulfillment of the requirements of the degree of

MASTER OF ARTS

Department of Classics

University of Manitoba

Winnipeg

Abstract

The Molyvoti, Thrace, Archaeological Project is a diachronic study of the geography and human activity of the Molyvoti Peninsula and surrounding area, near modern Komotini. This thesis' objective is to place the Late Roman (c. 4th to 7th centuries A.D.) activity in and around the Molyvoti peninsula in its historical and economic context by quantifying the 2014 and 2015 surface survey amphora assemblages, understood through theoretical frameworks from economic history. The densest cluster of Late Roman amphora sherds, found on the headland, may suggest port activity with a late 5th to early 6th century date. The late 5th century deposits at Dichin offer the best comparanda, suggesting possible military activity. Another scatter matches assemblages identified with the *annona militaris*, with a similar date range. Elsewhere, two distinct amphora scatters suggest peaks of activity in the 2nd to early 4th century A.D. and in the late 5th to early 6th century.

Acknowledgments

First and foremost, I would like to thank my supervisor, Dr. Mark Lawall, for his support, encouragement, and guidance throughout this process. This project simply would not have been possible without him. I would also like to thank my committee, Drs. Lea Stirling and Kent Fowler, for their feedback, knowledge, and fresh perspectives.

My research was made possible by the assistance of many individuals and organizations who provided me with access to Molyvoti and its collection. I would especially like to thank the directors of MTAP, Drs. Nathan Arrington, Domna Terzopoulou, and Marina Tasaklakis for welcoming me into the project. I am equally indebted to Dr. Chryssa Karadima of the 19th Ephoria of Prehistoric and Classical Studies, and to Dr. Thomas Tartaron and Dr. Nicholas Hudson, as well as the other staff and students of MTAP for their hard work, assistance, and insight – I very much look forward to continuing our collaboration in the future.

Of course, this undertaking would never have been achievable without the unrelenting support and encouragement of my family and friends: Stephanie, Mum, Dad, Janet, John, Gord, Kelly, Mike, Matt, Conor, Remi, Lianne, Yiannis, and others too countless to name.

I would like to gratefully acknowledge the generous financial support shown to me by: the Social Sciences and Humanities Research Council, the University of Manitoba (Faculty of Graduate Studies, Faculty of Arts, Department of Classics, and Graduate Students' Association).

Dedication

To my darling, long-suffering Stephanie – this never could have happened without you. *Je t'adore.*

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Chapter 1: Introduction

1.1 General Introduction

Transport amphoras are the undecorated ceramic containers that were the predominant means of packaging liquid goods for storage and trade across the Greco-Roman world and throughout most of antiquity. One of the earliest scholars to investigate Roman amphoras was Dressel in the mid to late 19th century, who outlined broad amphora groups at Monte Testaccio to inform his discussion of the inscriptions with which he was concerned.[1] Schoene and Mau provided a similar function with the amphoras at Pompeii.[2] Grace pioneered research into transport amphoras and their function, demonstrating the usefulness of these common archaeological finds in understanding production and trade in the ancient world.[3] Thomas was one of the first scholars to focus on transport amphoras from the Late Roman period (roughly the 4th to 7th centuries A.D.), and was the first to identify some of the most common and widespread amphora types for this period.[4] This work came in the context of other 1950s refinements of the earlier typologies, along with Lamboglia, Callender, Almagro, and Robinson.[5] Since then, scholars such as Riley, Peacock and Williams, Hayes, and Reynolds have demonstrated the importance of Late Roman amphora typologies in understanding consumption and production patterns.[6] Due to their durable nature and close ties to economic activity, both in terms of production and exchange processes, transport amphoras continue to be popular research material

[1] Dressel 1878; 1899.
[2] Schoene 1871; Mau 1898.
[3] Grace 1947.
[4] Thomas 1959.
[5] Lamboglia, 1950; Callender, 1950; Almagro 1955; Robinson 1959.
[6] Riley 1979; Peacock and Williams 1986; Hayes 1992; Reynolds 2010a.

for archaeologists and economic historians. This is especially true for amphoras of the Late Roman Eastern Mediterranean, which have been well studied at a number of important archaeological sites around the Empire.[7] Textual evidence for economic activity in this period is relatively abundant, particularly in terms of papyrological evidence, various legal sources such as the *Codex Justinianus* and the *Codex Theodosianus*, and epigraphic evidence like the Price Edict of Diocletian. The physical remains of economic activity – storage jars, olive presses, millstones, shipwrecks, transport amphoras and the like - are equally essential to the Late Roman economic historian. By synthesizing different sources of evidence, it is possible to circumvent the limitations of each individual type of evidence. Increasingly, scholars are embracing this comprehensive approach. *The Cambridge Economic History of the Greco-Roman World*, for instance, synthesizes many different strands of evidence in order to provide a holistic perspective on ancient economic history.[8] Large-scale projects such as the Oxford Roman Economy Project take this synthetic approach even further, creating a dynamic, evolving database incorporating both documentary and material evidence.[9] The upcoming release of two volumes published under the aegis of this project represents the cutting edge of research into Roman economic history.[10]

While a large number of studies of Late Roman amphoras have been published concerning numerous sites widely dispersed across the entire Roman world, there are many regions for which there are little to no amphora data available. One such area is the Late Roman province of Rhodope, located in the northeast of modern Greece, bounded by the Nestos River to the west,

[7] e.g., Carthage: Riley 1976; Peacock and Fulford 1982. Ephesus: Bezeczky 2013. Istanbul: Hayes 1992. Ostia: Rizzo 2014.
[8] Scheidel et al. 2007.
[9] Bowman and Wilson 2016.
[10] Flohr and Wilson, in press; Tchernia, 2016.

the Hebros River to the east, the Aegean Sea to the south, and incorporating the Rhodope mountains to the north.[11] The 6th century A.D. geographer Hierocles lists seven cities in the province, and Ainos is believed to have been the capital.[12] Numerous smaller cities, settlements, and forts are also attested.[13] According to Procopius, the Emperor Justinian renovated or improved the defenses of five cities, fortified a previously unprotected village, and constructed twelve new forts in the province, suggesting at least some strategic value was assigned to the area.[14] The Church was also well represented in Rhodope, with five autocephalous episcopates.[15] Furthermore, located roughly halfway between the major Late Roman urban centres of Constantinople and Thessalonika, the province must have seen a great deal of movement, both along the great overland route of the Via Egnatia, and by sea along the coast.[16] Despite the fact that there must have been a sizeable population here, and despite the fact that a great deal of trade must have passed through, we know next to nothing about the transport amphoras found in this province, and by proxy, the goods carried in them. It is hoped that the research presented here will begin to remedy this problem.

Although the ideal would be a large-scale comparative study of amphora material from all Late Roman sites throughout the province, there is insufficient data for this approach. Moreover, not all archaeological projects prioritize investigation into economic exchange processes through

[11] Velkov 1977, p. 124.
[12] Hier. *Synecd*. 634.4-635.2. Velkov 1977, p. 125.
[13] Velkov 1977, pp. 125-127.
[14] Procop. *Aed*. 4.11. Although this is substantially more activity than he records for the neighbouring province of Europa, it pales in comparison to the number of forts he lists in Thracia, Haemimontus, and Moesia. The 'Byzantine Wall' still visible in modern Komotini is thought to be a Theodosian legionary fortress. M. Tasaklakis, pers. comm. Especially in light of its architectural similarity to sections of the surviving circuit at Anastasioupolis, it is plausible that this fortress might also have been renovated by Justinian, perhaps even being one of those listed by Procopius.
[15] Dumanov 2015, p. 93.
[16] Lolos 2009; Avramea 2002; Charlesworth 1926, pp. 115-119; Karivieri 2010.

the study of amphoras. The two ongoing series of conference proceedings, *Late Roman Coarse Ware* and *Rei Cretariae Romanae Fautores Acta,* are the major repositories of Late Roman ceramic publications and yet amphora scholarship from the province of Rhodope is conspicuously absent in these resources. Most archaeological sites dating to this period in Rhodope are arguably understudied, and our understanding would benefit greatly from further excavations and survey work.

To this end, the Molyvoti, Thrace, Archaeological Project (MTAP), under the directorship of Nathan Arrington, Marina Tasaklakis, and Domna Terzopoulou, is a five-year, multi-disciplinary collaboration between the 19th Ephorate of Prehistoric and Classical Antiquities and the American School of Classical Studies at Athens, represented by Princeton University. It combines stratigraphic excavation, geophysical survey and both extensive regional surface survey and intensive 'urban' surface survey centered on a large Classical settlement located on the Molyvoti peninsula with evidence of reoccupation in the Late Roman period.[17] The project's stated objectives are "to investigate the identity, form, and chronology of the settlement; to understand its various roles in regional communication and exchange networks; and to assess its evolving relationship with the landscape and local populations."[18] The project uses a diachronic perspective, in the effort to understand settlement patterns in this area over time. This thesis documents the Late Roman amphora material from the MTAP urban and rural surface surveys. The objective of this thesis is to place the Late Roman activity on and around the Molyvoti peninsula in its proper historical and economic context, and to provide some insight in the possible nature of the economic activity of the area based on the Late Roman amphora assemblage. As such, the remainder of this chapter is devoted to discussion of the research

[17] Arrington et al. 2016.
[18] Arrington et al. 2016, p. 2.

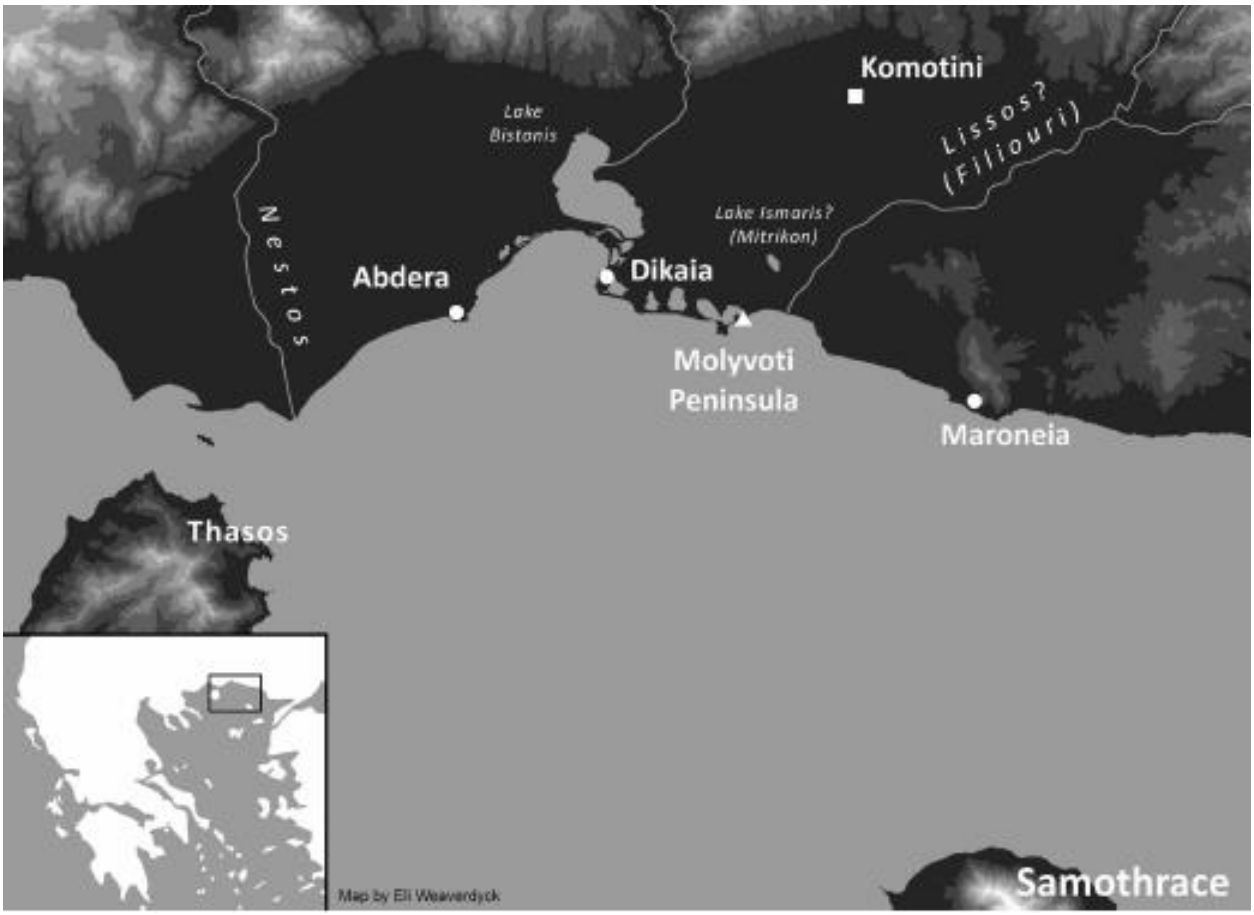
methods and theoretical framework that form the basis of this undertaking. Chapter 2 is an overview of the general history of the Late Roman period in Thrace generally, and Rhodope in particular, to contextualize the present analysis. This chapter combines careful reading of the surviving literary and documentary evidence for this period with review of modern historical scholarship, maintaining emphasis on the evidence for the economy. Chapter 3 provides an overview of Late Roman amphora studies and how amphora studies have contributed to our understanding of the Late Roman economy more broadly. This chapter also introduces the Late Roman amphora types present in the Molyvoti survey assemblage. Chapter 4 presents the amphora data from both MTAP's 2014 and 2015 surface surveys, including sherd counts from the survey assemblages and analysis of the sherds' distribution patterns. Chapter 5 reviews the available amphora data from other sites in Thrace, contextualizing the conclusions from the previous chapter in terms of geographic area, time period, and scholarship.

1.2 The Molyvoti, Thrace, Archaeological Project Survey

The Molyvoti peninsula is located on the Aegean coast of Thrace roughly halfway between the islands of Samothrace and Thasos, roughly 25 km southwest of the modern city of Komotini (Figure 1). The Classical settlement, often referred to as ancient Stryme, is situated on the northern end of the peninsula.[19] The MTAP survey investigated the immediate surrounding area and hinterland of this settlement.

[19] Arrington et al. 2016, pp. 1-5.

Figure 1. The Molyvoti Peninsula. Arrington et al. 2016, p. 2, fig. 1.



The surface survey was carried out by Thomas F. Tartaron and his team throughout the 2014 and 2015 field seasons. MTAP's two surface surveys were carried out with separate objectives and methods, and are therefore worth considering independently. The study region was divided into two 'survey universes'. Zone A', surveyed in 2014, constitutes the smaller of the two zones, encompassing essentially the entire peninsula, including the small headland at the peninsula's southwestern end – a total area of 215.2 ha. The objective was a 'hyper-intensive, urban-style' diachronic survey of surface archaeological material from the Classical site and its immediate surroundings. The methodology for this survey is based on established practices from other

urban survey projects in Greece.[20] This intensive or 'on-site' survey approach is employed in areas of known activity to get the best possible idea of what material is present. Using this approach, a large percentage of each tract is actually covered by the team and the survey units are smaller, allowing a collected artifact to be mapped with a high degree of precision. The 2015 survey, by contrast, was concerned with the hinterland of the Classical settlement. Zone B' incorporated a much larger area than Zone A', a total of 483.0 ha. Accordingly, the team to adopted an 'off-site' survey methodology, that is, less intensive than the 2014 survey, but still high-resolution.[21] The term 'off-site' refers to survey in an area where human activity has not yet been detected or is not fully understood, often described as 'extensive' survey.[22] A less intensive 'off-site' approach is used in order to cover territory more quickly when looking new signs of activity.

1.3 Field Methods

Field work for this thesis was carried out over the span of two research stints, three weeks in June 2015 and four weeks in January to February 2016. The 2015 research was focused on the 2014 survey material. Bags containing the pottery collected from each survey unit in these tracts were opened sequentially. Sherds were sorted according to fabric and sherd type, that is, handle, rim, base, and body fragments. Counts were recorded of all Late Roman amphora sherds. Diagnostic pieces were pulled for cataloging, photography (both macro- and microscopic), fabric

[20] Tartaron 2014, p. 1. For a recent summary of Classical urban survey methodologies in the Mediterranean, see Lolos et al. 2007, pp. 268-271.
[21] Tartaron 2015, p. 1.
[22] Foley 1981, pp. 158-163; Bintliff and Snodgrass 1988, p. 506.

description, documentation of the state of preservation of each sherd, and the drawing of rims and bases.

The 2016 research visit was used to finalize the cataloguing of the 2014 survey material as well as to count and catalogue the 2015 material. The methods employed during the 2016 visit were identical to those carried out the previous season, with one exception. Dr. Tartaron kindly provided a list of all survey units that the team identified as containing some kind of Late Roman activity. Due to the sheer volume of pottery collected in 2015, this research is limited to those bags flagged as containing Late Roman material.

1.4 Theoretical Background

No discussion of economic activity in antiquity is possible without acknowledging the long-standing debate between the great theoretical camps of Classical Economic History. Early economic historical thought maintained that the ancient economy worked on modern principles without considering the anachronistic nature of this view. For instance, Rostovtzeff believed that the Roman economy was based on the exploitation by the bourgeoisie of the lower classes, a decidedly modern view expressed using Marxist vocabulary, a product of his experiences in revolutionary Russia.[23] Frank assumed the existence of economic systems such as banking, drawing parallels to the contemporary American economy.[24]

Later economic historians moved away from these simplistic comparisons between ancient and modern economic systems.[25] Jones, studying the economy of the Later Roman Empire,

[23] Rostovtzeff 1926; Bickerman 1958, p. 460; Dow 1960, p. 549.
[24] Frank 1927, pp. 294-296; Ferguson 1920, pp. 801-802.
[25] Greene 1990, p.14.

downplayed the role of commerce in the ancient economy.[26] His argument that the state played such a large role in the economy implies that the economy cannot have functioned like a modern economy with private enterprise to the extent that previous scholars imagined.[27] Finley's 'primitivist' concept of the ancient economy, developing this idea further, proved to be a significant milestone. According to this framework, the ancient economy cannot be studied using concepts designed to suit modern economics on the grounds that the ancient economy was virtually entirely agrarian and subsistence oriented, its growth potential was sorely limited by a slow (almost non-existent by modern standards) rate of technological innovation, and did not operate under a free-market system but was instead based on mechanisms like reciprocity and redistribution, with an emphasis on sustainability rather than growth.[28] Finley argues that a key element of the ancient Roman economy is the importance of status and how it is gained and maintained. Economic activity was driven by the elite pursuit of social and political power.[29]

Whittaker refined Finley's primitivist model in discussing the agents of exchange. His 'tied-trade' approach to the Late Roman economy focuses on the huge imbalance of trade (and wealth) in the hands of the Emperor, the Church, and the landed aristocrats, emphasizing their predilection for gift-exchange and redistribution.[30] While these processes occur in a free market as well, primitivists distinguish that these are the primary market forces in the ancient economy. Although acknowledging the existence of entrepreneurial *negotiatores,* Whittaker down-plays their importance compared to what he calls 'tied' traders, *negotiatores* who were contracted to conduct business on behalf of specific wealthy individuals or institutions including the military

[26] Jones 1964, p. 827; Ward-Perkins 2008, p. 208.
[27] Jones 1964, p. 841.
[28] Finley 1973.
[29] Finley 1973, p. 139.
[30] Whittaker 1983, pp. 165-173.

(while acknowledging that these men frequently carried out private business concurrently). In a tied-trade system, *negotiatores* were not strictly independent operators, but rather held an obligation to do business with particular individuals or institutions, and therefore the Late Roman economy cannot be considered a true market economy due to inefficiencies introduced into the equation.

Criticisms of the Finley model focus on the issue of economic growth. Hopkins draws on the primitivist model but modifies it by suggesting that significant economic growth did occur in antiquity, driven by increasing agricultural surpluses.[31] Hopkins also argues against but does not entirely refute Finley's case for the lack of empire-wide economic integration, acknowledging that the scale of trade increased significantly between 200 B.C. and A.D. 400 and implying that a certain amount of market integration may have supported this development. The movement of goods likely paralleled the movement of taxes from the provinces into the centralized administration.[32] Hopkins also maintains that the Roman tax and rent systems incentivized the conversion of agricultural surplus, however meagre, into cash, necessitating participation in the market economy.[33] Greene and Mattingly also note that Finley overlooked technological innovation and distribution as forces for economic growth.[34] These perspectives are unified, however, in saying that the ancient Roman economy was not strictly a free market economy due to high levels of state control.[35]

'Modernists' such as Temin and Silver occupy the opposite theoretical camp from Finley and the 'primitivists', maintaining that modern economic theory can be applied to the study of

[31] Hopkins 1980, pp. 105-106; 1983, pp. xiv-xv.
[32] Hopkins 1980, pp. 101-103.
[33] Hopkins 1980, p. 104.
[34] Greene 1990, p. 14; Greene 2000, p. 30; Mattingly 2006, pp. 287-288.
[35] Hopkins 1983, p. xxiii; Mattingly and Salmon 2002, pp. 3-5.

the ancient economy, since the differences between the ancient and the modern economy are primarily of scale rather than structure.[36] Temin dismisses Finley's assertion that ancient Rome did not have a market economy, arguing that a market economy, while perhaps not as organized as its modern equivalent, was in fact necessary for the early Roman Empire to develop.[37] Using Temin's interpretation, the quantity of economic transactions under the Roman Empire constituted a market economy, characterized by prices that were subject to change based on principles common to modern economies, such as supply and demand.[38] Bang rejects Temin's hypothesis on the grounds that Temin dismisses his own statement that the majority of production was household-based rather than participating in the larger economy and that the degree of disorganization, also described by Temin, would be prohibitive to a functioning market economy. That is, the non-existence of perfect information and Empire-wide market integration negate the applicability of the Modernist economic model.[39]

From Silver's perspective, which, it should be noted, is primarily concerned with economic evidence from the Ancient Near East and Archaic Greece, it is logical that ancient social structure can and perhaps should be viewed as corporate structure. From the sources, it is difficult if not impossible to differentiate between true 'public' business and 'private' business that is carried out by/for the person in charge.[40] Banaji uses similar terms to describe Justinian's integration of the aristocrats, the Church, and high ranking military officers into the bureaucracy of the Eastern Empire, to the effect that "the leading institutions of civil society assumed the

[36] Temin 2013, p. 4; Silver 1995, p. 175; Morley 2007, pp. 6-9.
[37] Temin 2001, p. 181.
[38] Temin 2013, p. 14; Temin 2001, p 176.
[39] Bang 2008, pp. 31-32; Bang 2007, p. 25, n. 59; Temin 2001, p. 180.
[40] Silver 1995, pp 76-79.

characteristics of state agencies without ever being appendages of the state."[41] Indeed, the dominant themes of Banaji's work are that the economy of the Eastern Mediterranean throughout the Late Roman Period was characterised by a marked increase in monetisation, a shift from slavery to wage-labour, a thriving urban middle class, and diverse commercial activity on a massive scale.[42] As a result, Banaji's perception of the economy of the Late Roman Period in the Eastern Mediterranean has a distinctly modern character, despite the fact that his work draws heavily on other theoretical frameworks such as New Institutional Economics.[43] It is imperative to note, therefore, that the modernity of Banaji's model stems more from his view that the 'proto-industrial' Late Antique economy derived from fundamental economic change beginning at the end of the Middle Roman Period than from any strict adherence to 'modernist' thinking on his part.

The unproductive primitivist-modernist terms of the debate, some have argued, can be sidestepped with references to New Institutional Economics (NIE). North's theories on the role of institutions in the development of economies, the so-called New Institutionalism, have been among the more influential concepts underpinning recent scholarship.[44] To summarize, North views the study of institutions as vital to the understanding of a given economy. He argues that institutional change is both incremental and in response to external stimuli, including changes in the relative prices associated with exchange (supply/demand, cost of information, taste, technological development, etc.) and actions of the agents operating within the economic system. Furthermore, he suggests that institutions can predispose an economy towards growth,

[41] Banaji 2016, pp. 58-60.
[42] Banaji 2016; 2007.
[43] Banaji 2016, pp. 19-27. See below.
[44] Scheidel and von Reden 2002; Saller 2002; Morris, Saller, and Scheidel 2007; de Callatay 2014; Bowman and Wilson 2009.

stagnation, or decline. Due to the fact that institutions are designed to benefit the person or persons running a society, rather than on the basis of social efficiency, most economies do not achieve a sustained level of growth, or 'growth path'. North also maintains that the existence of the State is necessary for growth due to the State's role in keeping transaction costs low through legal and military protection.[45] North's emphasis on institutions is well reflected in Giardina, who discusses the roles of and changes to several Roman institutions, including the *coloni*, the villa system, the law, and the Church.[46] North's influence is also apparent in the work of Banaji, for whom the continuity of the roles of the Late Roman Church, the aristocracy, the financial system, and imperial power into the early medieval period, is of paramount importance.[47]

In general, the past ten to fifteen years have seen something of a shift away from the 'Great Debate,' between 'primitivism' and 'modernism,' accepting flaws and merits in both theoretical camps.[48] Morley highlights a number of shared assumptions between the two sides of the 'primitivist/modernist' debate, demonstrating that both operate within the same same ideological framework, despite the fact that they disagree on how the ancient economy fits within it. That is to say, the disagreements between the two camps come down to the matter of where to place the 'ancient economy' on conceptual scales generated within these paradigms. Morley argues that the two paradigms share three fundamental assumptions. The first is that a dichotomy exists between the "healthy" modern (industrialized, capitalist) economy and 'non-modern stagnation'. Second, that the modernity of an economy should be identified by trade taking place within the economy, not by other metrics such as consumption patterns or production. The final assumption posits that trade needs to be understood in modern terms, i.e. that profit, and therefore market

[45] North 1990;1991; Dugger 1995.
[46] Giardina 2007, pp. 749-768.
[47] Banaji 2016, pp. 19-27.
[48] Morley 2007; Bang et al. 2006; de Callatay 2014; Morris, Saller, and Scheidel 2007.

forces, is the most important aspect of all modern economies. In essence, then, self-sufficiency does not equal economic rationalism.[49] Fundamentally, however, neither side of the debate acknowledges that there may be other economic paradigms through which to understand the ancient economy. Morley promotes New Institutionalism as a suitable alternative because he maintains that institutions are necessary to govern and inform exchange transactions.[50] Social institutions facilitate the agreement on the attributes of the objects of exchange, such as the value, and also on the conditions of exchange.

The *Cambridge Economic History of the Greco-Roman World*, as a body of work, also strives to advance the discussion. This volume draws heavily on New Institutionalism but advocates for continued discussion.[51] The ancient economy described within it is one of continual, but gradual, growth and innovation.[52] Giardina's chapter notes that the study of the Late Antique economy "is regularly associated with the rejection of generalizations, and with an insistence on the great diversity of local contexts."[53] New Institutionalism, however, is not without its criticisms. For instance, Verboven draws atttention to the deductive bias of scholars working within the New Institutionalist framework, forcing contradictory evidence to suit their model.[54] Critics also take issue with the assumption that institutions develop strictly to increase market efficiency for the entire system, but rather can develop to improve efficiency for specific groups such as the aristocratic elite.[55] The tide of scholarship has trended in recent decades towards a more nuanced, particularist perspective on the ancient economy.

[49] Morley 2007, pp. 7-9.
[50] Morley 2007, pp. 13-14.
[51] Morris, Saller, and Scheidel 2007, pp. 1-6; Verboven 2015, p. 41.
[52] Morris, Saller, and Scheidel 2007, pp. 9-12.
[53] Giardina 2007, p. 746.
[54] Verboven 2015, pp. 35-36.
[55] Verboven 2015, pp. 36-37.

Although New Institutionalism is an important theoretical framework for this study, elements from modernism and primitivism are incorporated where relevant.[56] As outlined by the primitivists, the ancient economy cannot be assumed to be a strictly free market given the amount of state control. Nonetheless, this study adopts the position that the amphora material discussed below will have reached the Molyvoti Peninsula through market forces and independent agents, both processes recognizable to modern economists. The role of Institutions in Roman Economic History, however, is well-established, and is not to be ignored. Indeed, the role of the Roman military in shaping the amphora exchange processes in the Late Roman period is a recurring theme in this work.

In introducing the discipline of amphora research, this chapter described the gap in scholarship which both this thesis project and the larger Molyvoti, Thrace, Archaeological Project is meant to address. The objective of this thesis is to place the Late Roman activity in and around the Molyvoti peninsula in its proper historical and economic contexts using the amphora assemblage collected through surface survey, understood through current theoretical frameworks from economic history. The next chapter places this study in its historical context, defining and describing the Late Roman period, including the historical scholarship of the institutions and economy of Late Roman Thrace.

[56] Verboven 2015, p. 51.

Chapter 2: Historical Context

This chapter introduces the historical context for life at the Molyvoti peninsula in the Late Roman/Early Byzantine period. As such, this chapter provides an overview of the social, political, military, and economic landscape of Thrace throughout this period. Section 2.1 introduces some of the broader trends in modern historical scholarship for the Late Roman world to clarify the timeframe of the study and situate this study in its scholarly context. Section 2.2 is a traditional chronological narrative of the history of Thrace in the Late Roman period, but one which also focuses on the events and persons that affected the economy of Thrace generally, and of the province of Rhodope in particular. Section 2.3 offers a perspective more grounded in Economic History, with a particular emphasis on the role of institutions, namely the Military, the Church, and the Law, in the economic life of the Late Roman period.

2.1 General History - Introduction

The necessary starting point for a discussion of Late Roman history is to define what is meant by the term 'Late Roman'. Mitchell, when discussing historical scholarship of the later centuries of Roman rule, observes three broad categories of scholars: the historians of the Later Roman Empire, the historians of the Early Byzantine Period, and the historians of Late Antiquity.[57] To the first group, he ascribes more conservative narrative values, including a generally narrower chronological focus, often around A.D. 300 to 600, as well as a more

[57] Mitchell 2007, pp. 5-9.

traditional emphasis on political and military events over other areas of interest.[58] In contrast, he remarks that the chronological focus of the Early Byzantinists can vary significantly, as can their choice of topic, but that they are bound to the study of the Eastern Empire.[59] The historians of Late Antiquity favour a broader chronological perspective, often extending from the start of the 3rd to the end of the 8th centuries A.D.[60] More significantly, he argues, they tend to prioritize more 'modern' subject matter: religious and cultural studies, social history, economic history, and the like, often at the expense of the political and military history favoured by the Later Roman Empire historians. Mitchell also remarks that in recent decades, historiography has trended towards a more generalist perspective; that is, a shift away from the deeds of great men and great moments of history in favour of the study of the common, everyday, even mundane aspects of life and society.

In terms of subject matter, as the larger question of this thesis revolves around amphoras and their attendant relationship to economic activity and exchange processes, there would be little benefit to limiting this review to a style of narrative typically employed by scholars of the Later Roman Empire, focusing on political and military events within a narrow chronological range, as per Mitchell's categories. Despite the fact that questions of economic history are generally more associated with the scholars of Late Antiquity, one could argue that any discussion of the history of Thrace that did not emphasize the frequent and devastating barbarian invasions (and the personalities involved) would be inadequate, given the deleterious effect such frequent military action must have had on the economy of the region. From a geographical perspective, the concern here is to place the amphora fragments collected by the Molyvoti,

[58] For example, Jones 1964; Wickham 2005.
[59] For example, Kaegi 1995.
[60] For example, Brown 1971; Cameron, 1993.

Thrace, Archaeological Project within the broader regional historical context of Thrace, a region under the control of the Eastern Empire. Many of the amphora types represented at Molyvoti, however, have distribution ranges extending well into the Western Empire; as such, the term 'Early Byzantine,' with its Eastern connotations, would be a misleading label to apply to any study of a pan-Mediterranean phenomenon such as the Late Roman transport amphoras. Ultimately, Mitchell's categories are more descriptive than prescriptive, and considering these categories make it possible to position this discussion in the broader context of historical scholarship.

Given this study's focus on amphoras, it would be logical to adopt a chronological framework rooted in ceramic evidence. Riley suggested a periodization based on dateable ceramic finds from the Berenice site, labelling the 4th-7th century A.D. as the Late Roman period. Riley is careful to note, however, that this is a generalization, as certain typologies can trace their development well-before and indeed after this time period.[61] Nevertheless, for the purposes of this thesis, I use the term Late Roman to describe the 4th – 7th centuries A.D. In practical terms, however, I expand the historical discussion to the period between the beginning of the Diocletian's reign in A.D. 284, which saw a reorganization of the Imperial power structure, and conclude at the end of Heraclius' reign in A.D. 641. At roughly this point in time, the Romans lost control of southern Thrace and the Islamic Conquest was completed, fundamentally altering the economic landscape of the Mediterranean.[62]

[61] Riley's (1979, p.98) suggested periods are: Hellenistic (2nd-1st centuries B.C.), Early Roman (1st BCE-1st century A.D.), Middle Roman early (2nd-3rd century A.D.), Late Roman (4th-7th century A.D.).

[62] Kingsley and Decker (2001a, pp. v-vi, n. 1) advocate for the completion of the Arab conquest circa A.D. 640 as the end-point of Late Antiquity. Bandow (2013a, p. 18) suggests that the start of the Arab conquests may be a valid end-point for this period.

2.2 Narrative

The main literary source for the beginning of the Late Roman period is the historian Zosimus. The late 3rd century A.D. saw the beginning of a dramatic shift in the power structure of the Roman Empire, starting with Diocletian seizing power in A.D. 284. Realizing that external pressures were making it impossible for one man to rule the Empire on his own, he appointed a co-emperor (Augustus), Maximian, splitting the Roman domain into the Eastern and Western Empires. In A.D. 293, two junior emperors (Caesars) were also appointed, Galerius and Constantius, establishing the Tetrarchy.[63] In economic terms, Diocletian and his predecessors battled with inflation. The intentional devaluation of silver currency to save on the cost of minting new coins had been going on for some time by Diocletian's reign, which led to Diocletian's introduction of a new coinage system, as well as the Price Edict, stating the maximum prices for a list of goods and services.[64] The early 4th century A.D. saw frequent civil war between the Augusti, Caesars, and pretenders after Diocletian and Maximianus retired in A.D. 305, eventually leading to the emergence of Constantine and Licinius as dyarchs in A.D. 313, with Licinius in the East and Constantine in the West.[65] Constantine's recognition and adoption of Christianity set the stage for the rise of what was to be a major institution in the Late Roman economy, the Church, due in part to Constantine's implementation of tax exemptions for

[63] *Pan. Lat* 8(5).2.2-3.1; *Chron. min.* 1.229; Lactant. *De mort. pers* 35.4; Rees 2004, pp. 7, 77; Williams 1985, p. 64; Barnes 1982, p. 4, n.7,8.
[64] Under Septimius Severus (193-211), silver content in new coinage was down to 50%. The *antonianus*, a new coin struck by Caracalla, contained only 2-3% silver; Williams 1985, pp. 115-125; Giardina 2007, p. 759-760. Temin (2013, p. 77) observes that the price of wheat in Diocletian's Price Edict is 200% higher than prices from 150 years earlier.
[65] Mitchell 2007, p. 60; Barnes 1982, pp. 6-7. For Licinius, see *Chron. min.* 1.231; for Constantine, see Lactant. *De mort. pers.* 44.11.

church property and members of the clergy.[66] In A.D. 324, Constantine began a war against Licinius in Thrace, starting from Thessaloniki, and winning a major battle at Adrianople. Ongoing tension between the two led to repeated conflict, resulting in Licinius' eventual defeat and execution in A.D. 325 and leaving Constantine the sole emperor. Shortly thereafter, he transformed the city of Byzantium into his new capital, Constantinople, leading to this city's rise as the seat of imperial power.[67] The death of Constantine in A.D. 337 was followed by a period of strife, civil war, and intrigue, with Constantius emerging as sole emperor in A.D. 353. During his reign, Zosimus describes aggression against the Romans at the hands of the Franks, Alemanni, and Saxons in the North, the Quadi and Sarmatians in Moesia, and the Persians in the East.[68]

At this point in history, the surviving work of Ammianus Marcellinus enters the narrative. Constantius appointed his nephew Julian his Caesar in A.D. 355. Julian battled the Franks and Alemanni in Gaul, while Constantius fought off the Sarmatians around the Danube. While the Augustus and Caesar were otherwise engaged, the Sassanids began capturing cities in Mesopotamia. As Constantius dealt with this threat, Julian was proclaimed Augustus by his troops.[69] Constantius died en route to face this new internal threat in A.D. 361.[70] Julian was the last non-Christian emperor, which demonstrates the speed with which the Church rose to prominence after its legalization. Julian himself was killed on campaign in Persia in A.D. 363.[71]

[66] Giardina 2007, p. 768.
[67] *Cod. Theod.* 14.13.1; Mitchell 2007, p. 66; Van Dam 2010, p. 48.
[68] Zos. 3.1.
[69] Zos. 3.9.
[70] Amm. Marc. 15-21.
[71] Zos. 3.29.

Under the co-emperors Valens and Valentinian, the late 360s and early 370s saw the renewal of the border fortifications and trading posts along the Danube.[72] After Valens' invasions of Gothic territory from A.D. 367 to 369 forced peace, the Romans enjoyed improved diplomatic relations with the Goths across the Danube, though this would prove to be temporary.[73] In A.D. 376, two Gothic tribes entered Thrace, first the Tervingi (with permission) and then the Greuthungi (without permission), fleeing the advance of the Huns further North.[74] Relations with the Tervingi were already deteriorating when the Greuthungi crossed the Danube. Furthermore, Gothic troops stationed in Adianople revolted, going to join their countrymen, and together they devastated Northern Thrace. When Valens marched to face the barbarians, his army was crushed and he himself was killed in battle at Adrianople in A.D. 378.[75] After this, the Goths occupied Thrace and Illyricum, ravaging the countryside and cutting off land communication between the East and the West. They were, however, unable to capture Adrianople or Constantinople.[76] By A.D. 382, Gratian and Theodosius I had come to terms with the Goths in Thrace, allowing them to settle peacefully along the southern bank of the Danube.[77]

After Gratian's death in A.D. 383, a series of civil wars between Theodosius and various pretenders to the Western Empire ultimately gave rise to Alaric, a Gothic leader who harnessed the discontent of Gothic troops under Theodosius. After Theodosius' death in A.D. 395, and continuing on into A.D. 397, Alaric ransacked large swathes of Thrace and Greece, establishing

[72] *Cod. Theod.* 15.1.13; Them. *Or.* 10.135-136; Bajenaru 2010, p. 35.
[73] Amm. Marc. 27.5; Zos. 4.10-11; Them. *Or.* 8 and 10. For a detailed summary of these events, and for more information on the Goths generally, see Heather and Matthews 1991.
[74] Amm. Marc. 31.3-4. Mitchell (2007, p. 83) suggests the Gothic migration may also have been due to the economic appeal of life in the Roman provinces.
[75] Amm. Marc. 31.8-13.
[76] Amm. Marc. 31.14-16, where ends Ammianus' narrative; see also Zos. 4.24.3.
[77] Errington 1996; Heather and Matthews 1991.

his power base in Northern Greece, essentially controlling all of Thrace and Illyricum.[78] Playing Theodosius' heirs, Arcadius and Honorius, off against each other, Alaric managed to get himself appointed *magister utriusque militia*, allowing him to provision his own forces with the *annona*.[79] Eventually, Alaric invaded Italy, forcing the Western Imperial capital to be relocated to Ravenna. In A.D. 410, his forces sacked Rome, and finally the centre of power in the West truly shifted to Ravenna.[80] Meanwhile, Theodosius II became Augustus in the East in A.D. 408 at the tender age of seven. Despite this obvious drawback, Theodosius II was one of the longest reigning emperors of Rome, and his rule was remarkably stable.[81] His major contribution to posterity is the *Codex Theodosianus*, the codification of Roman law since the reign of Constantine, completed in A.D. 437.[82]

The first half of the 5th century A.D. saw Germanic tribes peeling off large swathes of territory from the Western Empire. The rise of Attila and the Huns in the Middle Danube became a major threat to Thrace, where they sacked a number of cities.[83] Meanwhile, Thrace was not the only part of the Empire under duress. In A.D. 439, the Vandals under Gaiseric conquered Carthage, a major exporter of olive oil.[84] The immediate aftermath of the Vandal conquest was a brief interruption in North African exports, with Eastern Mediterranean goods filling the void in western markets. During the second half of the 5th century, North African exports to the west

[78] Zos. 5.5.4-5.6.1 Mitchell (2007, p. 102) notes that the history of the 5th century A.D. is much harder to piece together than that of the 4th due to a lack of contemporary (or near contemporary) historical narratives.
[79] Zos. 6.7.2; Rohrbacker 2002, p. 223. Mitchell (2007, p. 92) suggests that Alaric's motivation was access to the Roman *annona militaris*. This contradicts Burns' (1994, p. 241) position which is that the *annona* would not have had adequate supplies even if this were the case.
[80] *Chron. min.* 1.465; Lemerle 1954, p. 279; Burns 1994, p. 244.
[81] Mitchell 2007, p. 104.
[82] *Cod. Theod.*; Rohrbacker 2002, p. 170; Kaiser 2015, pp. 120-121.
[83] *Chron. min.* 2.422; Priscus fr.1.c; Velkov 1977, p. 41; Lemerle 1954, pp. 279-280; Kelly 2008, pp. 65, 67; Howarth 1994, pp. 50-51; Blockley 1997, pp.128, 135.
[84] Mitchell 2007, p. 112; Blockley 1997, p. 137.

increased, and by around A.D. 500 had returned to a distribution pattern similar to the pre-Vandal period, including significant distribution in the east once more.[85]

Turning back to Thrace in the mid 5th century, after the death of Attila in A.D. 452, the Hunnic empire collapsed, and the Ostrogoths rose to prominence in the region.[86] Theoderic Strabo ruled the Ostrogoths in Thrace in this period; however, it seems Theoderic did not control the cities, but simply controlled the countryside until his death in A.D. 481.[87] During Zeno's reign in the East, the Western Imperial dynasty came to an end. Rome fell to Odoacar, the leader of a group of mixed peoples, in A.D. 472. In A.D. 476, Odoacar was acclaimed as king of Rome by his followers, and Romulus Augustulus, the last Western emperor, was killed.[88] Despite the administrative divide between the East and West, the two domains technically remained under the same imperial umbrella, even after Romulus Augustulus' death.[89]

Following the death of Zeno in A.D. 491, Anastasius became the emperor in the East.[90] Anastatius seems to have been one of the most economically successful Roman Emperors. His reign was marked by infrastructure spending, such as investment in fortifications and aqueducts, dredging harbours, and public baths.[91] Anastasius funded investment on this scale by reducing military expenditure, allowing him to run surpluses; he famously cut certain taxes in Constantinople and annulled all debts to the treasury.[92] His reign was not without its conflicts, however, with Bulgarians invading Thrace frequently from A.D. 493 to 499, and again in A.D.

[85] Reynolds 2010a, pp. 146-147.
[86] Mitchell 2007, pp. 112-113.
[87] Velkov 1977, p. 46.
[88] Jord. *Get*. 242.
[89] Mitchell 2007, p. 119.
[90] Malalas, 16.
[91] Malalas, 16.13.
[92] Evagrius *Ecclesiastical History*, 3.39.

502.[93] Regardless, according to Procopius, on Anastasius' death in A.D. 518, the treasury held a surplus of 320,000 pounds of gold.[94] There seems to be little of economic concern from Justin's reign (A.D. 518-527), though Procopius appears to credit Justinian, Justin's successor, with the construction and infrastructure projects of his predecessors.[95]

During Justinian's reign, Thrace was ravaged by frequent incursions from across the Danube. The improvement of fortifications and the construction of numerous small forts under Justinian and his predecessors sheltered much of the population, though the landscape was ravaged. Since much of Justinian's forces were fighting Persians in the East or were stationed in the West, the Romans faced numerous defeats in the Balkans.[96] The year A.D. 534 saw the Roman reconquest of Vandal North Africa; prior to the reconquest, North African exports to the east were already trending upwards, but increased significantly afterwards.[97] This year also marked the publication of the *Codex Justinianus*, a compendium of the contemporary state of Roman law building upon (and indeed incorporating large sections of) the *Codex Theodosianus* from the previous century.[98] Then, in A.D. 536, Justinian created a new administrative office for Thrace, the *Quaestura Exercitus*, fundamentally altering the power structure in the region. Under the control of the *Quaestor Exercitus*, the Thracian provinces of Scythia Minor and Moesia II were legally bound to the highly productive Mediterranean provinces of Caria, the Cyclades, and Cyprus.

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[93] Velkov 1977, p. 46; see also *Cod. Iust*. 10.27.2.
[94] Procop. *Anecd.*, 19.7. This figure is likely exaggerated, however, Evans 2003, p. 1; Barker 1966, p. 57.
[95] Croke and Crow 1983; Dumanov 2015, p. 96. For example, Croke and Crow (1983, p. 144) point out that Procopius claims Justinian fortified the eastern border fortress of Batnai, Procop. *Aed.* 2.7.18. In fact it was refortified by Anastasius, Josephus the Stylite 63.
[96] Velkov 1977, pp. 48-49; Lemerle 1954, pp. 284-285.
[97] Bes and Poblome 2009, p. 69; Reynolds 2010a, p. 153.
[98] *Cod. Iust.*; Kaiser 2015, pp.123-124; Liebs 2001, pp. 247-250; Harries 2012, p. 796.

This new arrangement may have been designed to improve the supply of the *annona militaris* to these strategically vital, and vulnerable, areas further North.[99]

In A.D. 550, the province of Rhodope was attacked by Slavs, who defeated the forces sent to oppose them, and who even succeeded in capturing the town of Topeiros.[100] Not long after, in A.D. 551, Rhodope and eastern Macedonia, described as the area between Adrianople and Phillipopolis was devastated.[101] There was another threat in A.D. 558 when the Kutriguri invaded Thrace. They split up their forces, invading Greece and laying siege to Constantinople. A naval invasion of the Gallipoli peninsula by the Kutriguri was crushed by the fleet at Ainos in eastern Rhodope.[102] Justinian's reign ended in A.D. 565 with a negotiated peace with the Avars, a barbarian tribe newly arrived on the Danube. The Avars secured the Danubian border against the Slavs, Bulgarians, and the Anti for 10 years, before they too became increasingly hostile. Justinian's constant warfare and construction more or less bankrupted the state, while the frequent barbarian raids and the effects of the great plague (A.D. 541-543) substantially weakened the economy.[103]

The reigns of Justin II (A.D. 565-578), Tiberius Constantine (A.D. 578-582), Mauricius (A.D. 582-602), and Phoca (A.D. 602-610) in the East are less clearly understood than Justinian's. The late 6th to early 7th century, however, was a period of great turmoil in Thrace, with increasingly frequent barabarian incursions and increasingly ineffective Roman defense.[104] The Avars became more adept at siegecraft and began taking cities, such as Sirmium,

[99] Karagiorgou 2001a, p. 154.
[100] Procop. *Goth.* 3.38; Velkov 1977, p. 49.
[101] Procop. *Goth.* 3.40.31-45; Velkov 1977, p. 50.
[102] Agathias 5.11-23; Velkov 1977, pp. 50-51; Lemerle 1954, p. 286.
[103] Velkov 1977, p. 52; Lemerle 1954, p. 287.
[104] Menander Protector fr. 48, 62; Theophylact Simocatta 1.7.3; Velkov 1977, p. 52, n. 149; Lemerle 1954, pp. 287-295.

Singidunum, Viminacium, Augusta, and Anchialus.[105] During the reign of Heraclius (A.D. 610-641), raids by various barbarian peoples continued to grow in frequency and intensity; even Constantinople was nearly taken during a combined siege by Avars and Persians in A.D. 626.[106] The Late Roman period can be said to have ended around this time; its Roman economic system decisively came to end with the Islamic conquests.[107]

2.3 Institutions and the Economy of Late Roman Thrace

The Military

Roman military expenditure has been estimated the single largest state expense; the expense for the army has been estimated to be as much as 77% of the state budget in the mid 2nd century.[108] Even this high figure may be an underestimate as it only considers pay.[109] Leading up to the 4th century A.D., there had been substantial shifts in Roman military strategy for the defense of the Balkan territories that came with costly consequences. The system of client kingdoms preferred by the Julio-Claudians gave way to the highly mobile border defenses favoured under the Flavians and Antonines in the 2nd century A.D.[110] From the time of the Severans into the Late Roman period, the strategy had settled on a defense-in-depth principle, where troops stationed in border fortifications were supported by centrally located garrisons.[111] In other words, the emphasis had shifted from keeping invaders out to meeting them on Roman soil. At the same time, the size of the army began to expand. During Diocletian's reign, the size

[105] Theophylact Simocatta 1.8; Velkov 1977, p. 54.
[106] Szadeczky-Kardoss 1990, p. 213.
[107] Loseby 2012, p. 335.
[108] Duncan-Jones 1994, p. 45; Kingsley and Decker 2001b, p.6.
[109] Hopkins 1980, p. 116; Lo Cascio and Malanima 2009, pp. 237-238.
[110] Luttwak 1976, pp. 53-60; Thorne 2007, pp. 228-230.
[111] Luttwak 1976, pp.149-152; Strobel 2007, pp. 268-269.

of the army is estimated to have been 435,000 men, a number which increased to approximately 645,000 under Constantine.[112] Perhaps it is unsurprising, then, that in the ancient literature, Late Roman military expenditure is denounced as excessive and detrimental to the well-being of the state.[113]

The shift of the Roman capital to Constantinople highlighted the need to improve the defenses of the Balkans, which now effectively constituted the heartland of the Empire.[114] There were two significant situations in Late Roman Thrace that had economic consequences for the state. On the one hand, barbarian forces, from raiding parties to large-scale invasions (or migrations), repeatedly entered the Balkan peninsula and ravaged the countryside. This frequent pillaging devastated local agricultural production.[115] Literary references discuss the destruction of villas in Thrace, while legal evidence explicitly references the economic difficulties of the region as a consequence of barbarian activity.[116] On the other hand, with the notable exception of the Huns under Attila, the peoples attacking Thrace in this period seem in general to have had difficulty overcoming well-fortified sites.[117] As a result, across this period, Thrace saw considerable expenditure on the construction of new fortifications and the maintenance or restoration of pre-existing ones.[118]

Arguably a more significant economic activity than the construction and maintenance of so many fortifications is the supply of food for the garrisons and/or civilian populations of these

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[112] Hendy 1989, p. 17.
[113] *De rebus bellicis* 1, 3-5; *Peri Strategikes* 11.4. Hendy 1985, p. 158.
[114] Velkov 1977, p. 23. After Constantine, there were field armies stationed in Thrace; under Valens this totalled one-third of his forces, Treadgold 1995, pp. 10-11.
[115] Lee 2007, pp. 107-111.
[116] Lee 2007, pp. 108-109. Amm. Marc. 31.5.8; *Cod.Just.* 10.27.2.10.
[117] Velkov 1977, pp. 21-59, for the Huns p. 41; see also Nagy 1956; the sacking of Topeiros by the Slavs in A.D. 550, which is presented as an unusual occurrence, even for a relatively small city, Procop. *Goth.* 3.38.
[118] Elton 1996, pp. 173-174. Procop. *Aed.* 2.1.2-3. For sites in Rhodope, see Procop. *Aed.* 4.11.

installations. It appears that this need was met by a massive, state-run redistribution network responsible for shipping the military's rations, the *annona militaris*.[119] While the existence of a state-run *annona* cannot be immediately assumed, there is evidence that suggests that a public military supply network did exist. Under Valentinian, the value of the *annona* was set to 4 *solidi* per soldier, while in the *Codex Justinianus*, it is set to 4 to 5 *solidi* per soldier.[120] The fact that the expenditure per soldier for the *annona* was established by law suggests that military supply was operated by the state. Epigraphic evidence from Savaria celebrating a new storage depot commissioned by a state official for the annonary supplies also suggests a state-run supply system.[121]

Physical evidence for the *annona militaris* is two-fold. In the first place, the ruins of military storehouses, *horrea*, are found throughout Thrace. These buildings are frequently associated with the military supply; the *Codex Theodosianus* discusses the use of *horrea* as storehouses for supplies organised by the state.[122] The majority of excavated *horrea* date to the late 3rd to early 4th century A.D., a few are linked to the Theodosian period, and there is also a group of examples that dates to the late 5th to early 6th century A.D.[123] *Horrea* are common in urban and military settings, near harbours, though there are rural examples found along rivers and in valleys, demonstrating a link between their location and access to viable inland transport routes.[124]

[119] Kingsley and Decker 2001b, p. 6; Kaegi 1985; Karagiorgou 2001a; Whitby 2015.
[120] *Nov. Valentiniani* 13.1.3-4; *Cod. Just.* 1.27.2.20-30.
[121] Rizos 2013, p.659. *CIL* 3 4180.
[122] *Cod. Theod.* 8.4.6; Rickman 1971, p. 264.
[123] Rizos 2013, pp. 680-688.
[124] Kaldeli 2008, p. 200; Rizos 2013, pp. 665, 672. Note that some *horrea* were privately owned and operated; Temin 2013, p. 32.

The other category of physical evidence useful for the study of the *annona militaris* is transport amphoras; wine and olive oil were major components of the *annona*.[125] In addition to the wine and oil, the *annona* also included grain, vinegar, meat, and fodder.[126] In contrast, the *annona civica* (civilian distribution system) was primarily focused on grain.[127] There are clear differences in the ceramic assemblages of military and civilian contexts observed independently in both Thrace and Britain, which could indicate the existence of both a public and private system to serve their respective consumers.[128] The administrators in Thrace ensured that goods from the Aegean and Asia Minor were supplying the army, which is reflected in the ceramic types represented at military sites.[129] It has also been argued on the basis of ceramic distribution patterns that the military supply could have been carried out through a mixed system of state direction and private enterprise, whereby entrepreneurs were contracted out by the state while concurrently conducting private business. In return for low shipping costs and guaranteed supply, the state assumed much of the risk, provided tax exemptions and permitted liberal delivery schedules. Thus, although the entrepreneurs may not have profitted directly from the transport of state-sanctioned goods, the benefits offered by the state were sufficiently advantageous to engage private shippers.[130]

Overall, the evidence supports the conclusion that the military was a major economic institution in the Late Roman period, given the expense of the army itself, the construction and maintenance of military fortifications, and the maintenance and supply of its forces.

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[125] Karagiorgou 2001a, see ch. 5, below.
[126] *Cod. Theod*. 7.4.4-11, 7.4.23; *Cod. Iust*. 12.37.1. See Kaegi 1985, p. 591.
[127] Although grain shipment is invisible in the archaeological record, it has been argued that, in the case of North African grain, fine ware transported as secondary cargo along with the grain shipment can be viewed as proxy evidence for this distribution process, Reynolds 2010a, p. 23.
[128] In Thrace, Karagiorgou 2001a, pp.149-150. In Britain, Fulford 2009, pp. 255-256.
[129] Reynolds 2010a, p. 266, n.272.
[130] Loseby 2012, pp. 339-343; Lee 2013, pp. 235-239.

The Church

The military was not the only major institution involved in the Late Roman economy in Thrace. From the establishment of Christianity as the state religion under Constantine throughout the Late Roman period, the Church developed into a massive economic institution, controlling substantial amounts of wealth and property across the Mediterranean.[131] The extent of the Church's involvement in the Late Roman economy, however, is perhaps less well-defined than is that of the military.

The Church owned a great deal of land, the patrimony, acquired via private donation and possibly imperial gift.[132] The rents collected on these lands were considerable, amounting up to 31,000 *solidi* from their Sicilian holdings alone, of which 15,000 *solidi* were paid in tax.[133] The Church was also involved in industry and business, controlling innumerable *ergasteria*.[134] For instance, churches have been associated with pottery, glass, and metal production, as well as wine and olive oil.[135] The Church was also involved in trade of both subsistence goods (e.g., grain) and luxury items (e.g., silverware).[136] Literary evidence attests that the Church of Alexandria owned a small fleet of trading vessels and carried out its own commerce. Christian

[131] Giardina 2007, pp. 764-768; Kingsley and Decker 2001b, p. 9.
[132] *Cod. Theod.* 16.2.4; Spearing 1918, pp. 3-4.
[133] Agnellus, *Liber pontificalis ecclesiae Ravennatis* 3; Banaji 2016, p. 60.
[134] Just. *Nov.* 43; Banaji 2016, p. 84.
[135] Kingsley and Decker 2001b, p. 10; Leone 2003, p. 28.
[136] Mango 2001, pp. 96-98. Compare the increasingly severe regulation of the Church's long distance trading activity throughout the 4th century, *Cod. Theod.* 16.2.10; *Cod. Theod.* 16.2.8; *Cod. Theod.* 13.1.11; *Cod. Theod.* 13.1.16. Following Whittaker (1983, p. 169) this suggests a noticeable rise in the Church's trading activity in this period.

literary sources refer to a fleet of ships owned by the Church carrying out trade, seemingly independent of both state and private interests.[137]

The Church may have been involved in the annonary system. Large *horrea* and bishoprics coexisted in urban settlements of the 5th to 6th centuries A.D.[138] Given that the Church was the dominant civic authority in the Late Roman period, therefore *horrea* in cities like Caricin Grad (Justinian Prima) were likely controlled by the Church. While this is certainly a plausible explanation, it is by no means definite; the fact that the Church was undoubtedly a major civic institution in this period does not necessarily indicate that it was in control of the state's redistribution network.

Other material evidence connecting the Church to the economy is scanty. The abundance of certain imported amphora types in cities in Thrace with a significant church presence could be explained as the result of the activity of Church officials privately importing luxury goods.[139] An alternative explanation, however, could be that the high proportion of imports actually represents direct Church involvement in economic exchange activity, as these imports are not observed at sites without a major Christian presence.[140] This argument is problematic and could be based on purely coincidental circumstances.

The Law

The final economic institution pertinent to this discussion is the Roman Law. Naturally, the Law is a different sort of institution than the military and the Church, as the Law is not a direct participant in the economy. Rather, Roman legal texts provide insight into the degree of state

[137] Mango 2001, p. 96; Festugiere 1974, p. 594.
[138] Rizos 2013, p. 686.
[139] Opaiţ 2004a, p. 107.
[140] Karagiorgou 2001a; Opaiţ 2004a, pp. 107-110.

control of economic activity. Economic historians studying the Late Roman period are fortunate to be able to draw on a substantial corpus for Late Roman law.[141]

Economic information can be gleaned from the *Codex Theodosianus* (A.D. 437) and the *Codex Justinianus* (A.D. 534). Each of these documents is, in essence, a summary of the state of Roman law at the time of their compilation. These legal frameworks offer striking glimpses of certain aspects of economic life in the Late Roman period. An interesting example concerns the increasingly stern tax policy regulating the Church's long distance trade activity throughout the 4th century A.D.[142] In A.D. 320, the Church enjoyed tax exemptions on long distance trade; by A.D. 330, a restriction was put in place specifying that this exemption only applied on goods shipped in aid of the poor. In A.D. 379, the law was again changed instituting a maximum value for tax exempt cargo.[143] This series of regulations likely documents a state response to increased ecclesiastical trade.

One particular instance where a legal institution seems to have had a significant effect on patterns of exchange revolves around the office of the *Quaestura Exercitus*, a role that held military and judicial control over Moesia Secunda, Scythia, Caria, Cyprus, and the Cyclades.[144] The original legal text for the creation of the *Quaestura Exercitus* does not survive, and as such, the nature and purpose of this office is inferred from passing references in other legal texts.[145]This office may have been intended to facilitate the supply of forces in the Danube region, legally binding agriculturally productive provinces to the strategically vital Northern

[141] E.g., Giardina 2007, p. 748; Kaegi 1985, p. 591; Leone 2003, p. 29; Rizos 2013, p. 688.
[142] Whittaker 1983, p. 169.
[143] *Cod. Theod.* 16.2.10; 16.2.8; 13.1.11; 13.1.16.
[144] *Nov. Iust.* 41; Athanasius 4.12; Theodor 41; Torbatov 1997, p. 79.
[145] *Nov. Iust.* 41; Athanasius 4.12; Theodor 41; Torbatov 1997, pp. 78-79.

provinces.[146] The *quaestor* collected the tax from the wealthy provinces either in cash or in kind and redistributed these resources to the troops in the border provinces.[147]

In addition to legal texts regarding imposition of taxes and redistribution of resources, there is legal evidence for currency control and price fixing by the state. When Diocletian took power in the late 3rd century A.D., he inherited an economy in crisis.[148] Since Antoninus Pius, emperors had been intentionally devaluing the coinage by lowering the silver content of their coins.[149] Debasement of the currency seems to have been viewed as a means of increasing revenue to the ever more bankrupt state. The amount of silver had been more or less stable until the time of Hadrian. From Antoninus Pius in A.D. 138 onwards, however, the silver content was progressively reduced from 75% silver to a mere 0.02% by the time of Claudius Victorinus in A.D. 268.[150] Indeed, it has been argued that mid to late 3rd century A.D. laws recorded in the *Codex Justinianus* regulating barter reflect the severity of impact these practices had on the cash economy.[151] Diocletian ultimately re-standardized the value of coinage, beginning with the *aureus* in approximately A.D. 286, and following with the *nummus* in approximately A.D. 294.[152] This was just one of the series of anti-inflationary measures introduced. In A.D. 301, Diocletian issued his *Edictum de Pretiis Rerum Venalium,* the Price Edict. This legislation was an attempt at market control, addressing the problem of inflated commodity prices.[153] A study of inflation rates in this period indicates that, compared to previous centuries, the prices increased

[146] Jones 1964, p. 280; Curta 2002, p. 12; Karagiorgou 2001a, p. 154.
[147] Torbatov 1997, p. 80.
[148] Michell 1947, p. 1.
[149] Giardina 2007, p. 759.
[150] Michell 1947, p. 2.
[151] *Cod. Iust.* 4.64.1-8; Aubert 2015, p. 216.
[152] Hendy 1985, p. 448-457.
[153] Kent 1920, p. 35.

significantly in this period.[154] The edict addresses inflation in part by defining the maximum allowable price of commodities and services. Prices listed in the edict are therefore not standard prices of goods and services. [155] Vendors were encouraged on moral grounds to charge lower prices, but those found guilty of charging above the listed price faced the death penalty.[156] The enforcement of this law may have been short-lived, but the price list itself is valuable to scholars; the edict is an important source for the cost of transporting goods by sea, river, and overland, in addition to the goods being transported.[157] While the edict does not provide the actual prices of these goods and services, it does give a sense of their relative values. This edict is an example of a larger pattern whereby the state would intervene in times of emergency with price regulating measures. For instance, in response to a grain shortage in A.D. 19 Emperor Tiberius regulated the price of grain, as did Emperor Julian in A.D. 362.[158] These instances of price fixing indicate a degree of state control over market forces, though these do not preclude private activity.

The more significant question for our purposes, however, revolves around agency[159]. Private enterprise existed alongside the state-run redistribution network.[160] The law makes clear that much of the everyday business of trading the agricultural surplus of large estates fell to contracted agents, the *actores*, *procurators*, or *pragmateutai*, the class of businessmen that

[154] Temin 2013, p. 71, 74; Duncan-Jones 1982, p. 367.
[155] The Price Edict uses the term *denarii*, though at this point in time this entailed merely a notional value, as the tetrarchy had instituted a new silver currency, Temin 2013, p. 76; Banaji 2016, p. 64.
[156] *Edictum de Pretiis Rerum Venalium*, praef.
[157] Duncan-Jones 1982, pp. 366-369.
[158] Julian *Mis.* 370c; Tac. *Ann.* 2.87; Rickman 1980, p. 270; Kunsman 2008, p. 66.
[159] Agency refers to the contracting of an agent to carry out business on one's behalf, Frier and Kehoe 2007, p. 122.
[160] Bang 2007, p. 32; Loseby 2012, p. 340; Morley 2007, pp. 71-72.

Whittaker calls 'tied traders.'[161] The state-run annonary system, however, seems to have operated differently. The laws suggest that the *annona* was often shipped alongside privately-owned goods, indicating that the state made use of private contractors to carry out its massive redistributions.[162] The status of the ship captain in 6th century A.D. law provides some insight into this matter. Ship captains were not legally considered dependents of the ship's operator, and consequently the ship's operator had no recourse against a captain who engaged to transport a third party's cargo, barring direct breach of contract.[163] Private contractors were therefore not legally required to carry only state goods. The Church appears to have made use of independent shipping contractors as well, but as the Late Roman period went on, they increasingly seem to have owned and operated their own trading fleet; the fleet may have originated as a charitable organization, but seems to have developed into a profit-driven enterprise over time.[164] In terms of the theoretical debate outlined in the previous chapter, then, it must be concluded that profit-driven trade certainly did exist in antiquity, working with and alongside institutions such as the

[161] *Cod. Theod*. 13.1.3: "*rusticanos colonosque vestros inter negotiatores describi non oportet, scilicet si nequaquam exercent negotiationis industriam, siquidem in eo negotiationem et mercimonia non oporteat aestimari, si ea homines vestri ac rusticani etiam in vestris possessionibus commorantes distrahant, quae in his terris quas incolunt adque in eodem rure gignuntur.*" Sarris 2013, p. 174; Whittaker (1983, p. 172) also acknowledges that entrepreneurs played a role in the liquidation of agricultural surplus and that the two groups were not always distinguished.

[162] *Cod. Theod*. 13.5.26: "*comperimus navicularios susceptas species in negotiationis emolumenta convertere eo, quod abutantur constantinianae legis indulto, quae his ex die susceptarum specierum concluso biennio securitates reportare permisit. quod nos quoque non prohibemus, sed tantum sententiae consultae definitionis addimus, ut intra annum quo susceperint inferant species et eiusdem consulis securitates reportent, quae etiam diem illationis edoceant. biennium autem propter adversa hiemis et casus fortuitos in reportandis securitatibus non negamus, dummodo intra tempus superius designatum fides peracti constet officii. quod ad omnium notitiam volumus pervenire, ut cognoscant transmissionem vel traditionem intra annum susceptionis esse complectendam.*" *Cod Iust*. 9.1.7-8; Royal and Tusa 2012, esp. p. 51; Reynolds 2010a, pp. 270-271, n. 275.

[163] Aubert 2015, p. 229; Morley 2007, p. 68.

[164] Hollerich 1982, p. 206; Mango 2001, pp. 96-99.

military, the church and the state.[165] These major economic institutions played a vital role in the economy, following the New Institutionalist perspective.

The Late Roman period is roughly defined here as extending from the beginning of Diocletian's reign in A.D. 284 to the end of Heraclius' reign in A.D. 641. Throughout this span of time, the Roman Empire changed and evolved dramatically, both in response to external pressures and as a result of the actions of key individuals, groups, and institutions from within. By the time Diocletian had established the Tetrarchy in A.D. 293, he had already established the fundamental dichotomy of the Eastern and Western Empires. The reign of Constantine (313-337 A.D.) set in motion the rise of the Church as a major institution. Large-scale invasions or migrations shifted power and altered trade dynamics, such as the Vandal conquest of North Africa in A.D. 439, the "collapse" or Gothic take-over of the Western Empire in A.D. 476, and the rise and spread of Islam in the 7th century. All the while, massive economic institutions like the Military, the Church, and the Law encouraged, directed, and influenced economic exchange throughout the Roman World in general, and in Thrace in particular. It has been demonstrated that this region saw its share of warfare and devastation, with all the attendant economic disruptions these bring. In narrower terms, however, we are concerned here with products imported to Thrace, largely through the medium of private shippers fulfilling delivery contracts for institutions while engaging in their own private business. As such, the study of transport amphoras, in their capacity as a proxy for the movement of goods, offers one of the most effective means available to scholars of tracking the shifts and changes of the ancient economy.

[165] Bang 2007, p. 32.

Chapter 3: Late Roman Amphoras

This chapter is concerned with the study of Late Roman amphoras, and narrows the focus from the general historical background presented in the previous chapter into the specific field of study with which this thesis is concerned. Section 3.1 reviews landmark publications in the field, including site-specific and regional studies, as well as broader synthetic works, particularly those that are relevant to this study. Section 3.2 takes an in-depth look at research into the most commonly represented Late Roman amphora types at Molyvoti. Section 3.3 briefly reviews the less common amphora types. Combined, these two sections provide the basis for the presentation and interpretation of the survey data presented in chapter 4.

3.1 Late Roman Amphora Studies

The birth of amphora typological studies can be traced back to the late 19th century. Schoene and Mau, in their study of *dipinti* on early Roman amphoras from Pompeii, included illustrations of the amphoras with a rudimentary organization scheme based on shape.[166] Dressel, in his study of the stamps from Monte Testaccio, an early to mid Roman amphora deposit in Rome, provided a similar classification scheme that is still in use today, albeit with some modification.[167] All three of these early works provided the basis for later, more detailed typologies.

For the next 50 years, the emphasis of Roman amphora studies was on their epigraphic evidence. In the 1950s, the field of Roman amphora typologies flourished with the work of

[166] Schoene 1871; Mau 1898.
[167] Dressel 1878; 1899.

Lamboglia at Albintimilium in northern Italy, Almagro in Catalonia, Spain, and Benoit off the coast of southern France.[168] These typologies refined Dressel's classification system and not only focused on amphora shape but also their chronological information. Robinson's work on the ceramics from the excavations at Athens produced significant amounts of Late Roman amphora material from closed contexts dated by non-ceramic evidence from around the Mediterranean that continue to be a valuable point of reference.[169] The first regional studies of Late Roman amphoras began to emerge in this period, including Thomas' work on material from Britain and Ireland.[170] Thomas was the first to classify some of the most common Late Roman amphora types and his typology is still in use today, particularly by British scholars.[171] Zeest was the first to provide a regional perspective for the Black Sea area up to and including the Late Roman period.[172] Regional perspectives not only provide useful comparanda, but can also bring to light consumption and distribution patterns. Moreover, such studies bring to the forefront amphora types that had been underrepresented in previous scholarship that largely focused on major sites in the Roman West.

Developments in the field continued into the following decades as amphora studies became more common. The 1970s and 1980s saw the development of quantitative methods in amphora studies, which enable more complex discussions of consumption and distribution patterns.[173] A number of important sites with a great deal of Late Roman amphora material in dateable contexts began producing amphora studies in this period, including Ostia, which

[168] Lamboglia 1950; Almagro 1955; Benoit 1956.
[169] Robinson 1959.
[170] Thomas 1959; 1976.
[171] For example, Doyle 2009; Melrose 2016.
[172] Zeest 1960.
[173] Peacock and Williams 1986, p. 3; e.g., Riley 1979; 1981; Peacock and Fulford 1982; Peacock, Bejaoui, and Ben Lazreg 1989.

provided some of the largest and most diverse amphora assemblages in the Roman world.[174] The Yassi Ada shipwreck brought to light a large assemblage of intact and nearly intact Late Roman amphoras which have been very intensively studied in terms of typology, archaeometry and fabric, and provide a key chronological anchor-point for the amphora types represented there.[175] In particular, the amphora capacity calculations of the Yassi Ada team provide insight into the economic value of an individual amphora. The work of Riley and his colleagues at Carthage[176] and Berenice[177], including quantitative analyses, produced arguably the most widely adopted typologies for Late Roman amphoras of the eastern Mediterranean. Similarly important is Keay's detailed catalogue of the Roman period amphora material from Catalonia.[178] North African amphoras were particularly abundant in that area, and his classification system is still widely used today for many North African types.[179] Another innovation of this period is Peacock and Williams' synthesis of common Roman amphoras and their role in the study of economic history. Given this book's introductory nature and broad diachronic range (Early to Late Roman periods), the discussion it contains is necessarily more concerned with breadth than depth. Nonetheless, their typology, including their detailed fabric descriptions, of the more common early to late Roman amphora types is a valuable reference tool.[180]

The 1990s onwards have seen new and important excavations, regional perspectives, and syntheses. Excavations at the major urban centres of Istanbul (Saraçhane site),[181] Corinth,[182] and

[174] Palma and Panella 1968; Panella 1973; Manacorda and Panella 1977.
[175] Bass and Van Doorninck 1982; Van Doorninck 1989; 2015, Van Alfen 1995; 2015.
[176] Riley 1976; 1981; Hayes and Riley 1978; Peacock and Fulford 1982.
[177] Riley 1979.
[178] Keay 1984.
[179] e.g. Opaiţ 1997; Bonifay 2004; Reynolds 2010a.
[180] Peacock and Williams 1986.
[181] Hayes 1992.
[182] Slane 1994; 2000; Slane and Sanders 2005.

Ephesus[183] provide detailed quantitative insight into amphora import patterns. Pieri produced an excellent review of the eastern Mediterranean Late Roman amphora imports from closed, datable contexts in Roman Gaul, tracing morphological changes of many of the more common amphora types over time and contributing to our understanding of their typological development.[184] Bonifay has produced the most comprehensive study of North African ceramics to date, with a significant emphasis on the evidence for ceramic production throughout the region.[185] Opaiţ's study of the Late Roman ceramics found in the province of Scythia Minor constitutes the largest contribution to the discipline in the general vicinity of Thrace, providing invaluable contextual evidence for the present study.[186] Finally, Reynolds has published two extremely valuable large-scale syntheses of Roman period ceramic data. The first compares imported ceramic assemblages, including amphoras, from Beirut and Butrint, while drawing on evidence from the rest of the Mediterranean. He observes shifting patterns of exchange and consumption throughout the 3rd to 7th centuries A.D.[187] His other synthesis is far more comprehensive, and attempts to reconstruct the exchange networks and consumption patterns of the entire Mediterranean from the 1st through the 7th century A.D. through careful comparison of ceramic data from an extensive range of archaeological contexts. He is thus able to place the Iberian peninsula, his particular area of interest, within the broader economic context of the Roman world.[188] Both of these syntheses are of tremendous value in that they provide a chronological

[183] Bezeczky 2013.
[184] Pieri 1998.
[185] Bonifay 2004.
[186] Opaiţ 2004a; He has also produced a more focused survey of specifically the Eastern Mediterranean amphora types found in the same region, Opaiţ 2004b.
[187] Reynolds 2010b.
[188] Reynolds 2010a.

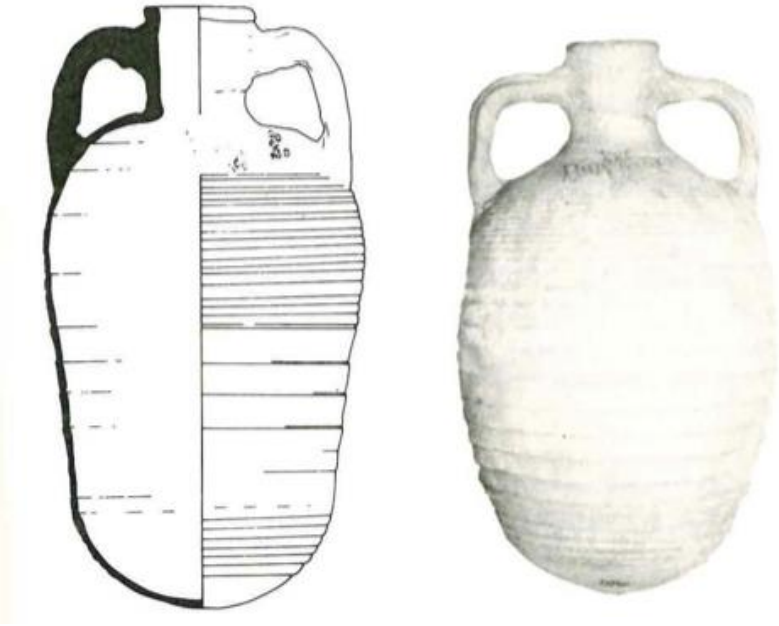
and regional framework for the interpretation of ceramic data from a wide range of sites containing material from this time period.

All of these studies contribute to our understanding of the Molyvoti Late Roman amphora assemblage in some form, whether typological or chronological. Closed contexts from excavated sites allow for relatively precise dating of amphora material. Regional studies offer a perspective on patterns and trends throughout a geographic area through the comparison of assemblages from different sites. Syntheses trace the large-scale movement of amphoras across the Roman world and across time. The first step to understanding this assemblage is to understand what each amphora fragment can tell us. The following section summarizes the available data on each Late Roman amphora type identified at Molyvoti.

3.2 Amphora Types Commonly Found at Molyvoti

LR 1

Figure 2. LR 1. Peacock and Williams 1991, p. 185, fig. 104. Drawing from Carthage, photo from Firka. Scale 1:10.



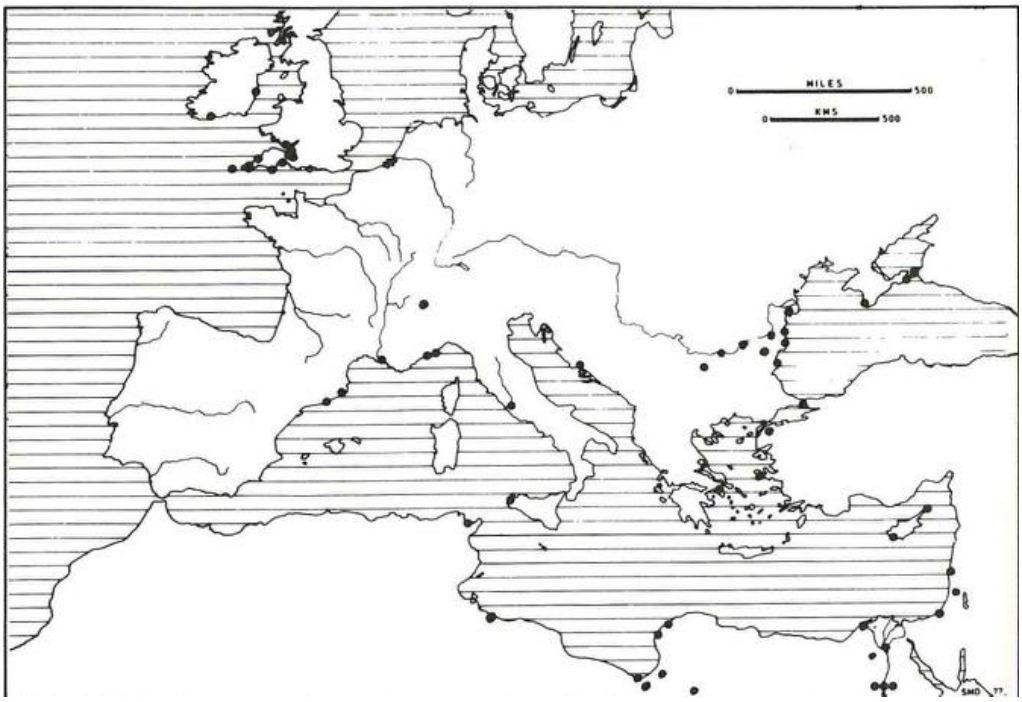
The LR 1 is a small, ovoid transport amphora of Eastern Mediterranean origin, with kiln sites having been identified in northern Syria,[189] Cilicia,[190] Cyprus,[191] and Kos.[192] Although many variants have been identified, the most common variant has a thickened, rounded rim with a small flange on the neck just below it where the upper handle attachment is located (Figure 2). The handles themselves are distinctive in that they are irregularly shaped in section and grooved

[189] Tuna et al. 1987; Empereur and Picon 1989; Demesticha 2013; Reynolds 2005, p. 566.
[190] Tuna et al. 1987; Empereur and Picon 1989; Reynolds 2005; Burragato et al. 2007; Demesticha 2013.
[191] Tuna et al. 1987; Empereur and Picon 1989; Manning et al. 2000; Demesticha 2000; Demesticha 2013.
[192] Poulou-Papadimitriou and Didioumi 2010; Diamanti 2010; Demesticha 2013. Equivalency: Thomas 1959, British Type Bii; Kuzmanov 1973, type XIII; Scorpan 1975, type VIIIB; Egloff 1977, types 164-169; Riley 1979, Berenike LR 1, 1981, Carthage LR 1; Keay 1984, type 53; Opaiţ 1991, type D.1; Hayes 1992, 4th to 7th century amphora type 5.

along their entire length, connecting the flange below the rim to the shoulder. This common variant has a ridged body and a rounded base instead of a more traditional toe.[193]

The LR 1 is one of the most common and widely distributed Late Roman amphora types, found in contexts from Britain to Egypt, the Ukraine to Tunisia, and many sites in between (Figure 3).[194] This amphora type is one of the most common in the Balkans, including Thrace and the Aegean.[195]

Figure 3. LR 1 distribution map. Peacock and Williams 1991, p. 186, fig. 105.



[193] Opaiţ 2004a, pp. 8-9, variant LR 1A4.
[194] Peacock and Williams 1986, pp 185-186; Demesticha 2013; Thomas 1959; Egloff 1977; Hayes and Riley 1978; Riley 1981; Waksman et al. 2014.
[195] Karagiorgou 2001, p. 146; Opaiţ 2004a, p. 8; 2004b, p. 294; Opaiţ 1991, p. 214, fig. 50; Opaiţ et al. 1991, p. 280, fig. 62; Abadie-Reynal and Sodini 1992, pp. 53-56; Kokkotaki and Tsoka 2010, pp. 369–370; Swan 2010, p. 108.

Both olive oil and wine have been suggested as the primary contents of LR 1 amphoras.[196] Residue analysis of a batch of seven LR 1 fragments from Sagalassos produced evidence of oil in three samples, but no evidence of wine, though this was likely due to the pitch lining of the vessels affecting the permeability of the fabric; the presence resin or pitch is often associated with wine, though this assumption is problematic.[197]

The development of this type has been studied extensively. Pieri, using examples found in Gaul, identified three main variants: LR 1A, the earlier variant, is present in excavated contexts from the mid 4th to mid 5th century A.D.[198] This subtype has a long, straight, narrow neck, with a rim diameter of 4.5-7.5 cm. The rim is roughly square or rectangular in profile. The handles are round in section, attached at the shoulder and just below the rim, and extend further horizontally than vertically. The body is ridged or stepped and tapers from shoulder to base, which features a button-shaped toe.[199] LR 1B, the more common mid 5th to 7th century A.D. variant (described above), is easily distinguishable from the LR 1A variant thanks to its wider rim diameter (10-12 cm), shorter and wider neck, smaller handles, narrower shoulder, and rounded base.[200] LR 1Bs are present in the Yassi Ada shipwreck collection, which is dated after

[196] For olive oil, see Peacock and Williams 1986, p. 187. For wine, see Pieri 2005, pp. 81-84. For both wine and olive oil, see Karagiorgou 2001a, p. 146; Van Alfen 2015, pp. 46-47; Steckner 1989, p. 65.
[197] Romanus et al. 2009.
[198] Pieri 1998, p. 99. Pieri's LR 1 variants are labelled LRA 1, though are changed here for consistency.
[199] Demesticha (2013, p. 172) revises Opaiţ's (2004a, p. 8) 5th century date range for this variant based on "several well-dated" contexts in which examples have been found; see also Egloff 1977, p. 113; Williams 1987, p. 237; Pieri 2005, pp. 70–75; Reynolds 2005, p. 566. For suggested precursors to the LR 1 type, see Opaiţ 2010. For further variants and sub-types, see Opaiţ 1984, pp. 316-320; Opaiţ 2004a, pp. 8-10.
[200] Pieri 1998, p. 99; Demesticha (2013, pp. 172-173) following Opaiţ (2004a, pp. 8-9), observes three distinct forms within this sub-type; Keay 1984, pp. 268-278, type 53B.

625/626 A.D. based on numismatic evidence.[201] This sub-type is also represented in the assemblage from the La Palud shipwreck off the coast of Southern France, which may date to the second quarter of the 6th century A.D.[202] Pieri describes the LR 1C variant as a smaller version of LR 1B, although Demesticha suggests that the neck is narrower and more cylindrical, while the body is more pear-shaped than ovoid.[203] Based on the Paphos kiln excavation, the LR 1C subtype is dated to the 7th century A.D.[204] At Molyvoti, all examples appear to be of the LR 1B variant, with one possible exception (**4**).

The main fabric group at Molyvoti for this type, LR 1 'Pink', is a hard fabric with low to moderate compaction (**2-5, 7**).[205] This group ranges in colour from 5YR 5/6 Reddish Yellow to 10YR 7/4 Very Pale Brown. The coarse fraction includes moderate to dense, medium-sized, white, translucent gray, and black, sub-angular inclusions. Also present are sparse coarse, colourless and translucent white, sub-angular inclusions, sparse medium-sized, red, sub-angular inclusions, and sparse to moderate, medium to coarse, white to beige, sub-rounded inclusions. Small to medium-sized flat and irregular voids are common. This fabric group is similar to the sample from the Kourion kiln described by Williams, suggesting a Cypriot origin.[206]

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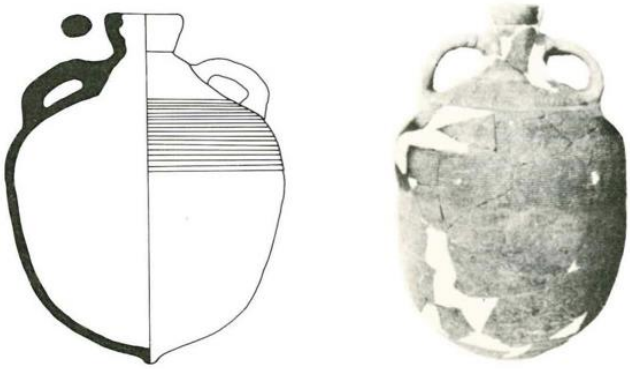
[201] Bass and Van Doorninck 1982, p. 145; Van Doorninck 2015, p. 205.
[202] Bonifay (2011, p. 17) dates the wreck to the second quarter of the 6th century A.D. by a Hayes type 99 A or B fineware bowl. Although Long and Volpe (1998, p. 339) themselves do not mention this particular type, they do suggest a mid 6th century A.D. date based on other fineware fragments. Furthermore, a set of balance weights from the wreck are dated as no earlier than the 2nd quarter of the 6th century A.D., Bonifay 2004, p. 140.
[203] Pieri 1998, p. 99; Demesticha 2013, p. 173; Riley 1979, p. 216, type LR 1A.
[204] Manning et al. 2000, pp. 245-247; Demesticha 2013, p. 173; Demesticha and Michaelides 2001, pp. 289-296.
[205] Fabric colours described using Munsell soil colour chart. Granularity and roundedness assessed using the Wentworth scale. Estimated inclusion density: "rare" >1 %, "sparse" 1 %, "moderate" 3-5 %, "dense" 5-10 %.
[206] Williams 2005, pp. 166-167; Bezeczky 2013 p. 160, no. 372, plate 81. None of the Molyvoti examples show signs of the pale, flaky slip observed in some examples of the LR 1A fabric produced at the Zygi-Petrini kiln, Manning et al. 2000, p. 245.

The other LR 1 fabric group at Molyvoti, LR 1 'White', is less common (**6, 9**). This fabric group is similar to LR 1 'Pink', but softer and less compact. This group ranges in colour from 10YR 7/4 Very Pale Brown to 2.5Y 8/4 Pale Yellow. The inclusions are very similar to those found in LR 1 'Pink', but generally less dense. This fabric does not correspond well with any of the Cilician fabrics described by Williams.[207] This group may also be of Cypriot origin, with the discrepancy in colour and hardness owing to a different firing technique. Indeed, a number of sherds appear to be fired unevenly with sections of fabric falling into both the LR 1 'Pink' and the LR 1 'White' colour range (**1, 8**).

LR 2

[207] Williams 2005, pp. 163-167.

Figure 4. LR 2. Peacock and Williams 1991, p. 182, fig. 101. Drawing from Iatrus, photo from Thasos. Scale 1:10.



The LR 2 is a globular amphora with a funnel-shaped rim, a conical neck, a small knob-shaped toe, and combed decoration on the shoulder (Figure 4).[208]

Despite much debate, the consensus view holds that the LR 2 amphora type was produced at multiple centres.[209] Although the Black Sea region has been suggested based on the abundance of LR 2s in this region, the available evidence points towards a predominantly Aegean origin.[210] Surface survey has brought to light LR 2 wasters at Kounoupi (the Argolid),[211]

[208] Thomas 1959, British type Bi; Robinson 1959, M272; Beltran Lloris 1970, form 77; Kuzmanov 1973, type XIX; Scorpan 1976 type A; Riley 1975, type 6, 1979, 1981, LR 2; Scorpan 1975, VIIA; Radulescu 1976, type 8; Hautumm 1981, Amphorentypus für öl; Böttger 1982, type 1: form 1; Peacock and Fulford 1982, Form 2; Riley 1982, LR 2; Keay 1984, LXIII; Peacock and Williams 1986, class 43; Popovic 1987, type 2; Van Doorninck 1989, type S; Papadopoulos 1989, type 1; Opaiţ 1991, type A.1; Hayes 1992, type 9; Falkner 1999, ware 94; Van Alfen 2015, type S; Dyczek 2007, type 25b. For discussion of the desirability and problems of a unified classification scheme for this type, see Karagiorgou 2009, pp. 41-43.
[209] Riley 1979; Tomber and Williams 1986; Peacock and Williams 1986; Daszkiewicz et al. 2000; Karagiorgou 2001a; Opaiţ 2004a, 2004b; Dyczek 2007; Swan 2010; Gerousi 2014; Reynolds 2014.
[210] For discussion of a possible Pontic origin, see Bjelajac and Petrovic 1996; Scorpan 1976.
[211] Megaw and Jones 1983, pp. 246-247; Zimmerman Munn 1985, pp. 342-343; Jameson et al. 1994, p. 402.

and at Reşadiye-Kiliseyani on the Knidos peninsula.[212] A Late Roman amphora workshop, including three kilns that produced LR 2, has been excavated at Dilesi (Boeotia).[213] Based on the similarity of fabric between certain LR 2 examples at the site and the local coarse ware fabric, Reynolds has posited production at Nicopolis (Epirus).[214] Hayes has suggested a probable Saronic production centre, likely Athens or Corinth, though to date no LR 2 kilns or wasters have been identified in this area.[215] Recent scholarship has rejected earlier attribution of LR 2 production on the island Kos, concluding instead that the amphora type produced there is in fact the morphologically similar LR 13, which is easily and frequently mistaken for LR 2.[216] The LR 13 is often produced in a fabric similar to the LR 2, and although the shape is roughly similar, the LR 13 tends to have a more cylindrical neck, a simple everted rim instead of the LR 2's distinctive funnel shape, and a rounded bottom instead of a knob toe.[217] The LR 13 is likely a later development of the LR 2 shape.[218] Chemical and petrological analysis of LR 2 fragments from Novae suggests one group has common provenance with Kapitan II (Aegean), another with Zeest 90, while a third is linked to Rhodian fabrics.[219] Zeest 90 amphoras are an early to mid-Roman amphora type, featuring a tall conical neck, an elongated funnel-shaped rim, an ovoid

[212] Tuna et al. (1987) describe evidence of production of a globular, combed amphora dating from the 4th to 6th century A.D., but do not specifically identify their findings with type LR 2, p. 49; Opaiţ (2004a, p. 11; 2004b, p. 296), citing the above preliminary report, identifies these findings as LR 2.
[213] Gerousi 2014, p. 194.
[214] Reynolds 2014, p. 452. Reynolds, using evidence from fabric comparanda, also tentatively suggests East Cypriot, Corfiot, and Corinthian production for certain examples found at Nicopolis, pp. 452-453.
[215] Hayes 2003, pp. 529-534; the possibility of Athenian (and also Euboean) production had been raised previously, see Peacock and Williams 1986, p. 182; Tomber and Williams 1986, p. 47.
[216] Poulou-Papadimitriou and Didioumi 2010, p. 743; see also Diamanti 2010, p. 73.
[217] Peacock and Williams 1986, p. 208-209, class 54; Demesticha 2005, p. 175; Bass and Van Doorninck 1982, pp. 157-160, type 2; Hayes 1992, p. 71, type 29; see also Van Doorninck 1989.
[218] For a good discussion of the typological development of this type, see Opaiţ 1984, pp. 311-316; Bonifay and Pieri 1995, pp. 109-110; Demesticha 2005, p. 175.
[219] Daszkiewicz et al. 2000, pp. 34-35; Dyczek 2007, p. 830.

body, and a small spike toe.[220] It has previously been argued that the LR 2 is a development of the Zeest 90.[221] The chemical similarity of the second group of LR 2 sherds from Novae to Zeest 90 amphora fabric may support an argument in favour of LR 2 production on Chios, a known producer of Zeest 90.[222] Such typological links between LR 2, earlier Aegean jars, and later LR 13 Aegean jars further strengthen the association of this type with multiple Aegean production centres.

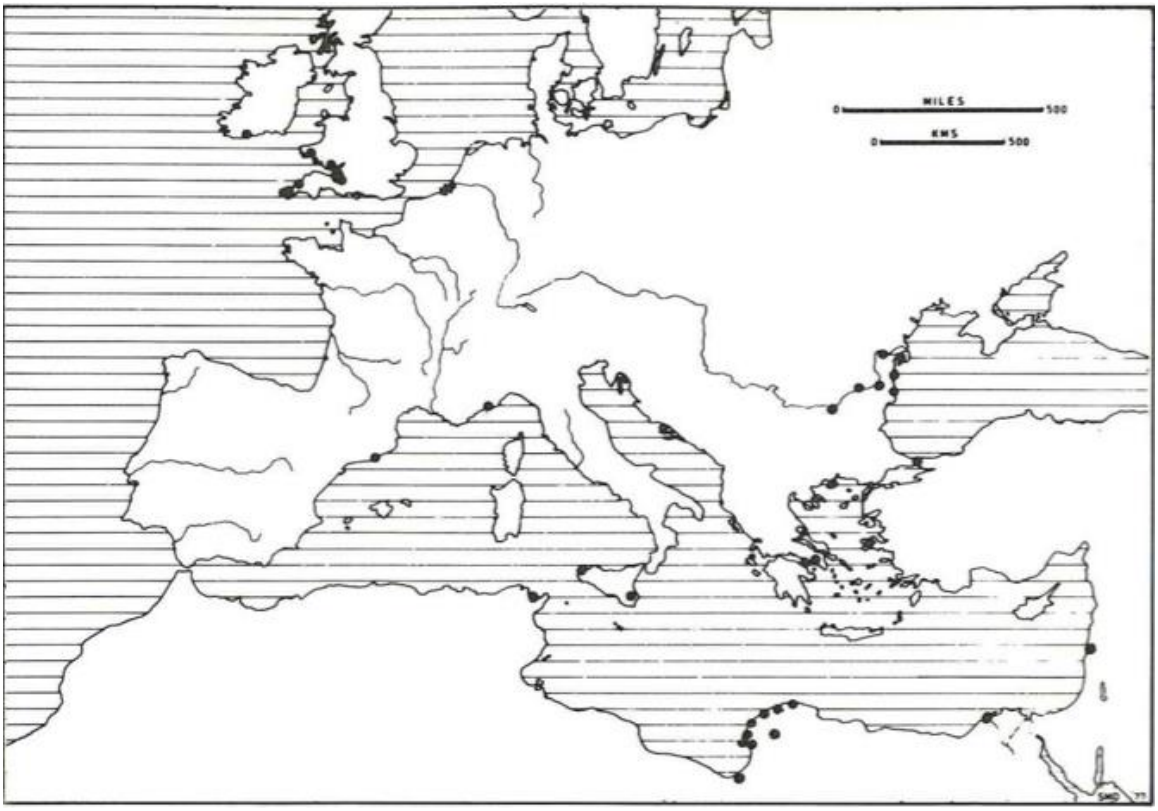
The LR 2 amphora type exhibits a broad distribution range, found at sites across the length and breadth of the Roman world (Figure 5).[223] The greatest concentrations of this amphora type, however, are found in the Aegean and the Balkans, especially on the Black Sea coast.[224]

Wine and olive oil have been suggested as possible contents, and it is possible that LR 2 amphoras were used for both.[225] At Yassi Ada, both grape seeds and olive pits were found in LR 2 (or similar) with pitch lining.[226] Dyzcek considers olive oil to have been more common product contained in this amphora type, despite evidence for various different contents found at different

[220] Zeest 1960, plate 37, 90a and 90b; Peacock and Williams 1986, form 57. Riley 1979, pp. 205-207, MRA 18.
[221] Opaiţ 2007; Dyczek 2007, pp. 828-830.
[222] Tsaravopoulos 1986, figs. 36 and 37; Opaiţ (2004a), believes that the Zeest 90 amphora type is a direct precursor to the LR 2. He therefore suggests that since Zeest 90 are produced on Chios, then LR 2 may also prove to have been manufactured there, p. 11.
[223] Robinson 1959; Thomas 1959; Beltran Lloris 1970; Riley 1975; 1979; 1981; Keay 1984; Arthur 1985; Tomber and Williams 1986; Peacock and Williams 1986; Sidebotham et al. 1989; Hayes 1992; 2000; Karagiorgou 2001a; Opaiţ 2004a; Pieri 2005; Reynolds 2010b; Bonifay 2013.
[224] Karagiorgou 2001a, 2009; Opaiţ 2004a.
[225] Karagiorgou 2001a, p. 146; on Samos, Hautumm (1981, p. 41), observed a greasy residue on the sherds that he equated to olive oil, but he also noted that the ecclesiastical complex with which the amphoras were associated produced both wine and olive oil.
[226] Bass and Van Doorninck 1982, p. 164. These amphoras were almost certainly reused, however, Van Doorninck 1989, pp. 247-257; Van Alfen 2015, p. 30.

sites.[227] At Tomis, several natural resins were identified as contents.[228] *Dipinti* from sites in the Northern Balkans suggest that olive oil was the principle content of this type.[229]

Figure 5. Distribution map of LR 2. Peacock and Williams 1991, p. 183, fig. 102.



The general date-range typically given for the LR 2 amphora is from the early 4th to early 7th century A.D.[230] Karagiorgiou notes that the small knob-shaped toe seems to disappear from the material record around A.D. 550;[231] according to Opaiţ, the knob disappears by the end of the 6th century A.D., around which time undulating, as opposed to straight, combed decoration

[227] Dyczek 2007, p. 829.
[228] Radulescu 1973, pp. 193-207.
[229] Derda 1992, pp. 139, 146-159; Karagiorgou 2001, p. 146.
[230] e.g. Keay 1984, p. 354; Peacock and Williams 1986, pp. 183-184; Bezeczky 2013, p. 161. Opaiţ (2004a, p. 11) puts the production end-date for this type in the mid 7th century A.D.
[231] Karagiorgou 2001a, p. 141; Slane and Sanders 2005, p. 259, fig. 5, no. 2-33, dated by lamp evidence to the mid to late 5th or early 6th century A.D.

begins to appear.[232] Examples of LR 2 with undulating decoration at Butrint are exclusively found in mid to late 6th century A.D. contexts.[233] LR 2 are also present in the La Palud shipwreck assemblage, which may be dated to the second quarter of the 6th century A.D. based on the associated fine ware fragments.[234] At Corinth, LR 2 is the most common Eastern amphora type in the mid 5th century A.D., and remains common in the mid to late 6th century A.D.[235] Demesticha argues that the LR 13, which can have either undulating or straight combed decoration, a rounded base without a knob toe, and a simpler, smaller rim type, is the successor of the LR 2 as the dominant Aegean amphora.[236] In the Yassi Ada shipwreck assemblage, LR 2 is much less common than LR 13 and later variants of LR 1, and most of the LR 2 present are considered to have been old at the time of the shipwreck, and probably reused.[237] Therefore, it seems that this assemblage preserves the transition from LR 2 to LR 13. Although a definitive end-date for the production of this type remains elusive, the overall impression is of a marked decline between the late 6th and mid 7th century A.D. At Molyvoti, there are none of the earlier Zeest 90 or the later LR 13 fragments attested. The only bases present are knob-shaped (**17, 22, 30**), and despite the abundance of LR 2 body fragments in the survey assemblage, there were none that exhibited undulating body decoration. Therefore the LR 2 amphora assemblage from Molyvoti likely dates to before A.D. 550.

[232] Opaiţ 2004a, p. 11.
[233] Reynolds 2014, p. 452.
[234] See p. 45.
[235] Slane 2000, pp. 303-304; Slane and Sanders 2005, pp. 255, 264, 271. Examples from a mid to late 7th century context at this site listed as LR 2, with wavy decoration, rounded bases, and long necks (rim shapes unclear), are perhaps better designated as LR 13, Slane and Sanders 2005, pp. 275-277, nos. 4-9 to 4-12.
[236] Demesticha 2005, p. 175.
[237] Van Alfen 2015, p. 30.

There are three LR 2 fabric groups present at Molyvoti. LR 2-A is a hard, fine, compact fabric with well-sorted inclusions (**10-18**). This group ranges in colour from 2.5YR 5/8 Red – 5YR 6/6 Yellowish Red, with outliers that have 7.5YR 6/6 Reddish Yellow exteriors and 2.5YR 5/6 Yellowish Red cores. Coarse fraction includes moderately dense, fine to very fine, shiny white inclusions, which are very common. Sherds often show sparse to moderately dense, fine to medium, red, black, grey, white, and brown, sub-rounded inclusions; rare to sparse, coarse, dull whitish, sub-rounded inclusions; and gold and colourless mica flecks are very common. This fabric group may be of Argolid production.[238]

The LR 2-B fabric is hard and fine (slightly coarser than LR 2-A), with looser compaction and poorly sorted inclusions (**19-27**). The exterior colour of this group ranges from 7.5YR 6/4 Reddish Yellow to 7.5YR 7/6 Reddish Yellow, with an outlier at 10YR 7/4 Very Pale Brown. The interior colour ranges from 2.5YR 5/6 Red - 2.5YR 6/8 Light Red, with an outlier at 10R 6/8 Light Red. All examples of this fabric group exhibit light to heavy spalling. Coarse fraction includes sparse to moderately dense, very coarse to granular, dull whitish, sub-rounded inclusions. Sparse to moderately dense, medium to coarse, tan, sub-rounded inclusions are present. Also present are sparse to moderately dense, medium, red, round to sub-rounded inclusions. Moderately dense, fine to very fine, white particles are common as well. Medium to large (up to 2 mm), sub-rounded voids are very common. Gold or silver mica flecks are

[238] Megaw and Jones (1983, pp. 246-247) list the colour of argolid examples as ranging from buff to pink; Reynolds (2014, p. 452) describes the Argolid LR 2 fabric in passing as "hard-fired, with a hackly break and yellowish buff surfaces, …characteristic gold mica"; Slane and Sanders (2005, pp. 286-287) offer the most complete description of the Argolid fabric as "medium coarse to quite fine… light red to reddish yellow (2.5YR-5YR 6/6)… light gray (10YR 7/2) or reddish yellow (7.5YR 6/6) on the exterior, with a smooth to conchoidal break… but all pieces display sparse to moderate, angular platy gold mica on both interior and exterior surfaces and sparse to moderate, medium to very large, subrounded creamy yellow lime bits that have spalled…"; S. Gallimore (2015, pers. comm) of the Western Argolid Regional Project, suggests that the Molyvoti LR 2-A fabric may more closely resemble the Argolid fabric than does LR 2-B or -C.

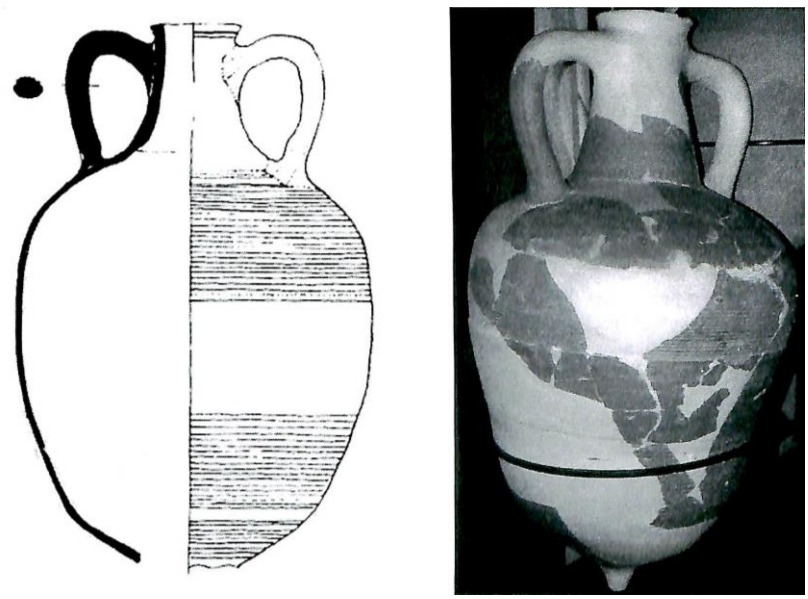
uncommon. This fabric group appears to be similar to the common LR 2 fabric described by Peacock and Williams, and is probably of Chian origin.[239]

LR 2-C is a hard, fine, compact fabric with moderately well sorted inclusions (**28-31**). The colour of this fabric group is 7.5YR 6/4 Light Brown, with outliers in 7.5YR 7/6 Reddish Yellow and 7.5YR 7/4 Pink. Light to moderate spalling is common. Coarse fraction includes sparse to moderately dense, coarse to very coarse, dull white, sub-rounded inclusions. Moderately dense, fine to medium, red, brown, white, and tan, sub-rounded to sub-angular inclusions are very common. Moderate to dense, very fine to fine, white particles are also very common. Colourless mica specks are rare. Sparse, medium (0.1-1 mm), sub-angular to sub-rounded voids are present. Macroscopically and microscopically, this fabric group is similar enough to LR 2-B that the two groups may be related, with the difference in colour perhaps due to variation in firing technique or iron content of the clay.[240]

[239] Peacock and Williams 1986, p. 184; Arthur 1998, pp. 168-169; Hjohlman 2005, p. 239.
[240] Shepard 1956, pp. 23-24; Rice 1987, pp. 335-336.

Zeest 80

Figure 6. Zeest 80. Opaiţ 2004a, p. 26, no figure number. Drawing from Agighihol, photo from Sucidava. Not to scale.



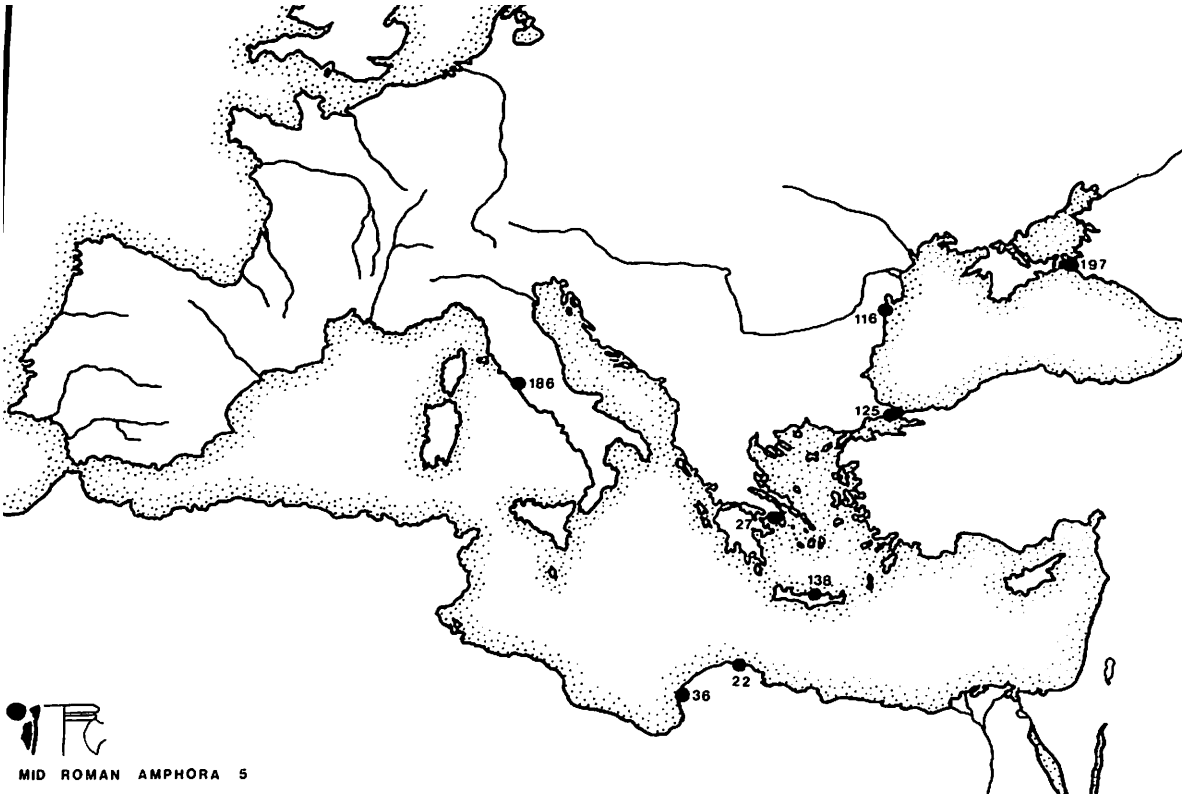
The Zeest 80 amphora is a large, ovoid amphora, with thick, ridged handles, combed body decoration, and a conical or knob-shaped toe (Figure 6).[241] The rim is a distinctive wedge shape, sloping down and outward with two or three grooves just below it, before the cylindrical neck.[242] A later variant, described by Opaiţ, is smaller, and lacks the distinctive grooves below the rim.[243]

[241] Robinson 1959, p. 69, K 15; Zeest 1960, pp. 114-116, type 80; Scorpan 1975, pp. 276-277, tip F; Riley 1979, pp. 188-189, MRA 5; Hayes 1992, p. 63, type 4.
[242] Zeest 1960, pp. 114-115.
[243] Opaiţ 2004a, p. 26.

The exact provenance of this type is not known. Riley suggests a northern Aegean or Black Sea origin based on the distribution pattern (Figure 7).[244] Opaiţ, noting that the distribution of the later variant is limited to the Black Sea region, suggests that this is the more likely production area.[245] Swan supports this conclusion, adding that the distribution further favours the Western Pontic area. She also raises the possibility that the fabric may be related to that of a Late Byzantine amphora from the island of Ganos, near Istanbul.[246] Hayes had previously remarked that the Zeest 80 fabric bears similarity to the local brick fabric at Istanbul.[247] Other scholars have suggested an Eastern Mediterranean origin: Dyzcek considers Pamphylia to be the most likely source, while Slane links the fabric to that of the Niederbieber 77, an Aegean type, based on the appearance of the fabric.[248]

[244] Riley 1979, p. 188.
[245] Opaiţ 2004a, p. 26.
[246] Swan 2010, p. 114. See also Günsenin 1999, p. 19.
[247] Hayes 1992, p. 63.
[248] Dyczek 2001, p. 157; Slane 2000, p. 303.

Figure 7. Distribution of Zeest 80. Riley 1979, p. 188, fig. 33.



Opaiţ and Swan note that the earlier variant (the only variant present in the Molyvoti assemblage), is attested in the Aegean (Athens, Corinth, Crete), the Central Mediterranean (Berenice, Cyrenaica), as far west as Ostia and Rome, as far Northeast as the Crimea, as well as on the Lower and Middle Danube, and at Constantinople.[249]

The primary contents of the Zeest 80 amphora are unknown. Swan suggests either wine or fish-products on the basis of a pitch-lined example found in the Chersonese.[250] If the type was indeed produced in the Dardanelles, Swan goes on to comment, fish-product may well be the

[249] Opaiţ 2004a, p. 26; Swan 2010, p. 112.
[250] Swan 2010, p. 112.

most likely primary content based on access to fish migration.[251] The Late Byzantine amphora from Ganos with which she posits a relationship for the Zeest 80, however, is considered to be a container for monastic wine, since kiln sites associated with this type are located on monastic estates that may have produced wine.[252]

Opaiţ argues that the development of the Zeest 80 amphora type can be traced from the 1st to the 6th century A.D. In the course of this time, he observes a conspicuous diachronic trend in the size of this amphora type: the early variant of Zeest 80 is very large, with an estimated volume of over 100 liters, whereas in the later variant the volume is reduced to around 60-80 liters.[253] Zeest herself, who does not incorporate the later variant in her type 80 designation, gives a date range of the 2nd to 3rd century A.D.[254] Again according to Opaiţ, the early variant, with its distinctive ridges below a flat, outward sloping rim, is attested from sealed deposits possibly as early as the 1st century A.D., and through to the middle of the 4th century A.D.[255] The mid 4th century A.D. end-date appears to be based on the appearance of the later variant in the record. Opaiţ's evidence for a 1st century A.D. start date for the development of this typology is unclear, but is perhaps a reference to a possible example cited by Zeest, found in a 1st century A.D. context from Illyrian Apollonia. If so, this date should be treated with caution, as Zeest herself did not base her dating of the type on this evidence, preferring a 2nd century A.D. date.[256] Certainly at Berenice, it appears in a context dated no later than the mid 3rd century A.D., and

[251] Swan 2010, p. 114.
[252] Günsenin 1999, p. 19.
[253] Opaiţ 2004a, p. 26; see also Opaiţ 1987, pp. 248-254.
[254] Zeest 1960, p. 114.
[255] Opaiţ 1987, pp. 247-250.
[256] Zeest 1960, p. 116.

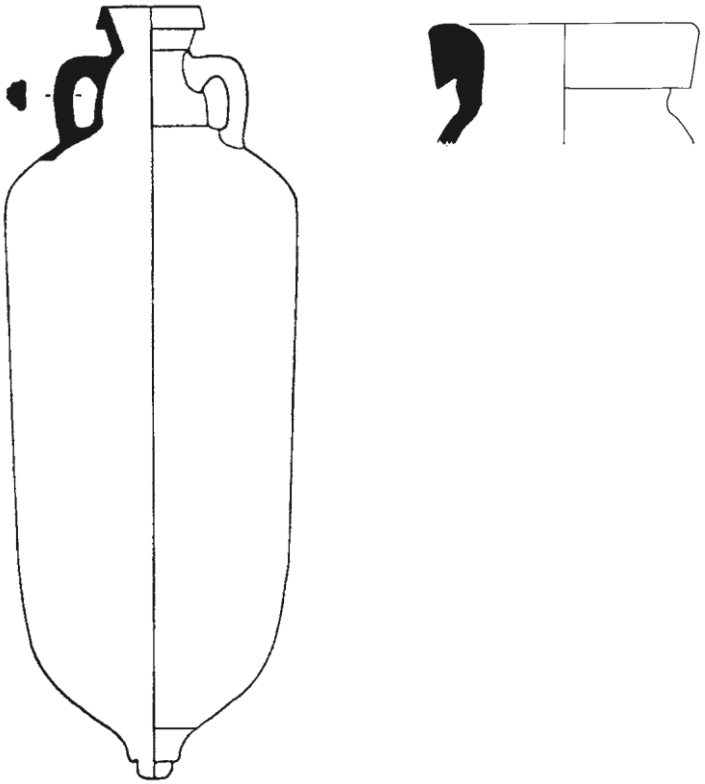
also in a mid 3rd century A.D. deposit at Athens.[257] At Ostia, this variant is found in a late 3rd century A.D. context.[258] Swan postulates that this variant underwent a floruit in the 3rd century A.D.[259] Opaiţ and Swan agree that the later variant, after its appearance *ca*. A.D. 350, does not appear to have been distributed in the Mediterranean;[260] the Molyvoti assemblage does not contradict this conclusion, as only the earlier variant is attested here.

The Zeest 80 fabric is hard, coarse, and compact, with poorly sorted inclusions (**32-35**). The fabric colour is generally between 2.5YR 5/8 Red and 5YR 5/6 Yellowish Red, though variations in firing produce firing cores in the 7.5 4/4 Brown - 10YR 6/2 Light Brownish Grey spectrum. Light spalling is common. Coarse fraction includes dense, medium to very coarse, colourless, translucent white, and translucent grey, sub-angular inclusions, which are very common. Sparse, medium to coarse, white, sub-rounded inclusions are present. Also present are sparse, fine to medium white, pinkish, and beige, sub-rounded inclusions. Moderately dense, fine to very fine, white particles are very common. Sparse, fine to medium, dark grey and black, sub-angular inclusions are present, as are sparse, very fine, colourless mica specks. Also present are sparse to moderately distributed small, sub-round to irregular voids.

[257] For Berenice, see Riley 1975, p. 189, no. D241, fig. 84. For Athens, see Robinson 1959, pl. 40, no. K115.
[258] Palma and Panella 1968, p. 112, table 45, no. 582.
[259] Swan 2010, p. 112.
[260]Opaiţ 2004a, p. 26; Swan 2010, p. 12.

Keay 62

Figure 8. Left: Keay 62A. Bonifay 2004, p. 138, fig. 72, no. 2. From Filicudi Porto. Scale 1:10. Right: Keay 62E, Bonifay 2004, p. 138, fig. 74, no.11. From Marseilles. Scale 1:5.



Keay 62 is a term that describes a broad class of cylindrical Late Roman amphoras originating from North Africa, which incorporates a large number of variants based largely on the shape of the rims and toes (Figure 8).[261] Keay identified 22 different subtypes, A-V, each

[261] Beltran Lloris 1970, p. 564, type 59; Riley 1979, p. 204, type MRA 17a; Keay 1984, pp. 308-350, LXII; Peacock and Williams 1986, pp. 158-165, class 35; Bonifay 2004, pp. 137-140, type 46

with a degree of internal variation.[262] Indeed, owing to the significant variation of shape demonstrated within each subtype, as well as the apparent similarities between certain examples assigned to different subtypes, the identification of subtypes present at Molyvoti is tentative. The two most common variants identified at Molyvoti are Keay 62 variants A and E. Variant A (**37, 38, 43, 45, 47, 49**) has two everted rim sections (with varying degrees of eversion), with the upper everted section being more pronounced, and being undercut where it meets the lower section.[263] Some variant A rims are not as thick across the top of the rim, giving them a more pointed profile than variant E, but this distinction is not universal. The E variant (**39, 44, 46)** has an upper rim section with a wider diameter, and the juncture between the two rim is marked by an "exaggerated undercut."[264] The possible variant E rim (**39**) looks similar to some examples of Keay 61 and some of Keay 62 without perfectly matching any.[265] One of the possible Keay 62 E toes (**44**) is similarly ambiguous. The profile of this toe fragment is reminiscent of a Keay 62 E, but there appears to be the remains of an inner peg, a feature Bonifay attributes solely to Keay 61.[266] Other variants are represented at Molyvoti by one or two sherds but do not seem to offer additional datable information. Variant B is characterized by a cup-shaped rim, with inner and

[262] Bonifay (2004, p. 137) argues that two of these subtypes, Keay 62Q and Keay 62R (neither identified in the Molyvoti survey assemblage), should actually be grouped together as a separate, earlier type.
[263] Keay 1984, p. 319. They are also supposed to follow roughly the same proportions, although these proportions are undefined in the text.
[264] Keay 1984, p. 321.
[265] For similar examples of Keay 62 E, see Keay 1984, p. 328, fig. 148.4; Bonifay 2004, p. 138, fig. 74.11. For similar examples of Keay 61 D, see Keay 1984, p. 308, fig 134.6; Bonifay 2004, p. 139, fig. 75.1.
[266] Bonifay 2004, p. 140. This peg is not wholly preserved, however, and judging from Keay's illustrations, it appears that a number of Keay 62 examples exhibit similarly incomplete protuberances. Bonifay remarks that the later Keay 62 variant E seems closely related to the earlier Keay 61 variants.

outer faces the curve slightly outward, and handles with a relatively circular profile.[267] Variant C (**40, 42**) has a triangular rim with a significant degree of eversion.[268] Variant D (**48**) is characterized by a distinctive ridge on the interior face of the rim and a ringed foot.[269] In Variant F (**36**), the lower section of the rim is more vertical than other variants, with a convex bulge.[270] Variant I features a flat everted surface in place of the more common undercut from other variants, with an ear-shaped handle profile.[271] Variant J (**41**) is very similar to variant I, except that the everted surface between the two rim sections is slightly curved rather than flat.[272] All of Keay's examples of type 62 are slipped, with the external colour ranging from brown to white (yellow to cream and yellow to pink being most common).[273]

This amphora type was produced in multiple workshops in the Roman provinces of Byzacena and Zeugitania, in what is now Tunisia. Byzacena, roughly corresponding to the region now known as the Sahel, contains numerous Keay 62 production sites, including Leptiminus and several significant workshops in the Ksour Essaf area.[274] In Zeugitania, there is a well-known workshop at Sidi Zahruni, near Nabeul.[275] Bonifay argues that the multitude of subtypes is reflective of numerous different workshops as well as of chronological trends; he

[267] Keay 1984, p. 319. Only handle fragments of this variant are preserved at Molyvoti, so no catalogue entries were included in this study.
[268] Keay 1984, p. 321.
[269] Keay 1984, pp. 321, 338.
[270] Keay 1984, p. 325.
[271] Keay 1984, p. 325. Only handle fragments of this variant are preserved at Molyvoti, so no catalogue entries were included in this study.
[272] Keay 1984, pp. 325, 331.
[273] Keay 1984, p. 346.
[274] For production sites in the Sahel, see Peacock, Bejaoui, and Ben Lazreg 1989, pp. 183-194. For Leptiminus in particular, see Dore 2001, fig. 1.65, nos. 1, 6.
[275] Bonifay 2004, p. 137; Ghalia et al. 2005, p. 496.

maintains that examples produced at Nabeul have a heavier and more rectilinear rim profile than those produced in the Sahel, which are typically more convex.[276]

Bonifay observes that Keay 62 is frequently attested in the West, but less so in the East.[277] As noted by Keay, this type is common in Catalunya, though less so in the rest of Spain.[278] The type is well attested in Carthage,[279] and Southern France,[280] and is also present in Berenice,[281] Algeria,[282] Italy, Switzerland, and Malta.[283] In the East, the type is present at Dichin,[284] as well as in Scythia Minor, being found at Tomis,[285] and in rural Telita.[286]

Keay suggests that oil was probably the primary content of the Keay 62 type.[287] This would appear to be supported by Garnier's residue analysis of an example from the La Palud shipwreck, though traces of pitch are also present, which causes Bonifay to suggest either reuse or that the oil was intended for non-alimentary use.[288]

Keay and Bonifay agree that variants Q and R are the earliest variants, though they disagree on the date; Keay suggests an example from a 4th to early 5th century A.D. context from Bordeaux as the earliest potential evidence, but concludes that production probably began around the 2nd quarter of the 5th century A.D.[289] Bonifay prefers a date range from the last third of the 5th

[276] Bonifay 2004, p. 137.
[277] Bonifay 2004, p. 137.
[278] Keay 1984, pp. 348-349.
[279] Peacock and Fulford 1982; Keay 1984, p. 349.
[280] Keay 1984, p. 349; Bonifay and Pieri 1995, pp. 100-103; Bonifay 2004, p. 140.
[281] Riley 1979, p. 204.
[282] Manacorda 1989, p. 179.
[283] Keay 1984, pp. 349-350.
[284] Swan 2004, p. 375.
[285] Opaiţ 1997, pp. 47-57; Paraschiv and Bajenaru 2008, p. 174.
[286] Opaiţ 1997, p. 69.
[287] Keay 1984, p. 347.
[288] Garnier 2007; Bonifay 2011, p. 19.
[289] Keay 1984, pp. 349-350.

through mid 6th century A.D.[290] These variants are not attested at Molyvoti. For the rest of the Keay 62 variants in general, Keay suggests that production began by the third quarter of the 5th century A.D., and continued into the mid 6th century A.D.[291] In contrast, Bonifay suggests that Keay variant A dates to the first half of the 6th century A.D., while Keay variant E trends towards the late 6th, early 7th century A.D.[292]

The Keay 62 fabric at Molyvoti is hard to very hard, fine, and compact, with moderately well-sorted inclusions. The fabric colour ranges from 2.5YR 5/8 Red - 2.5YR 6/6 Light Red, with one outlier at 7.5YR 6/4 Light Brown. Eight examples (**36-40, 42-43, 45**) have, or present traces of, a creamy yellow surface (2.5YR 8/4 Pale Yellow to 5Y 8/2 Pale Yellow, with one outlier at 10YR 8/4 Very Pale Brown). Light spalling and sparse, small, sub-rounded to irregular voids are common features. Coarse fraction includes sparse to moderate, medium to coarse, colourless, sub-rounded inclusions, which are very common. Also present are sparse to rare, coarse to granular, white to off-white, sub-angular to sub-rounded inclusions, as well as sparse to dense, fine to very fine, white to off-white, sub-rounded inclusions. Rare to sparse, coarse to granular, red to reddish brown, sub-rounded to sub-angular are present as well. Sparse, fine to medium, red, sub-rounded inclusions are uncommon. Sparse to dense, medium, grey, sub-rounded inclusions are also uncommon. This fabric is probably a heterogeneous fabric group, incorporating macroscopically similar fabrics from different production sites. The bulk of the Keay 62 examples (**36, 39-43, 45, 47-48**) from Molyvoti, when compared to Bonifay's macro photos of various North African amphora fabrics, seem most like fabrics from the Sahel, with the

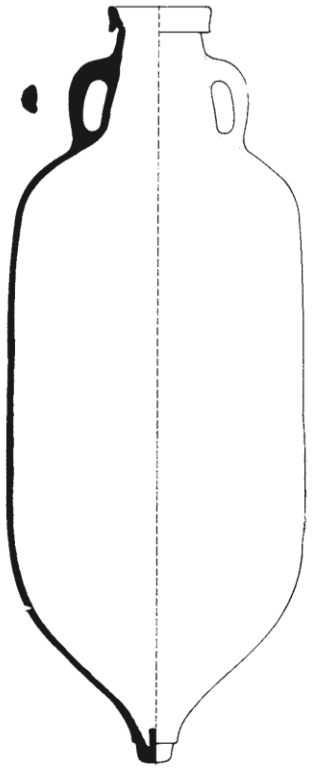
[290] Bonifay 2004, p. 137.
[291] Keay 1984, p. 350.
[292] Bonifay 2004, p. 140. Keay 62 A is very common at the La Palud shipwreck (see p. 45).

Keay 61 fabric from the Moknine workshop, and the Keay 62 Henchr ech-Chekaf workshops offering perhaps the closest parallels.[293]

3.3 Less Common Amphora Types Found at Molyvoti

Keay 61

Figure 9. Keay 61. Bonifay 2004, p. 139, fig. 75.3. From Pomegues. Scale 1:10.



Keay 61 describes another group of cylindrical, North African amphoras dating to the Late Roman period.[294] This group is morphologically very similar to the later Keay 62 variants;

[293] Bonifay 2004, p. 523, plate 1.14, 13, and 21, respectively.

in the Keay 61 the external face of the rim is taller, and the width of the rim is narrower (Figure 9).[295] According to Bonifay, the manufacture of the Keay 61 toe is different from the Keay 62, with a central peg being inserted into the base of the amphora and being left protruding into the interior of the body of the amphora.[296] Keay himself did not make this distinction, and a number of his illustrated examples of Keay 62 toes clearly demonstrate this feature.[297] All of Keay's examples of type 61 have a creamy yellowish surface.[298]

The Keay 61 amphora type was produced in Tunisia. Keay made this attribution on the basis of the fabric, presumably owing to its similarity to other North African examples.[299] Two workshops have since been identified and excavated in the Sahel, at Leptiminus,[300] and at Moknine,[301] as well as one in Zeugitania at Sidi-Zahruni (near Nabeul).[302]

Keay 61 is more common in the western Mediterranean than in the East. In the West, it is present in contexts throughout Spain and Southern France, and is attested in Sicily, Italy, and Carthage.[303] In Thrace, it is found at Tomis[304] and Dichin.[305]

There is no evidence yet for the principal contents of this type, though Keay suggests oil.[306] This suggestion has not been confirmed.

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[294] Beltran Lloris 1970, type 60; Keay 1984, type 61; Peacock and Williams 1986, class 35; Bonifay 2004, type 49.
[295] Bonifay (2004, p. 140). Raises the possibility that the later variants of Keay 62 could be related to the development of the earlier variants of Keay 61.
[296] Bonifay 2004, p. 140.
[297] E.g., Keay 62A: Keay 1984, p. 339, fig. 157.3; p. 340, fig. 158.6; p. 341, fig. 159.1, 8-9; Keay 62 E: p. 342, fig. 160.9.
[298] Keay 1984, p. 304.
[299] Keay 1984, p. 305.
[300] Dore 2001, fig. 1.65, nos. 10-17, 19.
[301] Bonifay 2004, pp. 35, 140
[302] Ghalia et al. 2005, fig. 3.23.
[303] Keay 1984, p. 305.
[304] Paraschiv and Bajenaru 2008, p. 174, table 1; Opaiţ 1997, p. 58.
[305] Swan 2004, p. 375.

Keay differentiated between five subtypes of Keay 61 (A-E), according to minor variations in the shape of the rim.[307] Keay does not suggest chronological ranges for each variant, but his survey of western Mediterranean evidence suggests a mid 5th to 7th century A.D. timeframe for the type as a whole.[308] Bonifay, working with evidence from more recently excavated sites including Marseilles and Leptiminus, suggests three separate groupings for this type: He dates Keay 61 subtypes B (**50, 52**) and D (**51**) to the late 6th to mid 7th century A.D. He identifies an independent development for the morphology of subtype B, but considers subtype D to be a development of the later Keay 62 variants.[309] For Keay's subtype A, Bonifay suggests the late 7th century A.D.[310] Bonifay also suggests a third group, what he terms the "variante tardive," also dateable to the late 7th century A.D. This sub-type appears to be the only one produced in Zeugetania instead of the Sahel.[311] Bonifay does not address the Keay 61 E variant, and reassigns Keay 61 C to a separate amphora type altogether.[312]

The fabric of the Keay 61 examples found at Molyvoti is essentially the same as that of the Keay 62 amphoras. Only one example of Keay 61 in this assemblage preserves the expected the yellow surface treatment intact (**51**), but most do preserve traces of it (**50, 52, 53**).

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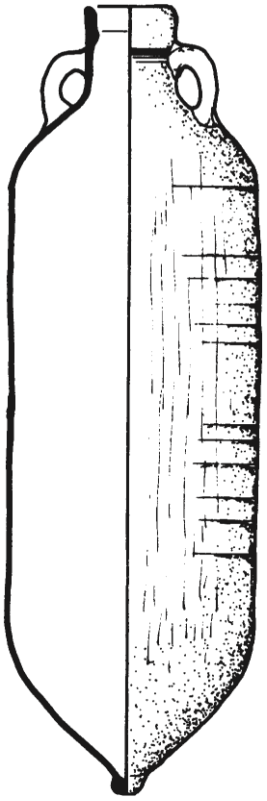
[306] Keay 1984, p. 305; Bonifay and Pieri 1995, p. 106.
[307] Keay 1984, figs.
[308] Keay 1984, pp. 305-309. Specifically, he suggests that, like the Keay 62, production of this type seems to drop off in the late 6th century A.D., but that isolated examples (probably residual) do appear in the Yassi Ada shipwreck.
[309] Bonifay 2004, pp. 140-141.
[310] Bonifay 2004, p. 141.
[311] Bonifay 2004, p. 141.
[312] Bonifay 2004, p. 140.

Keay 55

Figure 10. Keay 55. Bonifay 2004, p. 136, fig. 73.5. From Tomis. Scale 1:10.



The Keay 55 is another tall cylindrical North African amphora (Figure 10).[313] The rim is either a direct continuation of the cylindrical neck (Keay variant A) or slightly everted (Keay variant B). Variant A (**54**) has a distinctive ridge below the rim on the internal face. The handles have an "ear-shaped profile," and neck and body frequently have straight, or occasionally wavy, combed decoration.[314] The toe is a simple, short button-shape.[315]

[313] Beltran Lloris 1970, type 53; Scorpan 1977, type 2; Keay 1984, type 55; Peacock and Williams 1986, class 35; Bonifay 2004, type 44.
[314] Keay 1984, pp. 289-290.
[315] Bonifay 2004, p. 135.

The Keay 55 is a Tunisian amphora, and production is attested at the Sidi-Zahrouni kiln in Nabeul.[316] In the West, this type is found in various sites in Spain,[317] at the La Palud shipwreck off southern France,[318] and Carthage.[319] In Thrace, this type is represented at Tomis.[320]

The contents are unknown; Bonifay notes that they frequently appear with pitched linings, though none of the examples from the La Palud shipwreck were pitched.[321]

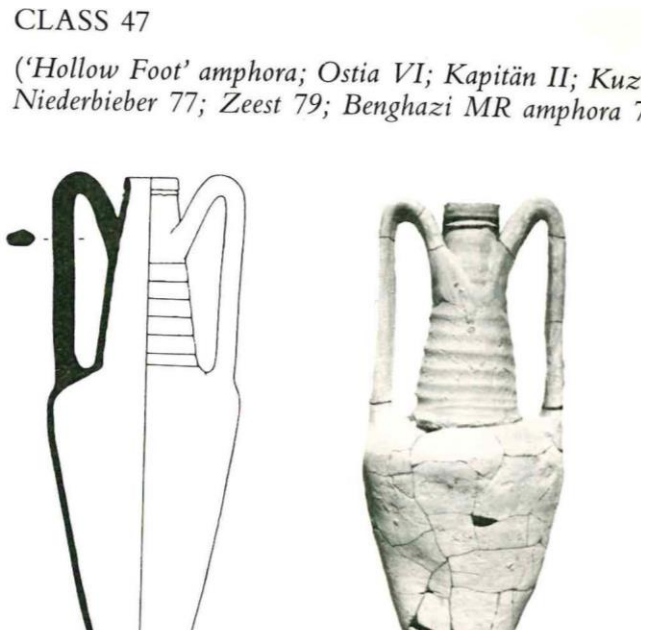
Keay's and Bonifay's suggestions for the date range of the Keay 55 are essentially in agreement, from the late 5th to 6th century A.D., though Bonifay puts it as no later than the mid 6th century A.D.[322] At Tomis, the type is found in a 6th century A.D. context.[323]

Only one Keay 55 fragment was identified in the Molyvoti survey assemblage. This is in a hard and compact fabric, with well sorted inclusions. The main fabric colour is 10R 5/8 Red, with a 2.5Y 8/4 Pale Yellow surface. Coarse fraction includes very coarse, whitish, sub-angular inclusions, which are sparse. Very fine whitish particles are sparse to moderately dense. Whitish sub-rounded granules are sparse. Very coarse dark grey and brown sub-angular inclusions are sparse. Small, irregular voids are moderately frequent (**54**). This fabric is similar to that of Sidi Zahruni.[324]

[316]Ghalia et al. 2005, p. 496.
[317] Almagro 1955, p. 115; Keay 1984, pp. 293.
[318] Long and Volpe 1998, figs. 274.5, 276.14.
[319] Hayes and Riley 1978, p. 87; Fulford and Peacock 1984, p. 216.
[320] Scorpan 1977, p. 271; Opaiţ 1997, p. 54.
[321] Bonifay 2004, p. 137; Long and Volpe 1998, p. 340.
[322] Keay 1984, p. 293; According to Bonifay (2004, p. 137) Keay 55 appears at Nabeul in a context dated to the late 5th or early 6th century A.D. It is also present in the La Palud shipwreck assemblage (see p. 45).
[323] The nature of the chronological evidence is unspecified, Scorpan 1977, p. 271.
[324] Bonifay 2004, p. 523, plate 1.21.

Niederbieber 77

Figure 11. Niederbieber 77. Peacock and Williams 1986, p. 193, fig. 112. Drawing from Ostia, photo from Benghazi. Scale 1:10.



The Niederbieber 77 features long, thick handles, which arc above the rim (Figure 11).[325] The rim itself is simple, with a small pointed flange just below it on the neck. The neck is conical, and the body is narrow and tapers form the shoulder to the base. The base itself is not the typical solid toe of most amphoras, instead being hollow and roughly cylindrical. This amphora type is quite small, standing to a height of roughly 80 cm. There does not appear to have been any significant development of form over the course of the type's production.[326]

[325] Oelmann 1914, type 77; Zeest 1960, type 79; Kapitän 1961, type II; Palma and Panella 1968, form VI; Riley 1979, MRA 7; Keay 1984, type 12; Bezeczky 2013, type 44.
[326] Variations in form do not appear to be strong chronological indicators, Negru, Badescu, and Avram 2003.

The origin of this type has been the subject of debate. Riley suggested an Aegean origin based on distribution patterns.[327] The possibility of production on Kos has been raised based on the similarity of fabric from other Koan amphoras.[328] Reynolds has indicated his preference for a Black Sea origin based on fabric similarities to Crimean amphoras.[329] Bezeczky notes that some Niederbieber 77s appear to have been produced around Ephesus, and perhaps on Samos.[330] Chemical analysis performed on examples from Novae (Lower Moesia) supports production on Kos, and possibly also on Rhodes.[331]

The consensus date range for the Niederbieber 77 is the 3rd to 4th century A.D.[332] According to Keay, in Spain it is most common in the 3rd century A.D. The Cape Ognina shipwreck, which contains Niederbieber 77s, was originally given a *terminus post quem* of the first half of the 3rd century A.D., but has since been refined to roughly A.D. 210 to 215.[333] At Benghazi, this type is common in contexts dating from the early to mid 3rd century A.D.[334] Examples from Dacia are dated, variously, from the end of the 2nd century to the 4th century A.D.[335] At Novae, Niederbieber 77 is only attested in contexts dating from the mid 3rd to early 4th century A.D., at which point the type seems to have fallen out of use there as well as throughout

[327] Riley 1979, p. 192.
[328] Panella 1973, p. 598; Keay 1984, p. 137.
[329] Reynolds 2010a, p. 109, 257, n.187.
[330] Bezeczky 2013, pp. 25-33, 150; examples of this type in Ephesian fabric do not appear to be very common, however, pp. 30-31. Outschar (1993, pp. 46-52) argues for an Ephesian origin based on the presence of vitrified fragments at the site. Warner Slane (2011, p.101, n. 22), however, suggests that this pattern of vitrification is consistent with the use of parts of this amphora type in bellows, as documented at Corinth.
[331] Daszkiewicz et al. 2000, pp. 24-39; Dyczek 2007, p. 828.
[332] Riley 1979, p. 190; Peacock and Williams 1986, p. 194; Bezeczky 2013, p. 149.
[333] Kapitän 1972, p. 244; Keay 1984, p. 140; Kapitän 1974, p. 153.
[334] Riley 1979, p. 191.
[335] Negru, Badescu, and Avram. 2003, p. 1.

Upper Moesia.[336] As is shown in Figure 12, this type is generally common, and widely distributed.[337]

Figure 12. Niederbieber 77 distribution map. Peacock and Williams 1986, p. 194, fig. 113.

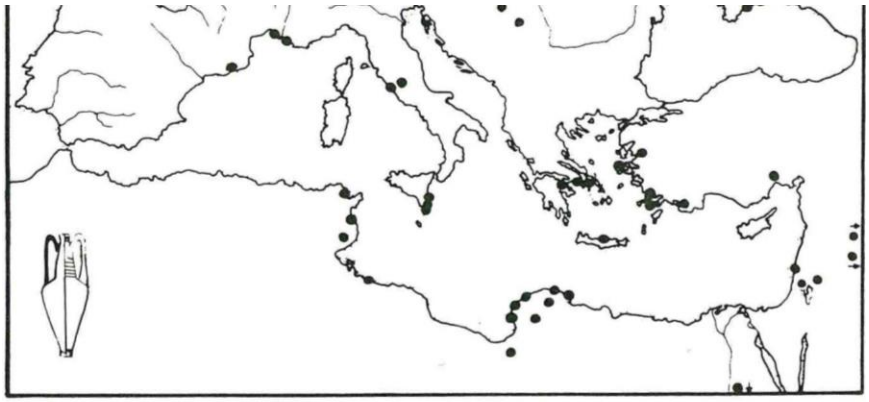


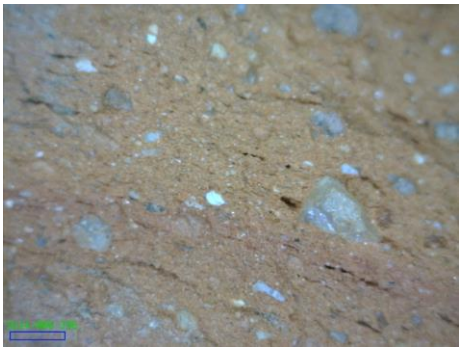
Fig. 113 Distribution of Class 47 (after Riley, 1979).

PRINCIPAL CONTENT
Not known; wine has been suggested (Carandini and Panella, 1981).

Both examples of Niederbieber 77 in the Molyvoti assemblage are in the standard fabric for the type.[338] This is a hard and very compact fabric, with poorly sorted inclusions. These examples are a vibrant 5YR 5/8 Yellowish Red. Course fraction includes medium to very coarse translucent white, sub-angular and irregular inclusions in moderate density. Fine white, sub-angular inclusions are present in moderate density. Medium grey and black, sub-rounded inclusions are sparse. Sparse, small irregular voids are present. Since there was no sufficiently preserved samples for drawing, a photomicrograph of a Molyvoti example has been included here (Figure 13).

[336] Bjelajac 1996, pp. 42-43; Dyczek 2007, p. 828.
[337] Riley 1979, p. 191; Peacock and Williams 1986a, p. 193; for more recent bibliography, see especially Bezeczky 2013, p. 150, n. 577.
[338] See Peacock and Williams 1986, p. 195.

Figure 13. Photomicrograph of an example of Niederbieber 77 collected during the 2014 Molyvoti field survey.



Samos Cistern Type

Figure 14. Samos Cistern Type. Arthur 1998, p. 167, fig. 7.2. Not to scale.

The 'Samos Cistern Type' is an ovoid-shape, with a simple rim and a short cylindrical neck, and smallish grooved handles.[339] *The body features ribbing, and ends in a spike toe (*

Figure 14).

Samian production has been suggested based on the type's abundance there and its general distribution patterns.[340] Petrological analysis has indicated that Halicarnassus is a likely production centre.[341] Bezeczky notes that production is likely in the Meander valley and near Smyrna.[342]

The Samos Cistern type is primarily an Eastern amphora type, reasonably common in the Aegean, the Black Sea, Turkey, and the Balkans, though also in Italy.[343] The typical suggested date range for this type is throughout the 6th and 7th centuries A.D.[344] At Samos, this type appears in a context dated to around A.D. 615 to 629.[345] At Argos, the type appears in a destruction layer associated with the Slavic invasion in A.D. 585.[346] In Georgia, an example was found built into the wall of a church, the construction of which was dated to roughly A.D. 580.[347]

The Samos Cistern Fabric at Molyvoti is hard and compact, with well-sorted inclusions. Colour is 5YR 5/6 Yellowish Red to 5YR 6/6 Reddish Yellow. Coarse fraction includes sparse, very coarse, glassy to translucent grey, angular to sub-angular inclusions. Fine to medium,

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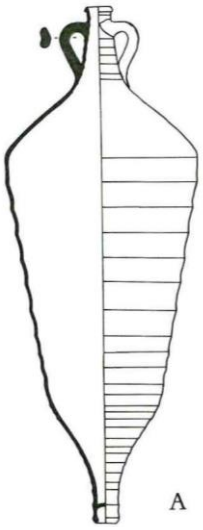
[339] Scorpan 1977, type III; Arthur 1985, 'Samos Cistern Type'; Bezeczky 2013, type 51.
[340] Scorpan 1977, p. 272; Arthur 1998, p. 167. Note that labels Agora M273 and Keay LXVII are not synonymous, Arthur 1998, pp. 167-168; Bonifay and Pieri 1995, p. 114.
[341] Williams 1990, p. 296.
[342] Based on the production of an earlier, unclassified, probably related amphora type, Bezeczky 2013, p. 157; Empereur and Picon 1986, p. 143, 145, fig. 2.
[343] Bezeczky 2013, p. 158, n. 617.
[344] Aupert 1980, p. 440-441; Arthur 1985, p. 252; Bezeczky 2013, p. 157.
[345] *Terminus post quem* provided by coin, Karagiorgou 2001a, p. 142.
[346] Coins give a *terminus post quem* of the end of the 5th century A.D., while the lamp assemblage is consistently later than A.D. 550, Aupert 1980, pp. 401-404, 440-441; Arthur 1998, p. 167.
[347] Sotelazvili and Yakobson 1984, pp. 194-195; Arthur 1998, p. 167.

glassy, angular inclusions are dense. Medium red, black, and grey, sub-angular to irregular inclusions are sparse. Very coarse, white, angular to irregular inclusions are also sparse. Mica particles are dense. Small, sub-rounded voids are rare to sparse. Fabric is overall similar to LR 3 (**55, 56, 58**). There is an outlier, which is of moderate hardness and compaction, with well-sorted inclusions. Its colour is 2.5 YR 5/6 Red, and its coarse fraction includes dense, fine, glassy, sub-angular inclusions. Fine to medium, whitish, sub-angular inclusions are sparse. Mica particles are dense. Small, sub-rounded voids are rare (**57**).

LR 3

Figure 15. LR 3. Peacock and Williams 1986, p. 188, fig. 107. From Kellia. Scale 1:10.



LR 3 is a small amphora, with a small mouth and a narrow conical, almost cylindrical neck (Figure 15).[348] The rim appears in three variations: flat, triangular, and gently everted. Its

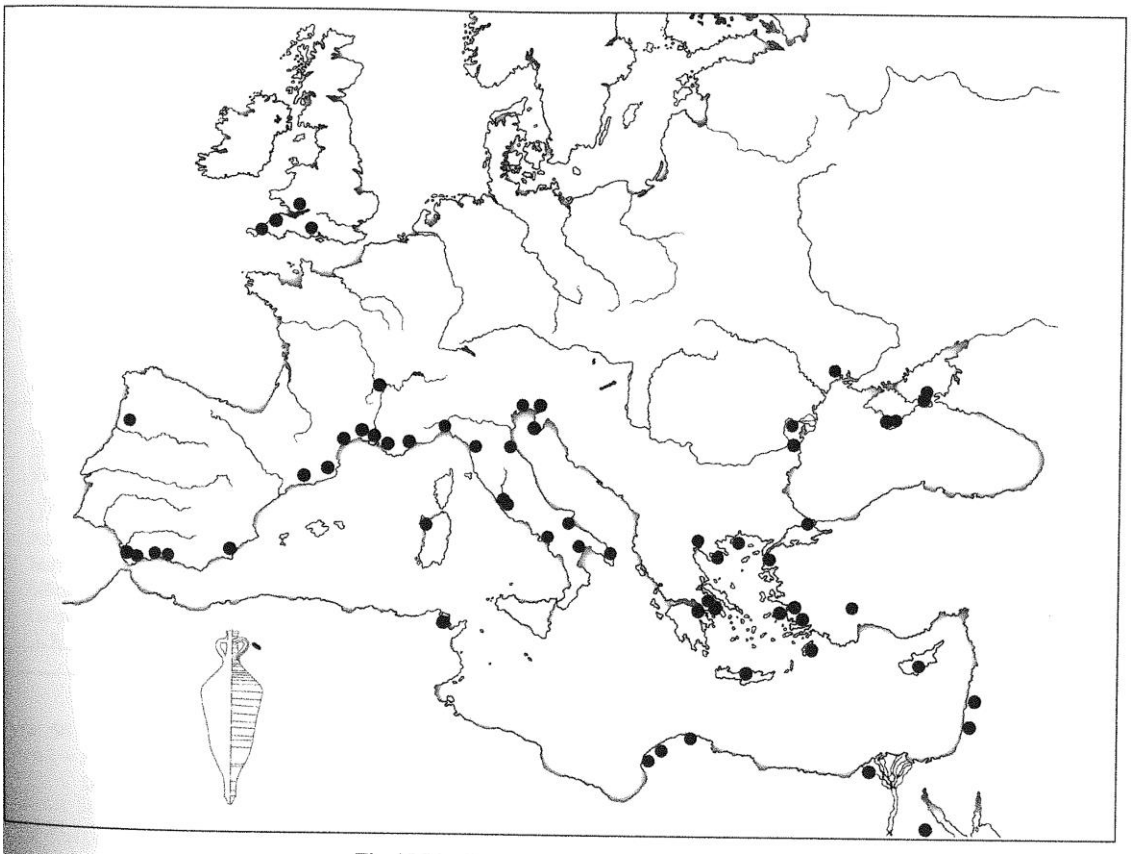
[348] Equivalency: Thomas 1959, Biv; Zeest 1960, type 95; Kuzmanov 1973, type 7; Scorpan 1975, type O; Riley 1976, LR 3; Riley 1976, type LR 3 Riley 1979, type LR 10; Keay 1984, type 54Bis; Peacock and Williams 1986, class 45; Hayes 1992, type 3; Bezeczky 2013, type 55.

ridged body tapers from a narrow shoulder to a toe that is typically hollow. The handles have a generally flat profile, often with a shallow groove running down the exterior, and attach to the neck below the rim and above the shoulder.[349] Though no kiln sites for this type have yet been identified, petrological evidence points to several possible production centres on the West coast of Asia Minor, including Ephesus.[350]

The LR 3 is one of the most widely distributed and common amphora types in the Late Roman period, appearing in contexts from Britain to India (Figure 16).[351]

[349] Bezeczky 2013, p. 164.
[350] Bezeczky 2010, p. 355; Bezeczky 2013, p. 26-31, 165, n. 656.
[351] For a good, relatively modern bibliography for the distribution of LR 3, see Bezeczky 2013, pp. 33, 165, n. 659.

Figure 16. Distribution of LR 3. Bezeczky 2013, p. 165, fig. 25.



The two-handled LR 3 is an end-of-the 4th century A.D. development of the earlier, one-handled version, Berenice MRA 4.[352] Bezeczky argues that variations in the base of this amphora (hollow or closed) are based on varied production centres rather than on chronological grounds.[353] The consensus date range for the LR 3 seems to be from the end of the 4th century A.D., through the 6th century A.D.[354] At Carthage, the frequency of this type peaks in the late 5th

[352] Earliest examples from an end of the 4th century A.D. deposit in Rome, Annis 1975, p. 31, nos. 1-2; and Riley 1979, p. 229; Peacock and Williams 1986, p. 189; and at Athens in a late 4th century A.D. context, Robinson 1959, p. 79. Bezeczky (2013, p. 164) remarks that one-handled variants are also attested from the Late Roman period. For information on the MRA 4, see Bezeczky 2013, pp. 162-163; Riley 1979, pp. 186-187.
[353] Bezeczky 2013, p. 164; Ladstätter 2008, p. 181, fig. 27.5.
[354] Robinson 1959, p. 79 (L 50), 119 (M 373); Panella 1973, 460-462; Riley 1979, p. 229; Riley 1981, p. 118; Keay 1984, pp. 287-289; Peacock and Williams 1986, p. 189; Bezeczky 2013, p. 164.

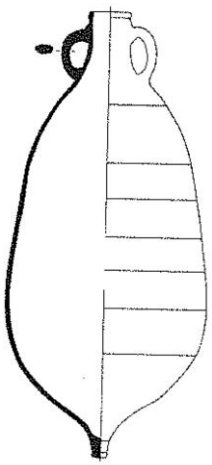
century A.D., and again in the late 6th century A.D.[355] Keay observes that while imports of this type to the West seem to tail off in the late 6th century, in the East it seems to continue into the 7th century A.D., with an example found on the ca. A.D. 625/626 Yassi Ada shipwreck.[356] This conclusion is supported at Saraçhane, where the type is given a date range into the 7th century A.D.[357]

The LR 3 fabric is hard and very compact, with well-sorted inclusions. The fabric colour is 5YR 5/8 Yellowish Red. Coarse fraction includes dense, very fine, colourless mica specks. Medium, colourless, sub-angular inclusions are sparse. Medium to coarse, grey, sub-angular inclusions are sparse. Small to medium irregular voids are rare. This fabric is probably of Ephesian origin (**59**).[358]

[355] Peacock and Williams 1986, p. 189.
[356] Keay 1984, p. 289; Bass and Van Doorninck 1982, p. 182.
[357] Hayes 1992, p. 63.
[358] Ephesus fabric B, see Bezeczky 2013, pp. 29, 166, 168.

Ephesus 56

Figure 17. Ephesus 56. Bezeczky 2013, p. 167. Provenance unclear. Not to scale.



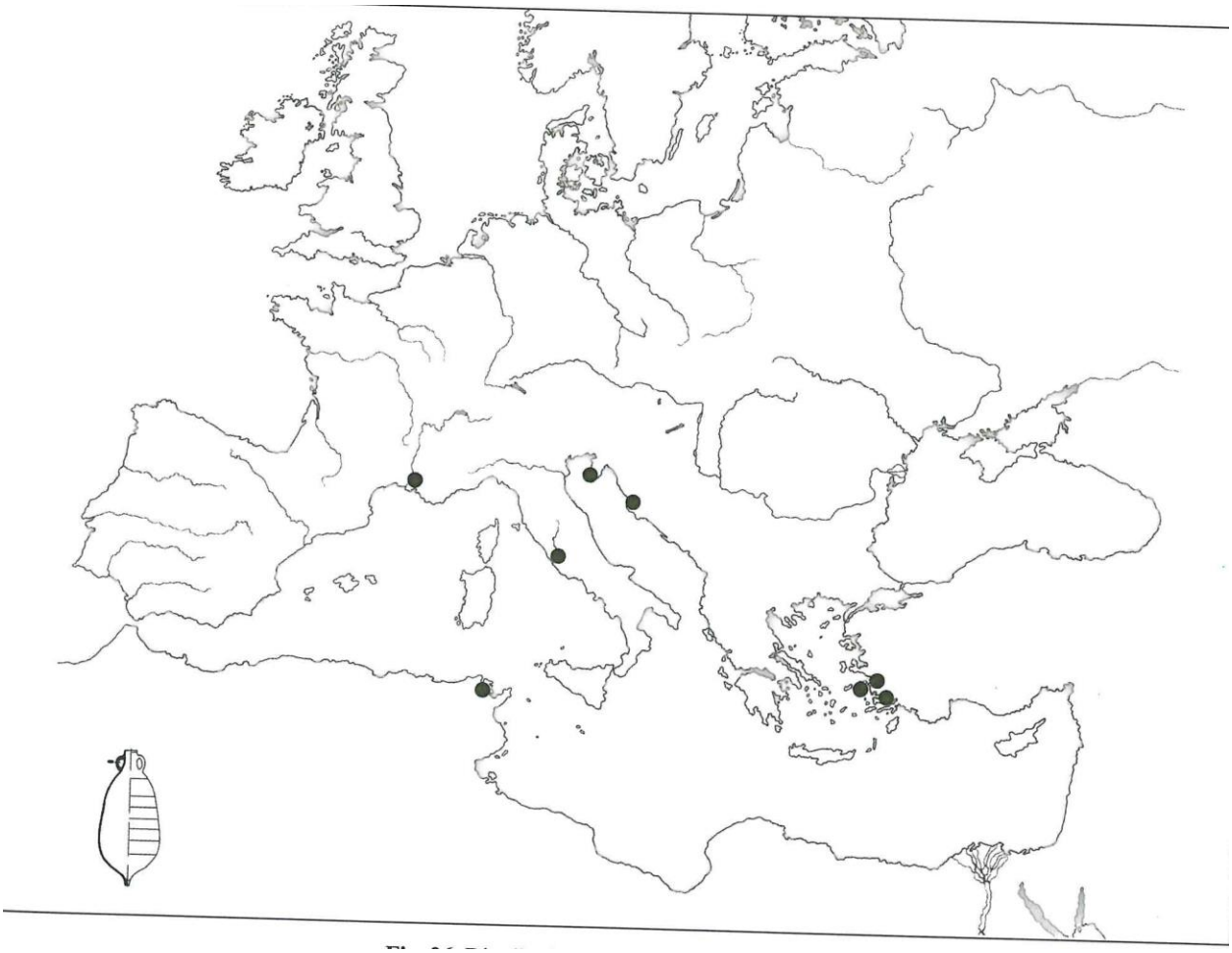
The Ephesus 56 is of a similar size to the LR 3. Its rim is either flat or rounded, and the neck is roughly cylindrical (Figure 17). The handles have an oval profile, and attach below the neck and above the shoulder. The immediately noticeable difference between the two types is that the body of the Ephesus 56 is pear-shaped, and it typically has a small, solid spike toe, often with a pinched appearance.[359] No workshops for this type have yet been found, but petrology indicates production in the Ephesus area, and perhaps also on Kos.[360]

The Ephesus 56 is far less common than LR 3 (Figure 18). The two types appear together at Samos,[361] Carthage,[362] Ephesus, Brijuni, Marseilles, Rome, Bodrum, and Zadar.[363] Molyvoti can now be added to this list. At Ephesus, the Ephesus 56 type is generally found in contexts

[359] Bezeczky 2013, p. 167.
[360] Bezeczky 2010, p. 355; Bezeczky 2013, pp. 26-31, 168.
[361] Hautumm 1981, p. 224, fig. 332, no. 224.
[362] Peacock and Fulford 1982, p. 123, fig. 36, nos. 8-9.
[363] Bezeczky 2013, p. 168.

with LR 3s, suggesting contemporaneity.[364] Two examples from Carthage were from contexts dated to A.D. 450 to 475, and around A.D. 500, respectively.[365]

Figure 18. Distribution of Ephesus 56. Bezeczky 2013, p. 169, fig. 26.



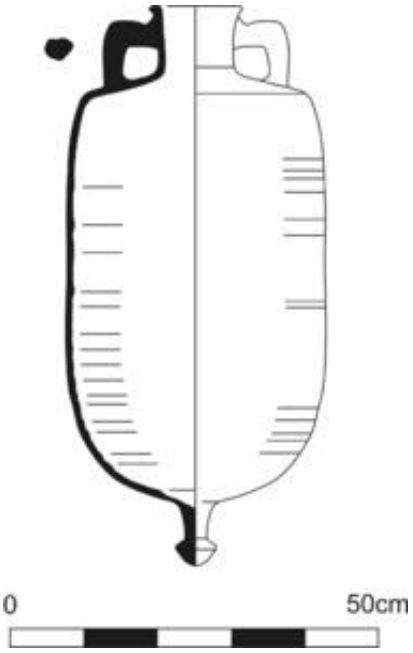
Similar to LR 3, the Ephesus 56 fabric is hard and very compact, with well-sorted inclusions. The fabric colour ranges from 2.5 YR 4/6 Red to 2.5YR 5/8 Red, with one example exhibiting a firing core that is 5YR 4/4 Reddish Brown. Coarse fraction includes dense, very

[364] Bezeczky 2013, p. 167.
[365] Fulford and Peacock 1984, p. 123, no. 9 and no. 8, respectively; Bezeczky 2013, p. 167.

fine, colourless mica specks. Medium, colourless, sub-angular inclusions are sparse. Medium to coarse, grey, sub-angular inclusions are sparse. Small to medium irregular voids are rare. This fabric is probably of Ephesian origin (**60, 62**).[366] One outlier is otherwise identical, but also contains rare medium beige, sub-rounded inclusions (**61**).

Pinched-Handle Type

Figure 19. Pinched-Handle Type. Lund 2005.Provenance uncertain. Scale 1:10.



The Pinched-Handle Type amphora is cylindrical, with a short cylindrical neck (Figure 19).[367] The handles are grooved down the centre and distinctively pinched in the corner, and they

[366] Ephesus fabric B, see Bezeczky 2013, pp. 29, 166, 168.
[367] Mau 1909, type XXVII/XXVIII; Robinson 1959, G199, L11, M239; Panella 1973, form 631; Zemer 1977, no 41; Riley 1979, MRA 4; Hayes 1991, type 3; Leonard 1995, "Pinched-Handle Type;" Bezeczky 2013, type 16.

attach below the rim and just above the shoulder. The toe is long, with a distinctive mushroomoid knob shape. The rim is typically plain.[368]

Cyprus has been suggested as a likely production centre on petrological grounds and owing to the type's frequency there.[369] So far, production of this type is only attested at kiln sites in Cilicia.[370] The Pinched-Handle type amphora is widely distributed, and is generally more common in the Roman East than in the West.[371] In Cyprus, this amphora type is particularly abundant.[372]

The consensus date range for the Pinched-Handle amphora type appears to be from the 1st to the 4th century A.D., probably peaking in the 2nd and 3rd centuries A.D.[373] Earlier examples are generally larger, tending to have longer necks and handles, and typically exhibit the distinctive mushroom-shaped toe, while the later variant is smaller with a shorter neck and handles, and seems to lose the mushroom-shaped toe.[374] The presence of the earlier variant at Pompeii provides a definitive *terminus ante quem* for the type's introduction,[375] and it continues to appear in contexts certainly into the second half of the 3rd century A.D., and possibly into the 4th century

[368] Bezeczky 2013, p. 83; Riley (1979, p. 186), describes the rim as knobbed.
[369] Hayes 1991, p. 91; Lund 2000; Autret 2012, p. 256; Bezeczky 2013, p. 84. Williams and Lund (2013, p. 156) argue against a Cypriot origin.
[370] Williams 1989, p. 91; Rauh and Slane 2000, pp. 321, 325.
[371] For a recent bibliography for this type's distribution, see Bezeczky 2013, p. 84, n. 322.
[372] Autret 2012, 256; Kaldeli 2008, pp. 118, 122, 128, 132, 133; Kaldeli 2013, p. 126; Williams and Lund 2013, p. 156.
[373] Riley 1979, pp. 186-187; Daszkiewicz et al. 1997, p. 132; Reynolds 2005, p. 564; Autret 2012, p. 254; Bezeczky 2013, p. 83; Williams and Lund 2013, pp. 156-157; Meyza and Baginska 2013, p. 142.
[374] Autret 2012, p. 255; Williams and Lund 2013, p. 156.
[375] Mau (1909, pp. 790ff) initially identified the type in his classification of the Pompeii material; Daszkiewicz et al. 1997, p. 132; this type appears in a 1st to 2nd century context in Athens, as well, Robinson 1959, p. 43, pl. 16 (G 199).

A.D. at Corinth and Nea Paphos, as well as in Cyprus.[376] The later variant seems to be a late 3rd and 4th century A.D. phenomenon in Cyprus.[377] One possible example of the later Pinched-Handle type variant from the mid to late 4th century A.D. Yassi Ada shipwreck may be the latest context in which this variant and type is found.[378]

There are two possible fragments of the Pinched-Handle type amphora in the Molyvoti assemblage, both in different fabrics. The first is a hard, compact fabric with well-sorted inclusions. This example has a fabric colour of 5YR 6/8 Reddish Yellow. Coarse fraction includes spare, coarse to very coarse, colourless, sub-angular inclusions. Medium, whitish, sub-angular inclusions are present in sparse to moderate density. Fine, white particles are present in moderate density (**63**). The second example is also in a hard, compact fabric, but with poorly sorted inclusions. The fabric colour for this fragment is 5YR 7/6 Reddish Yellow. The coarse fraction includes sparse, medium to very coarse, red, sub-rounded inclusions. Medium to coarse, whitish, sub-angular and sub-rounded inclusions are sparse. Medium to very coarse, grey and brown, sub-angular inclusions are also sparse. Medium-sized irregular voids are rare (**64**). Cilician fabrics tend to be micaceous. Given that neither of these examples is micaceous, a Cypriot origin, however unlikely, cannot be immediately ruled out.[379]

Unidentified

[376] Slane 1994, p. 148; Meyza and Baginska 2013, p. 143; Williams and Lund (2013, pp. 156-157) suggest that the early variant continues even into the early 4th century A.D.; this appears to be the case at Beirut, Reynolds 2005, p. 564. Autret (2012, p. 255) considers the earlier variant to be a 1st and 2nd century A.D. phenomenon.
[377] Robinson 1959, 108, pl. 28 (M 239); Reynolds 2005, p. 564; Meyza and Baginska 2013, p. 142; Williams and Lund 2013, p. 157.
[378] Date arrived at on balance of ceramic evidence, Bass and Van Doorninck 1971, pp. 34 (Type II), 37, pl. 2.9; Daszkiewicz et al. 1997, p. 132.
[379] Williams and Lund 2013, p. 158.

The remaining catalogue entries represent a sample of unidentified sherds collected during the Molyvoti survey (**65-88**). These are included in the catalogue in order to illustrate the variety of shapes and fabrics included in this category. There do not appear to be groups of sherds from any one unidentified amphora type, and therefore I am confident that no statistically significant types have been overlooked for the analysis presented in the following chapter. Future research may allow for the identification and analysis of additional amphora sherds from this survey.

Chapter 3 explored the realm of Late Roman amphora scholarship. The typological, chronological, and petrological information discussed here forms the basis of the analysis of the survey data presented in the following chapter. LR 1, LR 2, Zeest 80, and Keay 62 are the most common Late Roman amphora types in the Molyvoti survey ceramic assemblage. Each of these types represents a different production region: the Eastern Mediterranean, Aegean, Black Sea, and North Africa, respectively. Of these four most common types, Zeest 80 is the earliest, with a date range from the 2nd through (possibly) the early 4th century A.D. LR 1 and LR 2 have long production ranges, but the examples present at Molyvoti are suggestive of a primarily 5th through 6th century date range. Keay 62 variant A, the most common variant of this type at Molyvoti, is most likely of the first half of the 6th century, while variant E , the next most common, suggests activity in the second half of the 6th, into the early 7th century. Each of the less common amphora types comes from one of the same general production areas: the Keay 61 and Keay 55 are North African; the Niederbieber 77, Samos Cistern Type, LR 3, and Ephesus 56 are Aegean; and the Pinched-Handle type is from the Eastern Mediterranean. Zeest 80 is the sole example of an amphora from the Black Sea region yet identified at Molyvoti. The less common amphora types

also provide chronological information: The Pinched-Handle and Niederbieber 77 are both early types, which, along with the Zeest 80, suggest activity at the beginning of the Late Roman period, or indeed the Middle Roman. LR 3 and Ephesus 56 both have long production ranges, but most plausibly fit within the 5th to 6th century date range. Keay 55 also fits this category, with a late 5th to mid-6th century date. The Keay 61 and Samos Cistern Type are solidly later types, suggesting activity in the late 6th, into the first half of the 7th century. Chapter 4 draws on this body of scholarship in order to contextualize the MTAP survey findings, and so to suggest patterns of settlement and or economic activity in the study area throughout the Late Roman period.

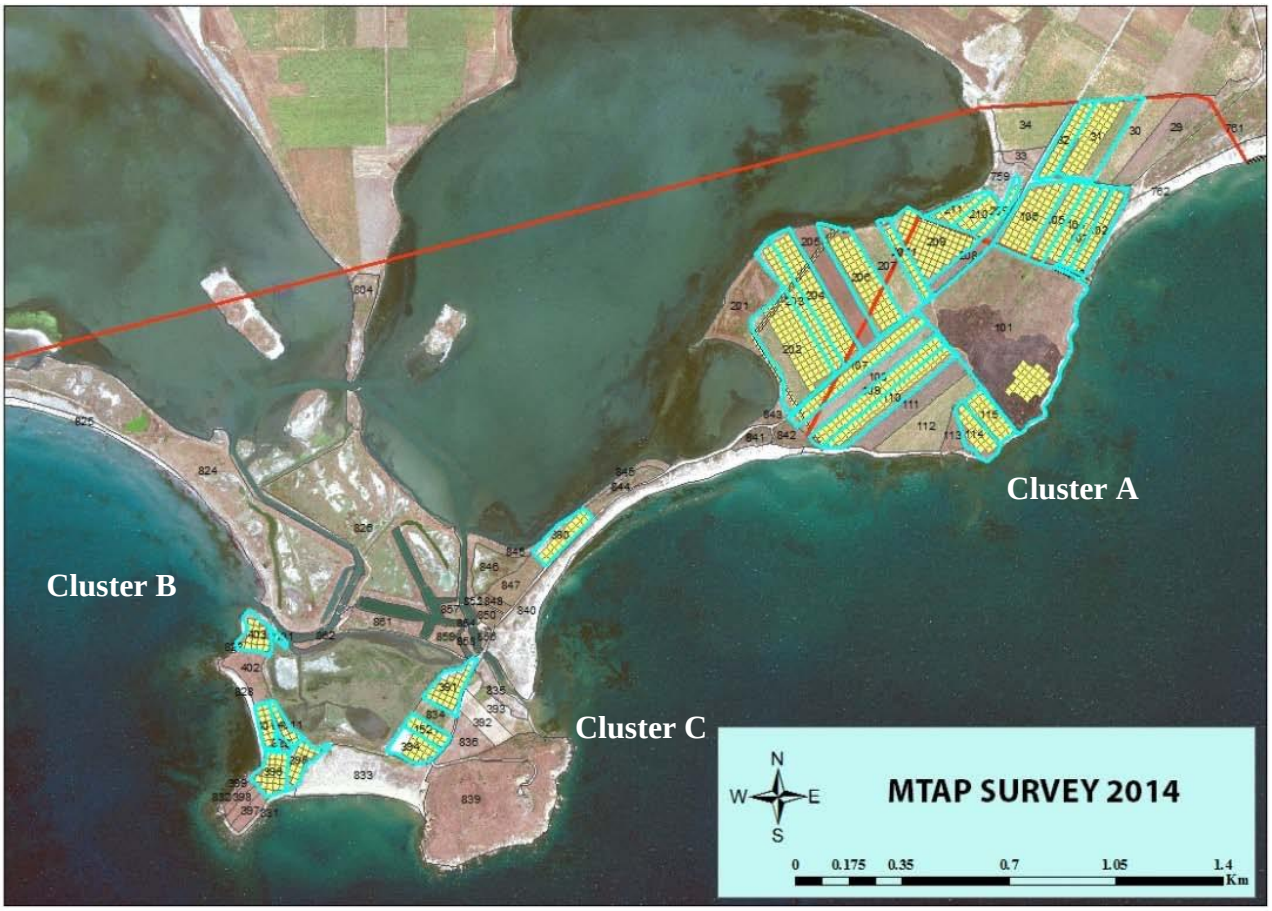
Chapter 4: Results

This chapter uses the chronological and typological information outlined in the previous chapter in order to interpret the amphora data from the survey project. The results from the 2014 and the 2015 surveys are presented separately. The first two sections address the 2014 assemblage, which focuses on the Molyvti peninsula itself, in and around the site of a walled Classical city, while sections 4.3 and 4.4 discuss the 2015 survey assemblage collected from the surrounding countryside.

The 2014 survey universe, Zone A', was divided into survey tracts following modern agricultural field boundaries wherever possible, and each tract was further subdivided into 20 x 20 m survey units (Figure 20). Tracts were selected for survey primarily on the basis of visibility, and as such, are mostly in cotton fields. The survey units were walked by teams of four at 5 m intervals, each covering an area approximately 3 m across; in other words, 60% of each unit was viewed. The end result was that 33 tracts were surveyed in 2014, for a total of 1,040 units, or 18.8% of the total area of Zone A'. This means that 11.3% of the total area was actually viewed by the team. Intensive sampling strategies based on available fields within defined geographic boundaries is an established practice in Mediterranean surface survey archaeology.[380]

[380] E.g., Keay and Millet 1991, p. 137; Lolos et al. 2007, pp. 175-178.

Figure 20. 2014 survey area, Zone A'. Tartaron 2014, p. 20, fig. 1.



As in 2014, Zone B' (Figure 21) was divided into tracts, which were further subdivided into survey units. Again, the majority of the fields selected for survey were cotton fields, chosen for high-visibility, though these fields were evenly distributed through Zone B'. In 2015, however, the survey units were larger, 40x100 m being the standard size. Field walkers were spaced at 10 m intervals, resulting in 30% coverage of each unit. The team surveyed 368 tracts in 2015, totaling 1,302 survey units. This means that the team viewed 3.5% of the total area of Zone B'. Furthermore, in 2015, the team employed 'Extensive Discovery Units' (EDUs). EDUs are areas subjected to even less intensive survey, with field walkers spaced at 50 m intervals, and

were generally assigned wherever the team had reason to believe that little to no material would be present on the surface. The team surveyed 27 EDUs, for a total of 112.5 ha.

Figure 21. 2015 survey area, Zone B'. Tartaron 2015, p. 20, fig. 1. Zone B' is outlined in red; Zone A' is outlined in yellow (by author).

The strategy for collecting ceramics throughout both survey seasons was designed to reduce the number of multiple examples of a given type picked up from within any given survey

unit, while at the same time guaranteeing that the full spectrum of shapes, forms, and fabrics was represented. Thus, for example, when multiple rim fragments of the same shape, size, and fabric were found in a given unit, only one of these sherds was collected for processing.[381] This style of sampling strategy is sometimes referred to as the 'chronotype' method.[382] Such a collection strategy means that the resulting sample may not reliably represent the original distribution on the ground, since not every sherd is collected. Rare artifact types have an exaggerated presence, while common types are artificially reduced, resulting in a sample that minimizes the differences present in the original population.

The primary criticism of the chronotype method is that it is not designed to produce a strictly representative, quantitfiable sample. Nonetheless, this method does provide an indication of the artifact distribution, as well as chronological and typological information. In order to derive any quantitative value from such results, however, it is necessary to translate what was essentially intended as a measure of presence/absence into frequency data. For the purposes of this study, it was deemed feasible to attempt this data translation for two reasons. The ultra high-resolution of the 2014 survey methodology dictates that each survey unit covers such a small surface area that, at least in practical terms, there is a very limited scope for the duplication of a given amphora type within any given survey square. That is, only in exceptionally dense amphora sherd scatters would there likely be found multiple examples of sherds of the same amphora type, shape (handle, rim, base, or body fragment), and fabric in such a close proximity, and therefore relatively few such sherds would have been rejected by the survey team in the

[381] While this strategy was employed for the broader survey, the surface material from the headland POSI (Place of Significant Interest), from which the bulk of the Late Roman amphora sherds were collected, was so rich that multiple examples of individual fabrics and forms were commonly collected.
[382] First introduced in Given and Knapp 2003, pp. 14-16,

field.[383] Furthermore, upon close inspection of the contents of the bags of collected ceramic survey material, it became clear that in areas of high artifact density, duplicate sherds were being collected regardless of the survey methodology. This phenomenon is likely the result of the survey team's general practice that when in doubt concerning the differences between two sherds found within a single survey unit, they would collect both. The end result is that although the data presented here cannot and should not be treated as perfectly representative, it nevertheless provides a strong impression of the relative densities of amphora sherd scatters on a tract-by-tract basis.

4.1 The 2014 Survey

Amphora fragments are present in large quantities in the 2014 survey assemblage. Late Roman amphora fragments, though abundant, are not distributed evenly across the 2014 Zone A' survey area. Fragments dating to this period are found in only 13 of 33 survey tracts. These 13 tracts containing Late Roman amphora material are located in three groups (**Error! Reference s ource not found.**): Cluster A (Figure 22), in the immediate vicinity of the Classical Settlement (tracts 101, 107, 114, 115, 211); Cluster B (Figure 23), at the western tip of the headland, an area identified by the survey team as a Late Roman/Early Byzantine POSI (tracts 395, 396, 401, 4011, 403); and Cluster C (Figure 24), at the eastern end of the modern beach adjacent to Cluster B, southwest of the Classical site and east of the Late Roman/Early Byzantine site (tracts 391, 394, 1521).

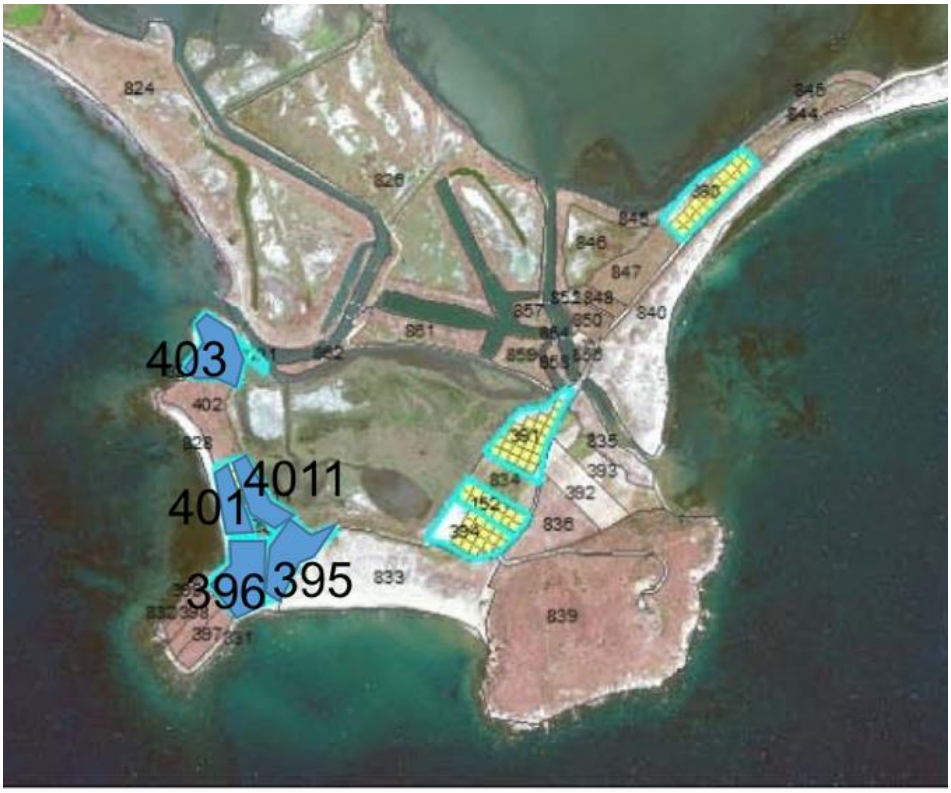
[383] Note that the 2015 survey, with its lower resolution methodology, is considered less reliable in this context.

Figure 22. Cluster A, in and around the Classical settlement. Tartaron 2014, p. 20, fig. 1. Cropped, with tracts containing LR amphoras highlighted and labelled by author.

The paucity of Late Roman amphora fragments collected from Cluster A suggests a relatively low level of amphora-based economic activity in and around the area of the Classical settlement in this period; of the three clusters, Cluster A held the fewest Late Roman amphora sherds. Tracts 107 and 211 each contained only one identifiable Late Roman amphora fragment each (Table 2). Tracts 101 and 114 brought to light 9 and 5 identifiable Late Roman sherds, respectively. From this cluster, only tract 115, with 66 identifiable Late Roman sherds, can boast a density of Late Roman amphora material comparable to the other clusters, indicating that this may have been the centre of what amphora activity did occur in the area. Despite the generally poor Late Roman amphora density here, the full chronological range of amphoras in this study is

present, suggesting the possibility of long-term settlement or economic activity in this cluster.[384] The relative abundance of LR 1, LR 2, and Keay 62 suggest a peak in activity sometime in the late 5th through the first half of the 6th century A.D.[385]

Figure 23. Cluster B, Late Roman/ Early Byzantine POSI. Tartaron 2014, p. 20, fig. 1. Cropped, with tracts containing LR amphoras highlighted and labelled by author.



[384] 'Amphora-related activity' is used here in place of the abstract term 'consumption'. Whether the goods contained in the amphoras were immediately consumed, stored for later use, redistributed, re-used, or even repurposed as a building material is impossible to determine from surface survey.
[385] Note, the Keay 62 fragments are very poorly preserved, and their identification is tentative.

Cluster B, which was recognized early on for its particular density of Late Roman artifacts, boasts by far the greatest concentration of Late Roman amphora sherds yet found at Molyvoti (Table 3). Of the tracts from this cluster, Tract 395 presents the fewest sherds for this study, with only 70 identifiable Late Roman amphora fragments. Tracts 396 and 401 contain 232 and 204 recognizable sherds respectively, while Tract 4011 accounts for 221. Tract 403 brings to light the largest number of Late Roman amphora sherds of anywhere in the Molyvoti survey, with 358 identifiable examples. As at Cluster A, the full chronological range of amphoras is present, but here the relative proportions of each type becomes more significant. The earlier types, Zeest 80, Pinched-Handle type, and Niederbieber 77 are either not present or are present in extremely low numbers. The strictly later North African types, Keay 62, Keay 61, and Keay 55, account for a more substantial proportion. The later Keay 62 A is the most common Keay 62 variant in this cluster, and Bonifay dates this variant to the first half of the 6th century A.D.[386] In contrast, the Keay 61 is given a late 6th to 7th century A.D. date range, but is far less common than the Keay 62 in this cluster.[387] The lone Keay 55A sherd identified in the entire survey assemblage, collected from this cluster, recommends a 6th century A.D. date, probably from the first half of the century.[388] Taken as a whole, the North African imports indicate a late 5th to early 6th century A.D. chronological profile for this cluster. The predominately later character of this artifact spread is further supported by the LR 1s, which are virtually all assignable to Pieri's variant LR 1B/Demesticha's second generation, and are therefore dateable from the end of the 5th and at least through the 6th century A.D.[389] The LR 2s provide an interesting chronological insight as well. LR 2 was produced in the 4th century A.D., but it was not until the 5th and 6th

[386] Bonifay 2004, p. 140.
[387] Keay 1984; Bonifay 2004, p. 141.
[388] Keay 1984, p. 293; Bonifay 2004, p. 137.
[389] Pieri 1998, p. 99; Demesticha 2013, pp. 172-173.

centuries A.D. that it became the dominant amphora type in the Aegean and the Black Sea.[390] Although few bases of this type have so far been found at Molyvoti, those that are present are of the knob-shaped toe variety, dating them to probably before the late 6th century A.D. Furthermore, despite the exceptionally large volume of LR 2 body sherds collected from this cluster, none exhibited the undulating combed decoration associated with later LR 2 and/or LR 13 production.[391] On balance, then, the LR 2 evidence also supports the primarily late 5th to mid 6th century A.D. character suggested for this cluster by the North African imports. Further chronological indicators can be gleaned from the shipwrecks of Yassi Ada and La Palud. The Yassi Ada assemblage is dated to A.D. 625/626.[392] There, the LR 13 vastly outnumbers the LR 2, its earlier relative.[393] The LR 13 is conspicuously absent from Molyvoti, while the LR 2 dominates the assemblage, perhaps indicating that amphora-related activity in the area had significantly declined by the early 7th century A.D. The Molyvoti survey's lone Keay 55 sherd, as well as the later Keay 62 variants collected from Cluster B offer a promising parallel to the La Palud shipwreck, dated to the second quarter of the 6th century A.D.[394] Keay 55 and Keay 62A dominate the La Palud assemblage, and LR 1 and LR 2 are also attested, along with LR 4 and LR 5, which are absent from the Molyvoti assemblage. Perhaps the combination of LR 2, LR 1, later variants of Keay 62, and Keay 55 found together at both La Palud and Cluster B, albeit in largely different proportions, suggests a similar date for the two assemblages. Taking these chronological indicators together, the most plausible date range for this cluster is from the late 5th to early 6th century A.D.

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[390] Demesticha 2005, p. 175.
[391] Karagiorgou 2001a, p. 141; Opaiţ 2004a, p. 11; Demesticha 2005, p. 175. Note that no LR 13 fragments were identified in the Molyvoti survey assemblage.
[392] *Terminus post quem* provided by numismatic evidence, Van Doorninck 2015, p. 205.
[393] Van Alfen 2015, pp. 18-19.
[394] Bonifay 2004, p. 140.

Figure 24. Cluster C, between the Classical settlement and the Late Roman/ Early Byzantine POSI. Tartaron 2014, p. 20, fig. 1. Cropped, with tracts containing LR amphoras highlighted and labelled by author.

Cluster C, meanwhile, maintains a more modest level of artifact density. Although tract 391 includes only 12 identifiable Late Roman amphora fragments, tract 394 at 54 sherds and tract 1521 at 118 suggest a higher level of Late Roman period amphora-related activity in this area than was attested in Cluster A (Table 4). These types follow the same chronological trends as in Cluster B, likely indicating a later 5th through first half of the 6th century A.D. peak for amphora-related activity in this area. That is, LR 1 fragments are uniformly of the late 5th through 6th century A.D. variant, and there are no examples of the late 6th century A.D. LR 2

features. Unlike Cluster B, the North African amphora evidence is less helpful for establishing the chronology, as the Keay 62 handle fragment is ambiguous.

4.2 2014 Survey Analysis

The 2014 survey collected 1661 Late Roman or possible Late Roman amphora fragments. Table 5 presents the 2014 sherd counts per type, as well as their proportion (%) of the amphora assemblage. Due to the poor state of preservation of the surface material collected during the 2014 survey, 468 fragments could not be identified, rendering analysis problematic. Analyses therefore do not include unidentified sherds; this is done to avoid inadvertently including rare, earlier Classical sherds in the data and to avoid including non-amphora plain or coarse pottery. In any event, the unidentified fragments do not appear to represent repeated examples from the same types, rendering it unlikely that any major contributors to the Roman amphora assemblage have been overlooked.

The data presented in Table 6 demonstrate another significant problem with this survey assemblage. The LR 2 amphora dominates the full assemblage (RBH, Body) at 75.50% of the identified amphora sherds.[395] Although LR 2 appears to be the most common amphora type in the 2014 Molyvoti material, its preponderance in this column is likely due to significant over-representation of the distinctive combed body sherds of this type in the assemblage. Despite the fact that the abundance of these body fragments is to a small extent supported by the frequency with which LR 2 rims, bases, and handles appear in the assemblage, this phenomenon is almost certainly the result of a collection and identification bias; LR 2 body fragments account for 88.76% of the total identifiable body sherds collected. The massive skewing effect of this

[395]RBH: rim, base, and handle fragments; RBH, Body: rim, base, handle, and body fragments.

phenomenon on the data is readily apparent in the difference between the RBH Body and RBH counts presented in Table 5. In the latter column, LR 2 is still the most frequent type at 52.05% of the identified assemblage, but no longer seems over-represented, as the other types remain little changed. The same is true, to a lesser extent, for the LR 1 sherds. This observation can be supported through a simple statistical analysis.

The lack of information regarding the original population, that is, the actual amphoras that existed at Molyvoti in antiquity, is a problem faced in every archaeological situation; one is forced to make assumptions regarding the frequency of events. In this case, frequency denotes the presence or absence of Late Roman amphora sherds in the survey universe. It has been remarked that archaeological material often fits the Poisson distribution model, and that tests based on this distribution are generally the best means of "comparing the frequencies of relatively rare items in units of space."[396] This is because the Poisson distribution is a better fit for skewed populations (and therefore for most archaeological material) than the normal distribution; the normal distribution is nevertheless more commonly, and less optimally, used in archaeological publications.[397]

By assuming that the frequency of Late Roman amphora sherds in the survey universe follows a Poisson distribution, it becomes possible to calculate a confidence interval for the sherd counts of each amphora type (as a single observation) conforming to this pattern, using the formula:

$$\frac{x^2(2n)}{2} \leq \mu \leq \frac{x^2(2n+2)}{2}$$

[396] Banning 2000, pp. 125-126. Indeed, there is even promising experimental evidence to support this conclusion on a small scale, where the horizontal distribution of trampled ceramic sherds in a controlled environment were found to closely follow the Poisson model, Nielson 1991, p. 500.
[397] Shennan 1988, p. 320, though for an example where the Poisson distribution has been applied, see Orton 2007, p. 26.

where *n* is the number of events (in this case, sherds of a given type) and x^2 is the Chi-square deviate.[398] A Poisson distribution assumes that: events occur in an interval (e.g. the survey unit, tract, survey universe), the frequency of events is a whole number (e.g. each sherd is considered a whole entity, not as a fraction of a larger whole), events are independent of each other (e.g. the presence of one sherd has no influence on the presence or absence of any other sherd in the same survey unit), events occur at a constant rate (e.g., we know that within the surveyed area, the RBH count for a given type is *n*. If we were hypothetically able to resurvey the same area, the RBH count for that type would still be *n*), events cannot occur simultaneously (e.g. a sherd is either present or is not), and where the probability of an event is proportional to the length of the interval (e.g. a larger area surveyed correlates to an increased likelihood that a given sherd will be present).[399] Table 6 contrasts the confidence intervals for each amphora type, using the RBH sherd counts as our known average frequency for the Poisson Distribution, with the RBH Body sherd counts. It is important to note that a confidence interval of 99% can be interpreted to mean that it can be said with 99% confidence that the true incidence rate lies between the lower and upper limits in Table 6, that is, an as-wide-as-possible range of results are considered to fit within the assumed (i.e. random) distribution.

With the exception of LR 1, LR 2, and Keay 62, all RBH Body counts are within the 99% confidence interval produced for the RBH counts, and therefore can realistically be explained as a random sample from the same population. This indicates that RBH and the RBH Body sherds could be collected at same rate. While this could indicate that body sherds for these types are not present on the surface, it is far more likely that they are simply not being collected or recognized.

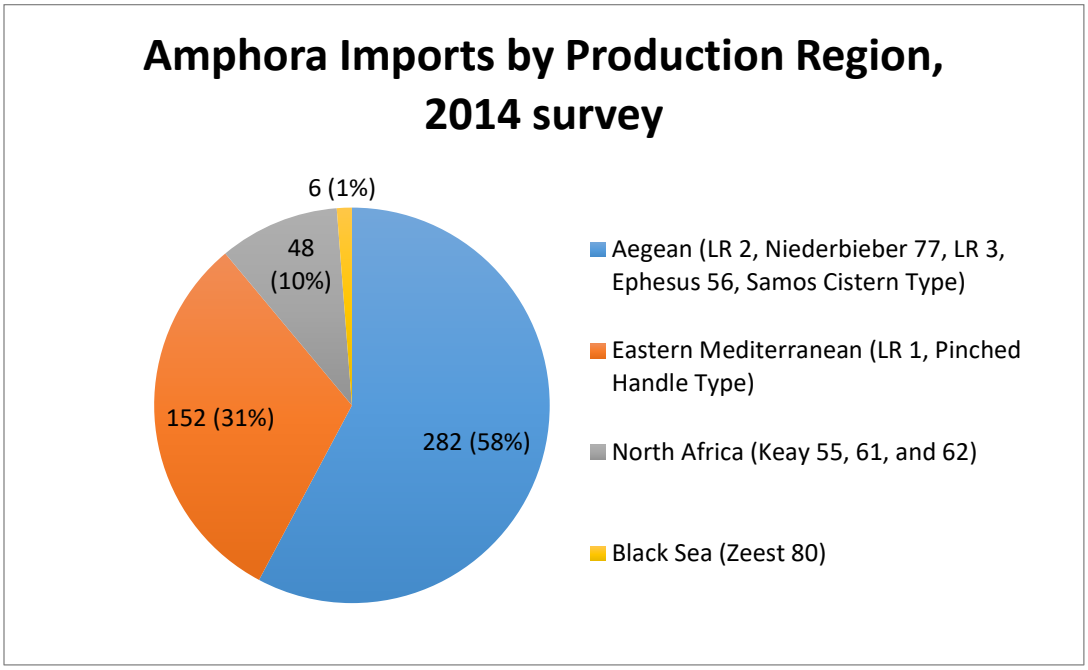
[398] Andersson 2016, pp. 160-161. This has been done in an archaeological context as well, see Ihm et al. 1978, pp. 293-294.
[399] For the properties of a Poisson distribution, see Härdle et al. 2015, pp. 170-172.

The LR 1, LR 2, and Keay 62 RBH Body counts are above the confidence interval, indicating that their distribution does not fit a Poisson distribution. Therefore, RBH and RBH Body sherds for each of these types were not collected at the same rate, even accounting for random variability. The LR 2 RBH Body sherd count, however, offers the most extreme contrast. This result is well outside and above the confidence interval, and it seems very likely that some outside factor is skewing the results. Whether this is due to a collection bias, an identification bias, or some combination thereof, it is clear that the body sherd counts should be removed from consideration in this study. By eliminating the inaccuracies embedded in the data, namely the unidentified sherds and the skewed body fragment count, the RBH count for each amphora type should present the most accurate possible snapshot of the 2014 Molyvoti survey Late Roman amphora assemblage.

Late Roman amphora imports in the 2014 survey assemblage come from four distinct production regions, the Aegean (LR 2, Niederbieber 77, LR 3, Ephesus 56, Samos Cistern Type), the Eastern Mediterranean (LR 1, Pinched Handle Type), North Africa (Keay 55, 61, and 62), and the Black Sea (Zeest 80). Figure 25 indicates that Aegean imports account for 57.79%, Eastern Mediterranean for 31.15%, North African 9.84%, and Black Sea 1.23% of this assemblage (RBH). Although the exact proportions differ for clusters A and B, this general pattern of imports holds true in these areas. This is not, however, the case in Cluster C, which exhibits an unusually high proportion of Eastern Mediterranean LR 1 amphora fragments compared to the otherwise more common Aegean LR 2. North African amphora fragments are generally rare in the 2014 assemblage, and Zeest 80 fragments from the Black Sea area are virtually nonexistent. The Aegean production centres, being nearer to Molyvoti, dominate the assemblage. Eastern Mediterranean types, originating further afield, are the second most

common, while the relatively remote North African production region is poorly represented. In this assemblage, however, there is a distinct paucity of amphora fragments from the Black Sea region relative to its proximity to Molyvoti.

Figure 25. Amphora imports by production region, 2014 assemblage.



4.3 The 2015 Survey

The 2015 survey universe, Zone B', is divided into seven geographical areas. Although Late Roman amphora fragments are not uncommon in the 2015 survey material (Figure 26), nowhere are they found in the dense concentrations noted in Zone A'. Six of the seven geographical areas from the 2015 survey were found to contain Late Roman amphora fragments. Within these six areas, eight tentative POSIs were suggested by the survey crew (Figure 27). Since the 2015 survey was carried out according to a less intensive methodology, and covers a

much larger area than the 2014 survey, the 2015 results are presented at a lower resolution than the previous year's data. That is, the emphasis here is on the level of POSIs and geographical areas, rather than by individual survey tracts.

Figure 26. Survey tracts containing Late Roman material, 2015 survey. Tartaron 2015, p. 23, fig. 3e.

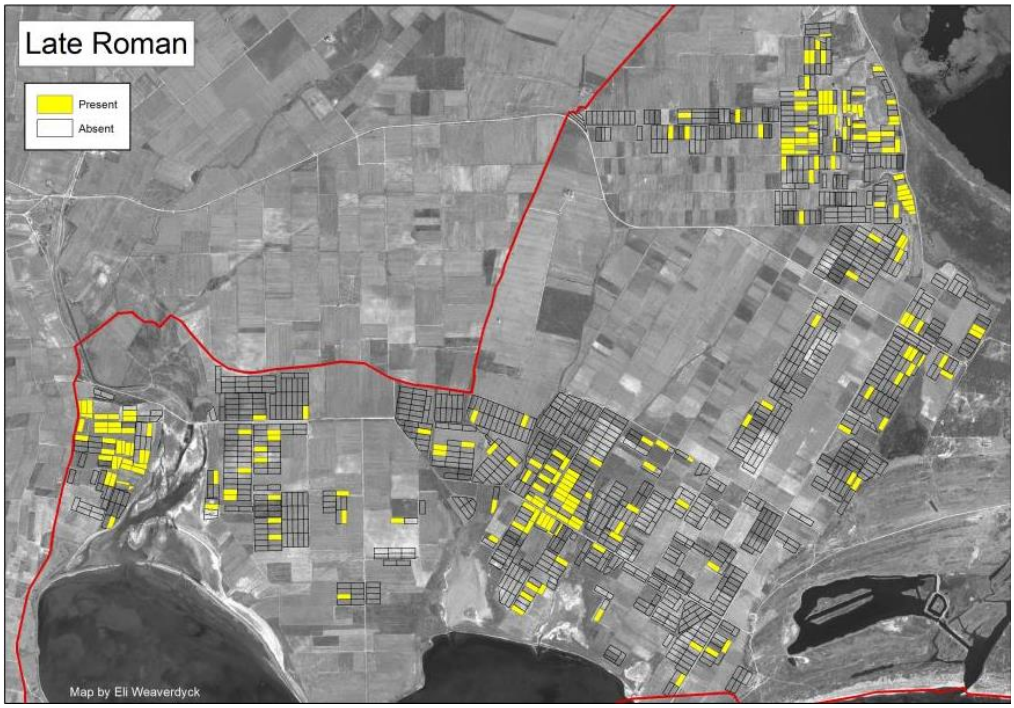


Figure 27. Suggested POSIs, 2015 survey. Tartaron 2015, p. 21, fig. 2.[400]

Due to time constraints, it was not possible to examine all of the 2015 survey material. As a result, this study is limited to those tracts which had been flagged by the survey crew as containing Late Roman material. The possibility of previously overlooked Late Roman amphora sherds having been collected in survey tracts otherwise not identified as Late Roman demands that these data be treated with caution. Nevertheless, owing to the high level of competence of the survey crew, the author is confident that the results presented below comprise, at the very least, a reliable preliminary sample of the Late Roman amphora material collected in the 2015 survey.

[400] Shading refers to density of artifact (not strictly amphora) scatter, ranging from green (less dense) to red (most dense).

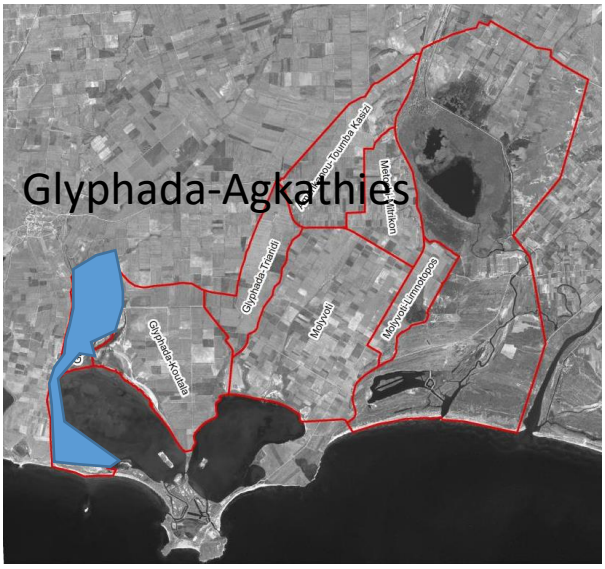
A further difference between the two surveys arises in the counting method. For the 2015 survey, in part because of the general paucity of diagnostic material, I documented a new category of sherds. In this assemblage, the category of UNID sherds has been split into two groups: those sherds whose fabric suggests a North African origin, but which are unidentifiable by shape (listed as North African) are distinguished from those body sherds whose fabric was unidentifiable but whose surface decoration, whether combed or ridged, suggested a Late Roman type (listed as Combed/Ridged). In the 2014 survey, these two groups were counted together (UNID). Ultimately, given the lack of certainty surrounding all these sherds, and in light of the marked skewing of the body sherds in the 2014 survey, both groups are discounted from the final analysis, as was the general unidentified category in 2014. For descriptive purposes in Zone B', however, it seems helpful to include these more probable Late Roman sherds, as it gives a better sense of the potential quantity of Late Roman amphora fragments; as will be seen below, counting only diagnostic sherds produces a strikingly small assemblage.

Glyphada-Agkathies (Figure 28) is the westernmost geographical region of Zone B'. The survey team established that the Late Roman artifact scatter covered most of the Northern section of this region. POSI PU15-002, therefore, contains all of the Late Roman amphora fragments collected there. Indeed, PU15-002 contains one of the highest Late Roman amphora sherd densities in the 2015 survey, but only three positive type identifications were made here: Zeest 80, LR 1, and LR 2 (Table 7). All of the Zeest 80 rims in the Molyvoti survey assemblage belong to the Middle Roman period variant of the type, suggesting primarily a 2nd to 3rd century A.D. timeframe for this type at Molyvoti, perhaps extending into the early 4th century A.D.[401] The LR

[401] Zeest 1960, p. 114; Opaiţ 1987, pp. 247-250.

1 and LR 2 fragments from this POSI fall into the same chronological range as those discussed in the 2014 survey, that is, likely a 5th through first half of the 6th century A.D. date. Taken together, there are as many Zeest 80 (RBH) sherds in this area as there are LR 1 and LR 2 sherds combined. This may represent two spikes in amphora-related activity, one with a Middle Roman, i.e. 2nd to 3rd century A.D. character, and one of Late Roman activity, likely 5th through the first half of the 6th century A.D. In neither period, however, does the collected material indicate particularly intense amphora-related activity, and the paucity of represented types is worthy of note. It is possible that these sherd counts may simply represent a chance aberration from the background levels established in other areas.

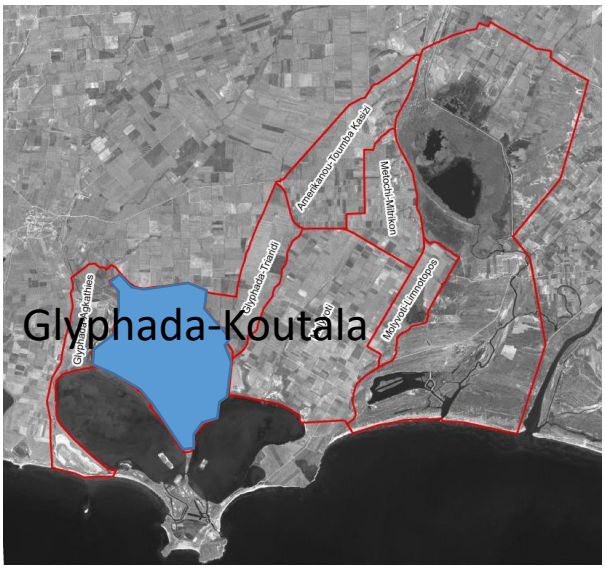
Figure 28. Left: the Glyphada-Agkathies region. Tartaron 2015, p.20, fig. 1. Highlighted by author. Right: POSI PU15-002. Tartaron 2015, p. 21, fig. 2.

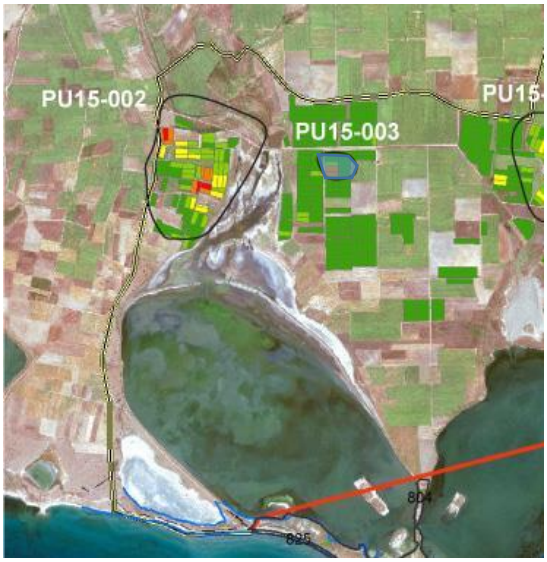


Glyphada-Koutala is a low-lying area to the east of the Glyphada-Agkathies area, on the other side of the wetlands that separate the two (Figure 29). The survey team identified a POSI in

this area, PU15-003, which has a distinctly Classical character. There are, however, a few scattered Late Roman amphora fragments collected here as well. The identified RBH count from this POSI includes only one LR 2 handle fragment, and three Zeest 80 body fragments (Table 8). This is not indicative of significant Late Roman activity in the area.

Figure 29. Left: The Glyphada-Koutala survey area. Tartaron 2015, p. 20, fig. 1. Highlighted by author. Right: PU15-003. Tartaron 2015, p. 21, fig. 2.





Glyphada-Triaridi is a small survey area centered on a low hill, adjacent to the northeast of the Glyphada-Koutala geographical area (Figure 30). The survey team identified a Classical POSI here exhibiting high artifact densities, and although there is some Roman period activity, only a small number of Roman amphora sherds are found here. The identified RBH count reveals only six Zeest 80 fragments (Table 9). The solitary rim fragment, as everywhere else at Molyvoti, is indicative of a 2nd to 3rd century A.D. date (possibly into the early 4th century A.D.), giving a Middle Roman profile to the amphora scatter. There were no definitively Late Roman amphora sherds collected in this region, and in any event, there are very few Roman amphora

sherds present here, which is not indicative of significant amphora-related activity in this time period.

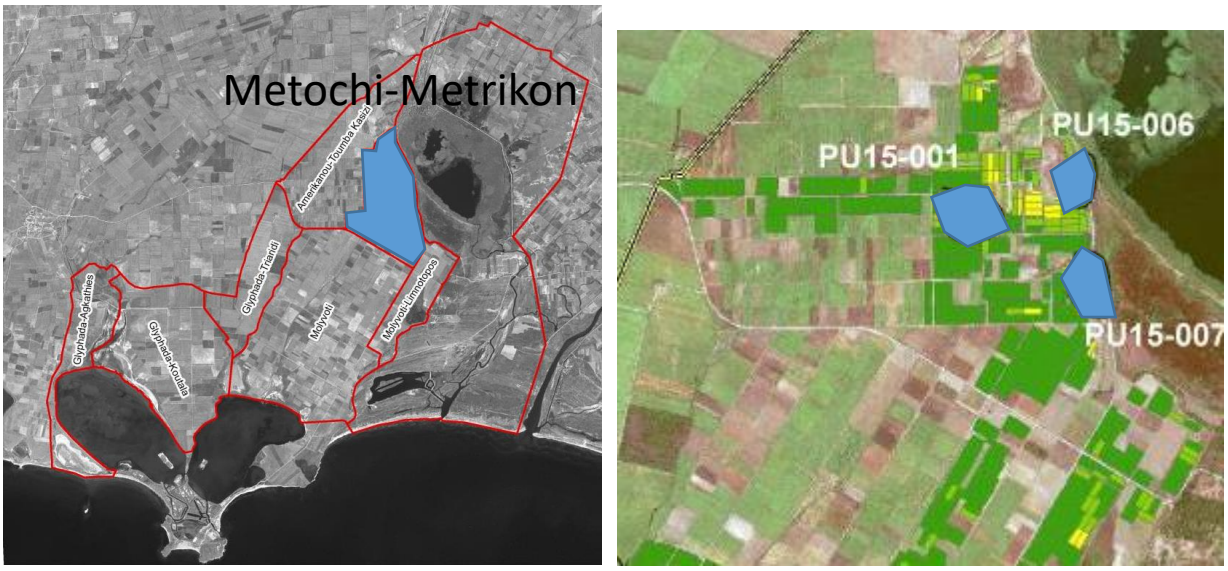
Figure 30. Left: The Glyphada-Triaridi region. Tartaron 2015, p. 20, fig. 1. Highlighted by author. Right: PU15-004, the Classical POSI in the region. Tartaron 2015, p. 21, fig. 2.

Metochi-Metrikon is the northeastern-most geographical area in Zone B', and this area produced among the highest artifact densities from the 2015 survey, with activity registered across all periods from Classical to Late Roman (Figure 31). Three POSIs were identified by the survey team in this area: PU15-001, PU15-006, and PU15-007. Problems arose in the documentation of these POSIs that could not be resolved at the time of writing. Although the survey team reports Late Roman amphoras in PU15-001, this material could not be located for study in 2016.[402] Only two fragments of Zeest 80 handles collected from this POSI were located, and are included in the total sherd count for the Metochi-Metrikon area (Table 10). PU15-007

[402] Note that PU15-001 was surveyed using the more intensive 2014 methodology owing to the high artifact densities found there.

constitutes one of the more significant Late Roman Amphora scatters of the 2015 survey. PU15-006 is problematic, as the survey team's report is unclear as to exactly which tracts belong to this POSI. Here it is assumed that all tracts within the Metochi-Metrikon area not assigned to either of the previous POSIs (PU15-001 and PU15-007) belong to PU15-006.

Figure 31. Left: The Metochi-Metrikon region. Tartaron 2015, p. 20, fig. 1. Highlighted by author. Right: PU15-001, PU15-006, and PU15-007. Tartaron 2015, p. 21, fig. 2.



The identified RBH sherd count from PU15-006 is similar to the background levels. The number of unidentified RBH and body sherds, which should continue to be disregarded due to the inherent inaccuracy of their identifications, is somewhat higher than the baseline levels. While this observation cannot be taken as solid evidence, it does hint at a higher concentration of amphora-related activity in this POSI. The sample size for chronological indicators from this POSI is small; Zeest 80 is the most common individual type, but the combined later types, namely LR 1, LR 2, and Keay 62, account for an equal share of the total. The evidence suggests

similar level of activity in both the 2nd to 3rd centuries A.D. and the 5th to first half of the 6th century A.D.

PU15-007 provides the most identified Late Roman amphora sherds (RBH) from any POSI in the 2015 survey. Again, Zeest 80 dominates the collected material, suggesting a strong Mid-Roman presence. This earlier type roughly splits the assemblage from this POSI with the probably later LR 2 and the definitely later Samos Cistern Type amphoras. When all of these types are examined together, amphora-related activity may have spanned the entire period from the Mid-Roman through the 7th century A.D.

When these two POSIs are taken together, it becomes clear that the Metochi-Metrikon area contained the most significant quantity of Late Roman amphora fragments collected from any of the geographic areas of the 2015 survey. Furthermore, this is as chronologically varied an assemblage as any discussed in this study. The logical implication is that Metochi-Metrikon was a focal point of amphora-related activity in survey Zone B' throughout the Late Roman period. In particular, two peaks appear. The abundance of Zeest 80 fragments, dating from the 2nd to 3rd century A.D., perhaps into the early 4th century A.D., suggests a spike in activity in the Mid-Roman period. Secondly, the number of LR 1 and LR 2 fragments suggest a spike sometime in the 5th and the first half of the 6th century A.D.

The *Molyvoti* geographical area, adjacent to Zone A' to the north and northwest, is the single largest analytical area of the 2015 survey (Figure 32). Although the survey team reports some Late Roman material from both of the POSIs identified in this area, PU15-005 and PU15-008 (both of whose artifact signatures are predominantly Classical), very few amphora sherds

dating to the Late Roman period are found there. This area produced no identified Late Roman amphora RBH (Table 11).

Figure 32. Left: The Molyvoti-Limnotopos region. Tartaron 2015, p. 20, fig. 1. Highlighted by author. Right: PU15-005 and PU15-008. Tartaron 2015, p. 21, fig. 2.

The *Molyvoti-Limnotopos* geographical area is the easternmost portion of Zone B'. Little ceramic material is found in this area, and although the survey team reports some evidence of activity there from the Classical to the Late Roman period, no POSIs were identified and very few Late Roman amphora sherds are present. The only identified Roman Period RBH fragments from this region are two Zeest 80 rims and one Zeest 80 handle (Table 12).

4.4 2015 Survey Analysis

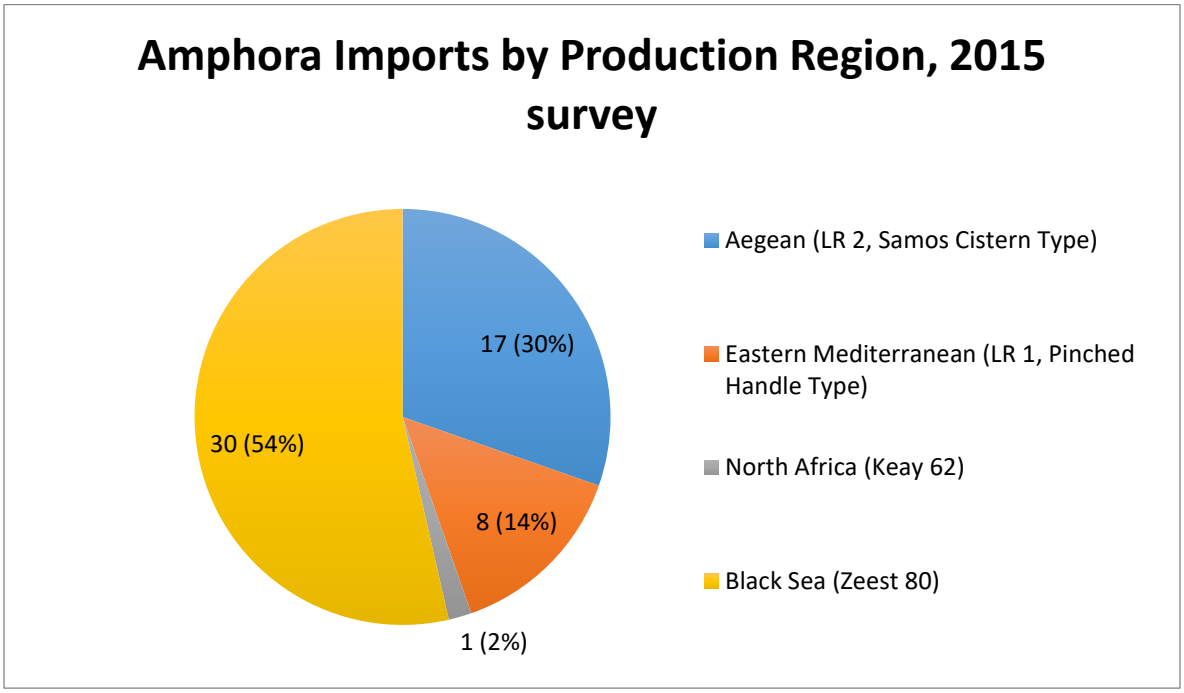
The 2015 survey assemblage is arguably a lower quality dataset than the 2014 assemblage. Overall, the 2015 sample size is smaller than that of the 2014 survey; the 2015 survey collected 260 Late Roman or probable Late Roman amphora sherds (Table 13). Of these, only 56 are identifiable RBH (Table 14). Two of these types, Zeest 80 and Pinched-Handle Type, collectively make up the majority, suggesting generally higher levels of activity before the Late Roman period, probably reaching a peak sometime in the 2nd to 3rd century A.D. This statement should be qualified, however, with two separate observations. On the one hand, the majority of the Roman amphora fragments collected during the 2015 survey are from one single amphora type, the Zeest 80. This type is particularly large and robust, so collection bias may be skewing the results in its favour, especially given the less-intensive collection strategy employed in the 2015 survey. On the other hand, one must also acknowledge the low average Roman amphora sherd density in this survey universe. The Roman amphora data, considered in isolation as they are here, does not suggest high levels of amphora-related activity anywhere in Zone B'. Only in PU15-002 (Glyphada-Agathies) and PU15-007 (Metochi-Metrikon) does this evidence suggest the possibility of Roman period activity slightly beyond the baseline established elsewhere in this survey universe.[403]

Considering the 2015 survey Late Roman amphora assemblage by production region brings to light a significantly different pattern of imports than was observed for the 2014 assemblage. As *Figure 33* indicates, Black Sea imports account for 53.57% of the assemblage,

[403] For a thorough discussion of the problems inherent to the comparison and analysis of this type of low-density ceramic artifact distribution in surface survey, see Given 2004.

Eastern Mediterranean for 14.29% of the RBH assemblage, Aegean for 30.36%, and North African for 1.79%. This general pattern holds true for all the geographic regions surveyed in 2015 with the exception of the Glyphada-Agkathies and Metochi-Metrikon regions. The Glyphada-Agkathies region alone contained a higher proportion of Aegean LR 2 fragments than Zeest 80 fragments, while the Aegean and Black Sea import regions were equally represented in the Metochi-Metrikon regions. Otherwise, Zeest 80 was by far the most common type represented in this year's survey assemblage. Overall, amphora fragments produced in the Black Sea region dominates the 2015 assemblage, while the proportion of Aegean, Eastern Mediterranean, and North African fragments varies in relation to their distance from Molyvoti. There is a stark contrast between the 2014 and 2015 assemblages, however (*Table 16*), suggesting that a simple ratio between proportion of the assemblage and distance travelled is not an adequate explanation.

Figure 33. Amphora imports by production region, 2015 assemblage.



Chapter 4 presents and interprets the amphora data from the two seasons of the MTAP field survey project. In so doing, this chapter allows for basic observations on the distribution of artifact scatters and general chronological trends. Late Roman amphora imports in the 2014 survey assemblage come from four distinct production regions, the Aegean (LR 2, Niederbieber 77, LR 3, Ephesus 56, Samos Cistern Type), the Eastern Mediterranean (LR 1, Pinched-Handle Type), North Africa (Keay 55, 61, and 62), and the Black Sea (Zeest 80). Aegean imports account for 57.79%, Eastern Mediterranean for 31.15%, North African 9.84%, and Black Sea 1.23% of this assemblage (RBH). Cluster B contains the densest collection of Late Roman amphora fragments in the 2014 assemblage, while Cluster C is unique in having a higher proportion of LR 1 to LR 2 fragments, and also has a distinctively low diversity of amphora

types represented. The 2015 survey assemblage represents a different pattern of imports than was observed for the 2014 assemblage. Black Sea imports account for 53.57% of the assemblage (RBH), Aegean for 30.36%, Eastern Mediterranean for 14.29%, and North African for 1.79%. The Glyphada-Agkathies region is unique in the 2015 assemblage for having a higher proportion of LR 2 fragments than Zeest 80, while in Metochi-Metrikon region, these two types are present in equal numbers. Everywhere else in Zone B', the Zeest 80 is the dominant amphora type. In order to fully understand this information, however, chapter 5 places these results within its broader regional context.

4.5 Tables

Table 1. Total sherd counts by cluster, 2014 survey.

	Cluster A		Cluster B		Cluster C	
Type	**RBH Body**	**RBH**	**RBH Body**	**RBH**	**RBH Body**	**RBH**
LR 1	6	5	107	86	105	60
LR 2	67	10	877	213	76	31
Ephesus 56	1	0	18	12	1	0
LR 3	0	0	1	1	0	0
Samos Cistern	2	2	12	11	0	0
Keay 55	0	0	1	1	0	0
Keay 61	1	1	5	4	0	0
Keay 62	3	2	57	39	2	1
Zeest 80	2	2	4	4	0	0
Niederbieber 77	0	0	2	2	0	0
Pinched-Handle Type	0	0	1	1	0	0
UNID	28	18	334	75	106	35
Total	110	40	1419	449	290	127

Table 2. Cluster A by survey tract, 2014 survey.

Tract	Type	Handle	Rim	Toe	Body	Total
Tract 101	LR 1	1	0	0	1	2
	LR 2	0	0	1	5	6
	Ephesus 56	0	0	0	1	1
	UNID	0	0	1	2	3
Total Tract 101						12
Total Identified Tract 101						**9**
Tract 107	Keay 62	1	0	0	0	1
	UNID	1	0	0	0	1
Total Tract 107						2
Total Identified Tract 107						**1**
Tract 114	LR 2	1	0	0	3	4
	Samos Cistern	0	0	1	0	1
	UNID	3	2	2	3	10
Total Tract 114						15
Total Identified Tract 114						**5**
Tract 115	LR 1	3	1	0	0	4
	LR 2	2	2	4	49	57
	Keay 62	0	1	0	1	2
	Samos Cistern	0	0	1	0	1
	Zeest 80	2	0	0	0	2
	UNID	4	2	2	5	13
Total Tract 115						79
Total Identified Tract 115						**66**
Tract 211	Keay 61	0	0	1	0	1
	UNID	0	0	1	0	1
Total Tract 211						2
Total Identified Tract 211						**1**
NB: UNID = Unidentified sherd						

Table 3. Cluster B by survey tract, 2014 survey.

Tract	Type	Handle	Rim	Toe	Body	Total
Tract 395	LR 1	3	2	0	0	5
	LR 2	8	1	0	46	55
	Ephesus 56	0	0	1	0	1
	Samos	0	0	1	1	2

	Cistern					
	Keay 62	2	1	1	2	6
	Zeest 80	1	0	0	0	1
	UNID	6	0	0	11	17
Total Tract 395						87
Total Identified Tract 395						**70**
Tract 396	LR 1	20	2	0	11	33
	LR 2	40	9	1	136	186
	Ephesus 56	2	0	0	4	6
	LR 3	0	0	1	0	1
	Zeest 80	2	0	0	0	2
	Keay 61	0	1	0	0	1
	Keay 62	0	0	1	0	1
	Niederbeiber 77	1	0	0	0	1
	Samos Cistern Type	0	0	1	0	1
	UNID	5	1	1	1	8
Total Tract 396						240
Total Identified Tract 396						**232**
Tract 401	LR 1	6	2	0	3	11
	LR 2	23	12	0	147	182
	Ephesus 56	1	0	0	0	1
	Keay 61	0	0	1	0	1
	Keay 62	4	0	1	3	8
	Neiderbieber 77	1	0	0	0	1
	UNID	4	0	1	60	65
Total Tract 401						269
Total Identified Tract 401						**204**
Tract 4011	LR 1	11	5	0	1	17
	LR 2	21	27	0	139	187
	Ephesus 56	0	0	3	0	3
	Keay 61	0	1	0	1	2
	Keay 62	6	1	0	4	11
	Pinched-Handle type	0	0	1	0	1
	UNID	8	4	2	73	87
Total Tract 4011						308
Total Identified Tract 4011						**221**
Tract 403	LR 1	28	7	0	6	41
	LR 2	48	23	0	196	267
	Ephesus 56	1	0	4	2	7

	Keay 55	0	1	0	0	1
	Keay 61	0	1	0	0	1
	Keay 62	13	5	4	9	31
	Samos Cistern Type	0	0	9	0	9
	Zeest 80	1	0	0	0	1
	UNID	28	2	13	114	157
Total Tract 403						515
Total Identified Tract 403						**358**
NB: UNID = Unidentified sherd						

Table 4. Cluster C by survey tract, 2014 survey.

Tract	Type	Handle	Rim	Toe	Body	Total
Tract 391	LR 1	5	0	0	0	5
	LR 2	1	0	0	5	6
	Keay 62	0	0	0	1	1
	UNID	1	4	0	9	14
Total Tract 391						26
Total Identified Tract 391						**12**
Tract 394	LR 1	17	9	0	13	39
	LR 2	3	2	0	8	13
	Ephesus 56	0	0	0	1	1
	Keay 62	1	0	0	0	1
	UNID	4	0	1	32	37
Total Tract 394						91
Total Identified Tract 394						**54**
Tract 1521	LR 1	27	2	0	32	61
	LR 2	25	0	0	32	57
	UNID	24	1	0	30	55
Total Tract 1521						173
Total Identified Tract 1521						**118**
NB: UNID = Unidentified sherd						

Table 5. RBH Body and RBH frequencies, 2014 survey.

Type	RBH, Body (n)	RBH, Body (%)	RBH (n)	RBH (%)
LR 1	218	16.14%	151	30.94%

LR 2	1020	75.50%	254	52.05%
Ephesus 56	20	1.48%	12	2.46%
LR 3	1	0.07%	1	0.20%
Samos Cistern Type	14	1.04%	13	2.66%
Keay 55	1	0.07%	1	0.20%
Keay 61	6	0.44%	5	1.02%
Keay 62	62	4.59%	42	8.61%
Zeest 80	6	0.44%	6	1.23%
Niederbieber 77	2	0.15%	2	0.41%
Pinched-Handle Type	1	0.07%	1	0.20%
Total	1351	100.00%	488	100.00%
NB: RBH = Rims, Bases, Handles.				

Table 6. Poisson distribution confidence intervals, RBH vs RBH Body, 2014 survey.

Type	RBH	CI 99%	RBH Body
LR 1	151	121.23 to 185.63	218
LR 2	254	214.83 to 298.01	1020
Ephesus 56	12	4.94 to 24.14	20
LR 3	1	0.01 to 7.43	1
Samos Cistern Type	13	5.58 to 25.50	14
Keay 55	1	0.01 to 7.43	1
Keay 61	5	1.08 to 14.15	6
Keay 62	42	27.18 to 61.76	62
Zeest 80	6	1.54 to 15.66	6
Niederbieber 77	2	0.10 to 9.27	2
Pinched-Handle Type	1	0.01 to 7.43	1
NB: RBH = Rims, Bases, Handles.			

Table 7. Glyphada-Agkathies/PU15-002 area, 2015 survey.

Area	Type	Handles	Rims	Bases	Body	Total
Glyphada-Agkathies/PU15-002	LR 1	2	3	0	4	9
	LR 2	2	2	0	18	22
	Zeest 80	8	1	0	4	13
	N. African	0	1	1	19	21
	Combed/Ridged body sherd	0	0	0	35	35
	UNID	0	11	2	0	13
Total						113

Total Identified	**44**
NB: UNID = Unidentified sherd	

Table 8. Glyphada-Koutala area, 2015 survey.

Area	Type	Handles	Rims	Bases	Body	Total
Glyphada-Koutala	LR 2	1	0	0	0	1
	Zeest 80	0	0	0	3	3
	UNID	0	1	0	0	1
Total						5
Total Identified						**4**
NB: UNID = Unidentified sherd						

Table 9. Glyphada-Triaridi area, 2015 survey.

Area	Type	Handles	Rims	Bases	Body	Total
Glyphada-Triaridi	Zeest 80	3	1	0	2	6
	North African	0	0	2	3	5
	Combed/Ridged Body Sherd	0	0	0	10	10
	UNID	0	6	2	0	8
Total						29
Total Identified						**6**
NB: UNID = Unidentified sherd						

Table 10. Metochi-Metrikon area, 2015 survey.

Area	Type	Handles	Rims	Bases	Body	Total
Metochi-Metrikon	LR 1	1	0	0	0	1
	LR 2	1	5	0	5	11
	Zeest 80	11	2	1	3	17
	Keay 62	0	1	0	0	1
	Samos Cistern Type	4	0	2	0	6
	Pinched-Handle Type	0	0	1	0	0
	North African	3	0	0	12	15

	Combed/Ridged Body Sherds	0	0	0	25	25
	UNID	1	0	2	1	4
Total						80
Total Identified						**36**
PU15-006	LR 1	1	0	0	0	1
	LR 2	1	0	0	1	2
	Zeest 80	2	0	0	2	4
	Keay 62	0	1	0	0	1
	North African	0	0	0	4	4
	Combed/Ridged Body Sherds	0	0	0	8	8
	UNID	1	0	0	0	1
Total						21
Total Identified						**8**
PU15-007	LR 2	0	5	0	4	9
	Zeest 80	7	2	1	0	10
	Samos Cistern Type	4	0	2	0	6
	Pinched Handle Type	0	0	1	0	1
	North African	3	0	2	8	13
	Combed/Ridged Body Sherds	0	0	0	17	17
	UNID	0	0	0	1	1
Total						57
Total Identified						**26**
NB: UNID = Unidentified sherd						

Table 11. Molyvoti area, 2015 survey.

Area	Type	Handles	Rims	Bases	Body	Total
Molyvoti	LR 1	0	0	0	1	1
	LR 2	0	0	0	1	1
	North African	0	0	0	2	2
	Combed/Ridged Body Sherds	0	0	0	12	12
	UNID	2	3	1	0	6
Total						22
Total Identified						**2**
NB: UNID = Unidentified sherd						

Table 12. Molyvoti-Limnotopos area, 2015 survey.

Area	Type	Handles	Rims	Bases	Body	Total
Molyvoti-Limnotopos	LR 1	0	0	0	1	1
	LR 2	0	0	0	2	2
	Zeest 80	1	2	0	0	3
	North African	0	0	0	3	3
	Combed/Ridged Body Sherds	0	0	0	1	1
Total						10
Total Identified						**6**

Table 13: RBH Body and RBH frequencies, including unidentified sherds, 2015 survey.

Type	RBH Body (n)	RBH Body (%)	RBH (n)	RBH (%)
LR 1	12	4.62%	7	7.45%
LR 2	37	14.23%	11	11.70%
Zeest 80	42	16.15%	30	31.91%
Keay 62	1	0.38%	1	1.06%
Samos Cistern Type	6	2.31%	6	6.38%
Pinched-Handle Type	1	0.38%	1	1.06%
Combed/Ridged	83	31.92%	0	0.00%
North African	46	17.69%	7	7.45%
UNID	32	12.31%	31	32.98%
Total	260	100.00%	94	100.00%
NB: RBH = Rims, Bases, Handles. UNID: Unidentified sherd.				

Table 14. RBH Body and RBH frequencies, excluding unidentified sherds, 2015 survey.

Type	RBH Body (n)	RBH Body (%)	RBH (n)	RBH (%)
LR 1	12	12.12%	7	12.50%
LR 2	37	37.37%	11	19.64%
Zeest 80	42	42.42%	30	53.57%
Keay 62	1	1.01%	1	1.79%
Samos Cistern	6	6.06%	6	10.71%

Type				
Pinched-Handle Type	1	1.01%	1	1.79%
Total	99	100.00%	56	100.00%
NB: RBH = Rims, Bases, Handles.				

Table 15. Poisson distribution confidence intervals, 2015 survey.

Type	RBH	Poisson CI 99%	RBH Body
LR 1	7	2.04 to 17.13	12
LR 2	11	4.32 to 22.78	37
Zeest 80	30	17.76 to 47.21	42
Keay 62	1	0.01 to 7.43	1
Samos Cistern Type	6	1.54 to 15.66	6
Pinched-Handle Type	1	0.01 to 7.43	1
NB: RBH = Rims, Bases, Handles.			

Table 16. Amphora imports by region, 2014 and 2015 survey material.

Region	RBH, 2014 survey		RBH, 2015 survey	
	n	**%**	**n**	**%**
Aegean	282	57.79%	17	30.36%
Eastern Mediterranean	152	31.15%	8	14.29%
North Africa	48	9.84%	1	1.79%
Black Sea	6	1.23%	30	53.57%
Total	488	100.00%	56	100.00%
NB: RBH = Rims, Bases, Handles.				

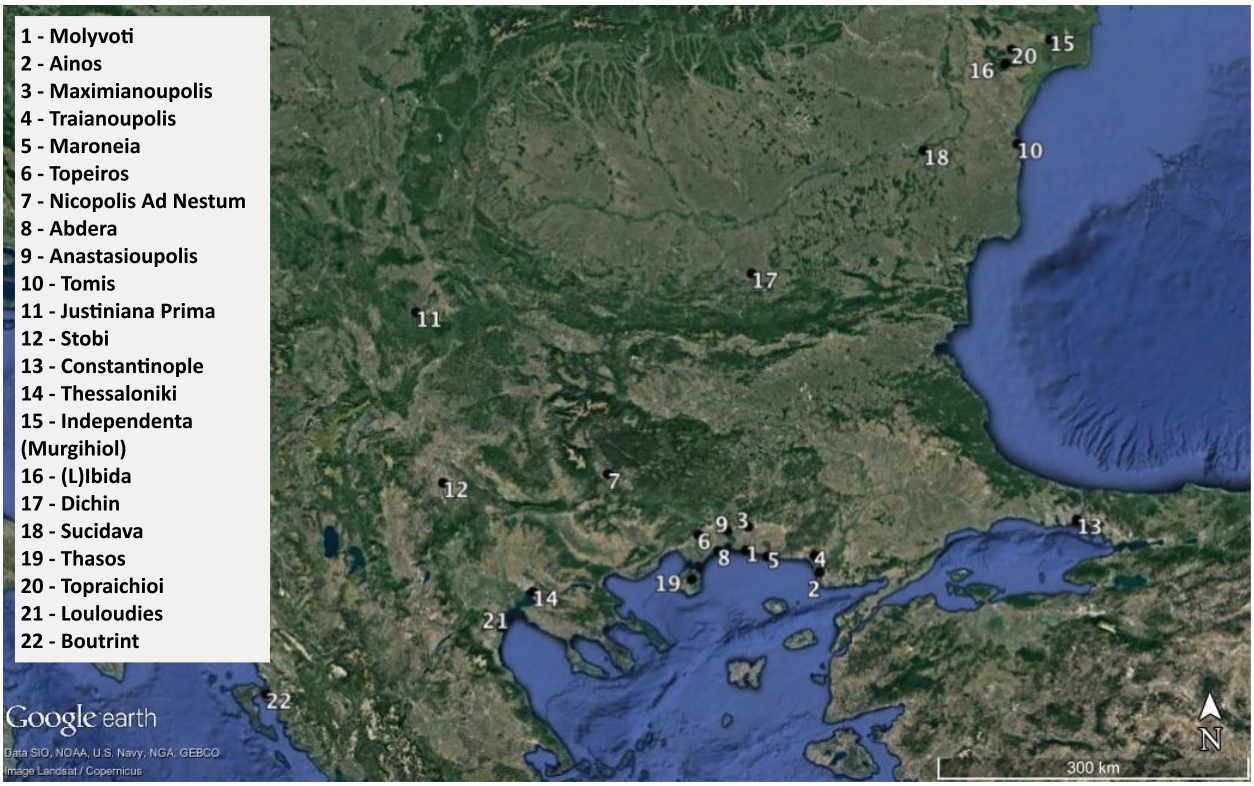
Chapter 5: Discussion

In order to derive any meaning from the amphora data presented in the previous chapter beyond sherd counts and chronological trends, it is necessary to understand the political and geographical setting in which this material originally existed. Section 5.1 begins by outlining what is currently known about the cities and settlements of Rhodope, so as to provide the immediate context for settlement patterns and types of activity in the neighbourhood around Molyvoti. This section proceeds to describe the different types of sites found throughout the rest of Thrace from the Late Roman period, and, where possible, the types of amphoras to be found there. This process facilitates comparison with the evidence presented in this thesis, thereby enabling the contextualization of this data within the broader historical trends of the entire region, which takes place in section 5.2. Section 5.3 summarizes the conclusions drawn, emphasizing particular areas of interest. Foremost among these are two regions from the 2014 survey assemblage, namely Cluster B, the most intense zone of activity identified at Molyvoti, and Cluster C, tentatively identified as the site of a *horreum* or similar zone of specialized activity.

5.1 The Political and Economic Geography of Thrace

A great deal is unknown about the cities, towns, and settlements of Rhodope in the Late Roman period. Still less is known about these settlements from the perspective of amphora research. As such, this section examines what can be learned from the situation in Rhodope, then this is compared against settlement and amphora consumption patterns from the rest of Thrace (Figure 34).

Figure 34. Map of ancient settlements in the Balkans relevant to the Molyvoti amphora assemblage.



Hierocles, writing in the 6th century A.D., lists seven cities in Rhodope: Ainos, Maximianoupolis, Traianoupolis, Maroneia, Topeiros ad Nestum, Nicopolis ad Nestum, and Kereopyrgos.[404] Cities attested in other sources include Abdera,[405] Anastasioupolis,[406] and Ulucitra.[407] Procopius, also writing in the 6th century A.D., tells of a mountain village, Bellouros, that was large and prosperous, and which Justinian fortified, making it a town in order to protect it from barbarian incursions; he also lists 12 forts in the province.[408] Of all these settlements,

[404] Hier. *Synecd*. 634.4-635.1-2; Velkov 1977, pp. 125-126.
[405] Amm. 22.8.3; Velkov 1977, p. 126.
[406] Procop. *Aed*. 4.11; Velkov 1977, p. 126-127.
[407] *Not. Dign. Or*. 40.46; Velkov 1977, p. 127.
[408] Procop. *Aed*. 4.11; Velkov 1977, p. 127.

only Ainos, Maximianoupolis, Traianoupolis, Maroneia, Topeiros, Nicopolis ad Nestum, Abdera, and Anastasioupolis have been identified.

These settlements can be categorized according to their geographic situation. Maximianoupolis, Traianoupolis, Anastasioupolis, and Topeiros, for instance, are all sizeable fortified cities located on the Via Egnatia. Maximianoupolis is a Late Roman city near the Molyvoti peninsula, located some 25 km inland over easy terrain, and was an episcopal see.[409] Traianoupolis, located off the Evros river approximately 62 km southeast of Molyvoti, was the seat of the Metropolitan Bishop of Rhodope.[410] Anastasioupolis, (medieval Peritheorion) was a mojor port located roughly halfway between the modern cities of Xanthi and Kommotini, to the North of lake Bistonis, only 23 km northwest of Molyvoti.[411] Topeiros is located 14 km west of modern Xanthi, and roughly 45 km west of Molyvoti. Procopius mentions that this city was located at the mouth of the Nestos river.[412] Perhaps this was the case in antiquity, but it is more likely that Procopius is simply mistaken in this respect, as the site is currently approximately 15 km inland from the coast. Nevertheless, Topeiros occupies a position at the intersection of the Via Egnatia and the Nestos river, so it likely benefitted from increased access to the broader exchange networks of Thrace and the North Aegean.[413]

[409] Zikos 2008; Kortzi and Siametis 2012. No amphora data is available for this site.
[410] Petrova 2012, p. 339; Dumanov (2015, p. 93) suggests in fact that it was a second metropolitan see in the eparchy of Europe. Despite the size, location, and importance of this city, no amphora data is available for this site, Tsouris 2011.
[411] Procop. *Aed*. 4.11; Lolos 2009, p. 279, n. 37; Velkov 1977, pp. 126-127. No ceramic evidence from this is available.
[412] Procopius also describes this city's fortifications in some detail, Procop. *Aed*. 4.11; *de bello Gothico*, 3.38.9-19.
[413] Lolos 2009, p. 279; Adams 1986; Campbell 2012, p. 269. In terms of ceramic material from the site, only the results from the excavation of a middle Byzantine period basilica have been published, Zikos 1984.

Ainos and Topeiros were ports with river access heading inland; Traianoupolis was situated near where the Via Egnatia crosses the Evros river, inland from Ainos. Each of these occupied an intersection of transport routes. Nicopolis ad Nestum is an inland site located on the Nestos river, upstream from Topeiros, nearly 145 km northwest of Molyvoti.[414] It would be interesting to compare the amphora assemblage at Nicopolis ad Nestum with material excavated at Topeiros, further downstream. Perhaps it would be possible to demonstrate riverine trade between these two sites, as this appears to be the logical supply route for the garrison at Nicopolis, following Campbell's arguments for the viability of non-navigable or seasonal river trade in antiquity.[415]

Abdera and Maroneia, though ports, do not appear to have enjoyed comparable access to the interior. Abdera is located roughly 28 km south of modern Xanthi on the Aegean coast, approximately 26 km west of Molyvoti. Although Abdera was an active port for the region throughout the Greek period, Lolos argues that, with the foundation of Topeiros and the rise of the Via Egnatia under the Romans, the site underwent a gradual decline.[416] Velkov notes, however, that Abdera is mentioned in Ammianus Marcellinus, and therefore was likely a settlement of at least minor importance into the mid to late 4th century.[417] This conclusion is supported by the ceramic evidence published by Malamidou, excavated from a Roman house destroyed sometime after A.D. 337-361.[418] Although Malamidou does not discuss the amphoras from Abdera, she does include amphora sherds in her catalogue for purposes of quantification, that is, she considers all amphoras as one category without differentiating them by type. One LR

[414] Petrova 2012, p. 289. Despite having been systematically excavated since 1980 and relatively well-published, all available ceramics data is concerned only with table wares, both imported and of local production, Petrova 2012, pp. 332-334; Kuzmanov 1993.
[415] Campbell 2012, p. 201.
[416] Lolos 2009, p. 286.
[417] Amm. Marc. 22.8.3; Velkov 1977, p. 126.
[418] Malamidou 2005, p. 23.

2 rim fragment appears to be the only instance of overlap between the Abdera and Molyvoti amphora assemblages.[419] This discrepancy between the assemblages at Abdera and Molyvoti could be partially explained by reduced chronological overlap, since Malamidou's context is from relatively early in the Late Roman period, while the Molyvoti material, on the whole, suggests a later date range. If so, then the lack of Zeest 80 fragments at Abdera, which are relatively abundant at Molyvoti, is somewhat curious.

Maroneia, located on the Aegean coast roughly 20 km to the east of Molyvoti, is considered to have been the third largest city of Rhodope, and is perhaps the most well-published archaeological site in the region.[420] Doukatsa-Demertzi, studying the non-amphora finds from the early Christian basilica observes more imported goods from North Africa and the Eastern Mediterranean than from mainland Greece.[421] Kokkotaki and Tsoka, who studied the ceramics excavated in the Roman agora, report that in the Late Roman levels, LR 1 amphoras were very common, with a large number of LR 2 fragments also having been uncovered. The next most common type, represented by only 11 sherds, is the LR 4, although it appears that LR 3s are also present.[422] It is interesting to note that the provenance of the amphora assemblage, being Aegean and Eastern Mediterranean in nature, does not more closely parallel the import patterns identified by Doukatsa-Demertzi. In light of her findings, the absence of any North African amphora types, well-represented as they are at the nearby Molyvoti peninsula, is somewhat surprising. As discussed below, Opaiţ considers North African amphoras to represent luxury imports, so one possibility that could be considered is that Molyvoti may have been a more prosperous settlement than Maroneia. This seems unlikely, however, given Maroneia's recognized size and

[419] Malamidou 2005, no. 1689, fig. 108, p. 222.
[420] Velkov 1977, p. 125.
[421] Doukata-Demertzi 2008, p. 88.
[422] Kokkotaki and Tsoka 2010, pp. 369-370.

importance. Perhaps this discrepancy in the amphora assemblages from these two sites can be ascribed to some as-yet unknown difference in market access. Alternatively, it is possible that Molyvoti may have been some sort of more specialized settlement.

The question here becomes which, if any, of these sites offer the closest parallel to Molyvoti. In terms of access to trade routes, ultimately, this matter depends on whether or not Molyvoti had access to a river in antiquity. The modern wetland adjacent to the peninsula is certainly watered by a small river, so such a connection in antiquity seems at least plausible. If so, then Ainos and Topeiros may provide promising comparanda for future consideration. Ainos is located 71 km east of Molyvoti, and in antiquity was located at the mouth of the Evros river on the east bank.[423] Ainos was a major port city, and was the capital of the province of Rhodope. Given its position a the confluence of overland, maritime, and riverine trade routes, it would have served as a transport hub for goods moving into and out of the Evros river basin, and likely also for the city of Traianoupolis, located only 16 km inland to the north.[424] Although the site has been excavated continuously since 1970, and in spite of an abundance of material, it appears that no Late Roman amphora studies have yet been published. Ainos is known, however, to have been an amphora producer in pre-Roman times, and it is feasible that such activity may have continued into Late Antiquity.[425] If Molyvoti did indeed act as a river port, it was likely closely tied to the nearby site of Maximianoupolis.[426] Maximianoupolis' amphora assemblage may bear

[423] Başaran n.d.; Velkov 1977, p. 125; Gregory 1991; for ancient testimony of the administrative significance of the site, see *Agath.* 5.22..
[424] Başaran n.d.; Avramea 2002; Karadima 2004; Lolos 2009.
[425] Karadima 2004.There is, however, a recent publication of the Roman table wares from Ainos that provides a different strand of evidence for the economic activity there, Lätzer-Lasar 2016.
[426] See below, pp. 136-137.

a strong resemblance to that of Ainos, which fulfills a similar function and is relatively nearby.[427] Given the paucity of amphora data from this site, however, and indeed all Late Roman sites in Rhodope, it is clear that for the purposes of the present study comparanda for the Molyvoti survey assemblage must be found elsewhere. Therefore it is necessary to examine amphora consumption patterns in various types of sites found in the rest of Thrace and beyond.

The following is a review of the available amphora data from selected archaeological sites in Thrace, Macedonia, and the Northern Aegean. These sites were chosen to represent a variety of site functions and degrees of market access. This survey covers urban contexts and military installations, as well as *horrea* and other small rural contexts.

Tomis was the capital of the province of Scythia Minor and was located on the west coast of the Black Sea. Here, Opaiţ notes a wide variety of ceramic finds and a particular abundance of North African imports. He suggests this abundance may be due to higher levels of merchant activity here as opposed to elsewhere in the province, and possibly also due to a concentration of episcopal power and state subsidies in the capital, given the site's abundance of churches.[428]

Justiniana Prima, the lone administrative centre in Central Illyricum, is quite far inland and much further West, and therefore likely enjoyed substantially different market access than did Tomis. This site offers an interesting contrast with Tomis. North African LR 8/ Spatheia amphoras make up nearly half the total amphora count, with LR 2 being the second most common at around 20% of the assemblage; LR 1 and a few local products account for 1-2% of the assemblage each.[429] This pattern strongly mirrors that of Butrint, which has been shown to be

[427] Indeed, it is plausible that the amphora assemblage at Ainos could bear some resemblance to that found at Tomis, given their similar socio-political status and strategic positions. Opaiţ 2004a, p. 107; Campbell 2012, p. 269.
[428] Opaiţ 2004a, p. 107.
[429] Bikic and Ivanisevic 2012, p. 44.

supplied by both the Tunisian and the Aegean markets.[430] A synthesis of amphora material from other sites in central Illyricum (mostly forts) presents a different pattern. Overall, there are fewer distinct amphora types represented there than at Molyvoti. While LR 2 and LR 1 remain common, Spatheia are the only North African amphoras represented. Various Syrio-Palestinian amphoras are also attested there which do not appear at Molyvoti.[431]

Stobi, an urban centre in northern Macedonia, offers a different perspective again, as very few Late Roman amphoras were collected there.[432] This site is inland, but situated on a major waterway connecting it with the Thermaic Gulf. LR 1, 2, 3, 4, and Spatheia are the only types attested there, and although no quantitative Late Roman amphora data are available, LR 1, 2, and 4 are noted as common, while LR 3 is considered rare. The frequency of Spatheia is not listed, though there are five examples included in the catalogue.[433]

The largest urban centre in the North Aegean/ Black Sea area was, by a wide margin, Constantinople. It is clear from the excavations at Saraçhane (in Istanbul), however, that the amphora assemblage of the capital bears little resemblance to the less cosmopolitan contexts of Thrace; there is a great variety of amphoras represented there, but LR 2 are not especially common, and are absent in contexts from before the early 6th century A.D.[434] LR 1, meanwhile, is the most common individual amphora type in 6th to 7th century A.D. deposits.[435]

Travelling west from Constantinople, Thessalonike was the next metropolis along the Via Egnatia. This major urban centre, located on the Thermaic Gulf, was the capital of the

[430] Reynolds 2010b, p. 100.
[431] Bikic and Ivanisevic 2012, p. 42.
[432] Anderson-Stojanovic 1992, p. 160.
[433] Anderson-Stojanovic 1992, pp. 96-97.
[434] Hayes 1992, pp. 66, 189, fig. 27; Karagiorgou 2001a, p. 132; Van Doorninck 2015, p. 208.
[435] Hayes 1992, p. 64.

praefecture of Illyricum. The common amphora types found there are LR 1, LR 2, LR 3, LR 4, and Spatheia, while Africana II and Pontic Sinopean amphoras are uncommon.[436]

Independenta (Murighiol) was a fortified frontier city located on the Danube. LR 1 and LR 2 amphoras dominate the assemblage there.[437] At Noviodunum, a fortified river port on the Danube, LR 2, Zeest 90, and Niederbieber 77 are the most common amphora types.[438]

(L)Ibida is a city in central Dobroudja situated at the intersection of several land routes and with river access. The most common Mediterranean amphora types at this site are LR 2 and LR 1, while LR 3 and the Samos Cistern Type are less common.[439] West Pontic types, such as Kuzmanov XV, Kuzmanov VI, and Opaiţ B V are also present in some quantity.[440]

Dichin is a 5th to 6th century A.D. fort in central northern Bulgaria, located on a tributary to the Danube and without known road access. LR 2 constitutes nearly half of the amphora assemblage from the late 5th century A.D. destruction deposits from this site, with LR 1 being the next most common type. LR 3, Samos Cistern Type, and Zeest 80 (later variant), as well as various North African types including Keay 62 Q, 64, 61/62, 25, 55/59, are present in much smaller quantities.[441] Strikingly, most of the amphora types accounted for in the late 6th century A.D. destruction deposits at Dichin do not appear in the Molyvoti assemblage, whereas almost all of those present in the late 5th century A.D. deposits appear at Molyvoti.[442] Furthermore, the general proportions of the late 5th century assemblage A.D., with LR2 and LR 1 dominating, and

[436] Papanikola-Bakirtzis 2010, pp. 268-274.
[437] Opaiţ 2004a, p. 107.
[438] Lockyear et al. 2005, p. 132.
[439] Paraschiv 2010, p. 1001.
[440] Paraschiv 2014. For other, rarer types attested at this site, see Opaiţ and Paraschiv 2012.
[441] Swan 2004, 375; Swan 2010, p. 836.
[442] Swan 2010, pp. 836-837.

smaller quantities of these other types, offers one of the best parallels for the 2014 Molyvoti assemblage.

Sucidava is another Roman fortress (located on the Danube) where a wide variety of amphora types have been identified. These include Niederbieber 77, Keay 55, LR 4, LR 5/6, LR 3, LR 2, Zeest 90, LR 13, LR 1, Zeest 80, among others.[443] Unfortunately, it seems no quantified data is currently available for this site.

The island of Thasos, just off the Aegean coast of Thrace, offers the best Late Roman amphora data from the vicinity of the Molyvoti peninsula.[444] In the aggregate assemblage from the excavation of a basilica and a villa, LR 1 accounts for 56% of the amphora assemblage, LR 2 27%, LR 3 10%, and Palestinian imports 7%.[445] Samothrace, another nearby island, does not seem to have produced any comparable Late Roman amphora data.

At Topraichioi, a Late Roman fortified *horreum* that grew into a settlement, LR 1 and LR 2, along with some Pontic types (Opaiţ B-I, Opaiţ E-I, E-II, and E-III), are the most common amphora fragments.[446] This site is located near the Black Sea coast, and seems to have been built at an important crossroad.[447]

At Louloudies, in the region of Macedonia, near modern Kitros, large quantities of LR 2 fragments were found in a 6th century A.D. *horreum* associated with a basilica, inside a small *quadriburgium*.[448] Field survey in the area surrounding Louloudies demonstrated that LR 2 is the

[443] Scorpan 1975, pp. 296-302, pl. 1-6.
[444] It is unclear to which province it did belong, as there is evidence for Macedonia I (Hierokl. 640.9) and for Thracia (*De them*. 1.57), but there does not appear to be any suggestion of Rhodope.
[445] Abadie-Reynal and Sodini 1992, pp. 53-62; Karagiorgou 2001a, p. 142, n. 68.
[446] Opaiţ et al. 1991, p. 240, table 1; Opaiţ 2004, pp. 109-110.
[447] Karagiorgou 2001a, p. 137.
[448] Karagiorgou 2001, p. 143; Rizos 2013, p. 686.

dominant amphora type, with LR 1 being the second most common, with scattered examples of LR 3 and LR 4.[449]

Other small fortifications and countryside settlements generally produce few amphora sherds, but LR 2 and certain Pontic types are sometimes present, while occasional North African imports are also found.[450] Opaiţ, when discussing the archaeology of the countryside in Scythia Minor, describes few villas, with sparsely settled villages instead being characteristic. There is even less evidence for rural habitation after the mid 5th century A.D. From such areas, he notes low amphora densities, but a variety of amphora types represented, which he considers evidence for limited exchange between the villages and the cities.[451]

There have been two regional studies of amphora consumption patterns in Thrace. Opaiţ, examining ceramic assemblages from various sites in Scythia Minor, contends that North African amphoras represent luxury imports, owing to their overall infrequency compared to the more common types in the region, representing commercial activity.[452] In contrast, LR 1, LR 2, and Pontic amphoras represent subsistence goods, and therefore primarily redistributive economic activity.[453] Therefore, he suggests, the wealthy provincial capital of Tomis boasts a major proportion of North African imports, while the fortified sites of the *limes* and the central garrison towns bring to light mostly the more mundane LR 1 and LR 2 amphoras. There are two potential problems with this argument, however. In the first case, many of the North African amphoras at Tomis were found in funerary contexts, therefore other cultural factors may be

[449] Poulter et al. 1998, p. 506.
[450] Opaiţ 2004, pp. 109-110.
[451] Opaiţ 2004a, pp. 110-111.
[452] Opaiţ 2004a, p. 104.
[453] For Opaiţ (2004, pp. 105-106), the distinction between luxury and subsistence imports is based on their relative abundance, that common goods must be cheap and plentiful, therefore subsistence-based. While this suggestion is plausible, more evidence is required before this position should be fully accepted.

complicating the situation.[454] Furthermore, the abundance of North African imports is arguably more relative than absolute; a later quantification of all Western Mediterranean imported amphoras, including North African, uncovered at Tomis adds up to only 41 examples, albeit including a much wider variety of types than are found at Molyvoti.[455] The amphora consumption pattern in Scythia Minor could also be described in terms of market access and transport distance. That is, proportionally there are not a great deal of North African amphoras in Scythia Minor because transport costs to this region are too high, with the result that less material is circulated in the market. In turn, Tomis, which enjoys better market access, owing to its favourable location, attracts a larger percentage of the North African material that reaches Scythia. For instance, at Justiniana Prima, which is much further west than Scythia Minor, North African Spatheia amphoras dominate the assemblage.[456] By Opaiţ's argument, are we to suppose that this site was extravagently more wealthy than Stobi and Butrint, other major urban settlements in the western Balkans where various North African amphoras are not especially common? It seems a far more plausible explanation that Stobi and Butrint simply enjoyed access to different amphora trade routes, likely through the Adriatic.[457] While this explanation does not account for the number of North African amphoras at Tomis, especially in the early years of the Vandal occupation of North Africa before exports to the east began to pick up again, it does argue against the explicit association of North African goods with luxury imports.[458] Rather, Tomis, as a large market, simply attracts a larger share of these goods than other sites in Scythia through basic market forces.

[454] Opaiţ 1997, pp. 47-50.
[455] Paraschiv and Bajenaru 2008, p. 147, table 1.
[456] See above, pp. 127-128.
[457] For Stobi, see above, p. 128. For Butrint, see Reynolds 2005b, p. 229.
[458] Reynolds 2010a, p. 147.

Karagiorgou produced the other major synthesis of amphora consumption data in Thrace. Karagiorgou's survey is extensive, covering numerous sites in Northern Thrace and in the Aegean.[459] Karagiorgou observes a strong correlation between the nature of Late Roman amphora assemblages and the military character of a given archaeological site in the Balkans, otherwise identified as forts, legionary stations, etc.[460] She notes that in military contexts, LR 2s and LR 1s dominate the amphora assemblage, and that overall there tends to be fewer different amphora types represented. The implication seems to be that in primarily civilian contexts there is a wider variety of amphora types represented, and the assemblages are less likely to be dominated by these specific types, and Karagiorgou herself calls for more research into civilian amphora assemblages.[461] Regardless, her conclusion that LR 1 and LR 2 amphoras are related to the *annona militaris,* that is, the Late Roman military supply network, seems plausible. It may therefore be possible to infer the military or civilian character of an archaeological site based on the nature of its amphora assemblage. Karagiorgou's argument has recently been applied to the Yassi Ada shipwreck assemblage, concluding that the ship was likely carrying military supplies to Roman forces operating in Armenia.[462]

The patterns observed by both Karagiorgou and Opaiţ acknowledge that LR 1 and LR 2 are the most common amphora types throughout the Balkans in this period, so one would expect these types to be present at Molyvoti. The proportions in which they appear, however, in conjunction with the other represented types, may provide some insight into the socio-economic function of the POSIs of the Molyvoti peninsula and its environs. Following Karagiorgiou, POSIs with a strong Late Roman signature featuring disproportionately high concentrations of

[459] Karagiorgou 2001a, Karagiorgou 2001b, pp. 188-203.
[460] Karagiorgou 2001a, pp. 149-153.
[461] Karagiorgou 2001a, p. 149, 155.
[462] Van Doorninck 2015, pp. 208-209, 212.

LR 1 and LR 2 amphoras may indicate activity otherwise associated with the *annona militaris*, therefore military supply. Similarly, a substantial proportion of North African amphoras could indicate thriving commercial activity, perhaps a sizeable urban centre, with significant market access. This idea will be addressed in the following section, as we discuss the artifact distribution patterns brought to light in the 2014 and 2015 survey assemblages.

5.2 Interpretation

The majority of the area surveyed during the 2014 and 2015 survey seasons at Molyvoti produced little to no Late Roman amphora material. Above, this trend is characterized as a baseline, against which locations featuring higher sherd counts could be compared. Further elaboration for these areas is necessary. The typical explanation for such low-intensity ('off-site') artifact scatters is that this pattern is the result of manuring.[463] The question of how to define the areas low-sherd density is one best left to the final MTAP survey publication, as the distribution of Late Roman non-amphora artifacts could easily alter our interpretation. Working under the manuring hypothesis, however, the relatively frequent presence of Zeest 80 fragments compared to other, later types in these areas could indicate more intensive agricultural activity in the 2nd to early 4th centuries A.D. than in the 5th through 7th centuries A.D.

The sparse rural settlement pattern Opaiţ describes in the 5th century may offer a plausible parallel for the three POSIs associated with Late Roman amphora scatters in survey area B'.[464] Two of the amphora types Opaiţ identifies from rural settlements in Scythia Minor are attested in

[463] Bintliff and Snodgrass 1988, p. 508; Given 2004, p. 14. Manuring refers to the spreading of household refuse and animal waste over fields as fertilizer. Broken pottery fragments, which happened to be mixed in with the other waste, are durable markers of this practice.
[464] See above, p. 131.

these areas at Molyvoti: LR 2, and Keay 62. The overall pattern is different enough, however, that other explanations should be considered. For instance, these scatters, could simply represent zones of more intense manuring in the 5th to 6th century A.D., despite a general decline in rural activity at this time. Perhaps more positive conclusions can be drawn from the final synthesis of the Late Roman amphora data with the other MTAP survey data. The material collected from PU15-002 (Glyphada-Agkathies) constitutes the second densest Late Roman amphora scatter identified during the 2015 survey. The sherd count (RBH) is evenly split between one earlier type, Zeest 80, and two combined later types, LR 1 and LR 2. These proportions suggest amphora-related activity at this POSI split between the Middle Roman period and the 5th to 6th century A.D. The overall low volume of sherds, however, is probably not indicative of activity on the scale of Clusters B and C from the 2014 survey.

PU15-006 and PU15-007, taken together, amount to the largest concentration of Late Roman amphora fragments in the 2015 survey. Although the chronological range suggested by this material extends from the Middle Roman period through the 7th century A.D., the prevalence of Zeest 80 suggests that the amphora-related activity in this area peaked early. The variety of attested types and the high volume of sherds is reminiscent of the Cluster C assemblage, though on a smaller scale. The most likely interpretation is therefore a moderately sized settlement, perhaps a small town or village situated so as to take advantage of the natural resources of Lake Metrikon.

A decline in rural settlement around the mid 5th century A.D. could also explain another phenomenon in the Molyvoti survey assemblage: the intense, predominantly late 5th to the first half of the 6th century A.D. amphora scatter in Cluster B from the 2014 survey. In the wake of the Gothic migrations of the 4th century A.D. and the Hunnic attacks in the mid 5th century A.D.,

Dumanov observes a significant trend in urban settlement patterns in Thrace: many previous settlements are abandoned or moved to new locations, and the overall area defended by city fortifications is reduced.[465] Given the massive discrepancy between the few examples of earlier amphora types and the abundance of 5th to 6th century A.D. examples collected from the headland, Cluster B suggests a sizeable settlement established on or relocated to this location sometime in the 5th century A.D., possibly owing to the natural defenses offered by the narrow connection to the mainland between the sea and the lagoon. Furthermore, when considered in conjunction with the concurrent reduction in rural habitation that is suggested by the 2015 survey material, it is tempting to suggest that this seemingly new settlement may represent a population transfer from a rural context to a more urban one, for purposes of defense. Comparison to Opaiţ's observations from different classes of settlements in Scythia Minor, however, does not draw a direct parallel.[466] With the exception of the North African imports, however, of which there are considerably more at Cluster B, the assemblage from this site is similar to that of (L)Ibida.[467] This is intriguing, as Opaiţ classifies (L)Ibida as one of the wealthy cities of central Dobrudja that occupies a key defensive position.[468] Based strictly on the amphora evidence, this would seem to imply that the artifact scatter in Cluster B may represent a settlement of some significance. Could there be a Late Roman town on this site? Possibly, but probably not. This interpretation would likely stretch the other survey evidence beyond reason.

An alternative, or indeed complementary, explanation worthy of consideration is that the headland settlement, Cluster B, may constitute a port facility in service of a nearby city. Maximianoupolis, a known and attested Late Roman city, is located approximately 25 km north

[465] Dumanov 2015, pp. 97-98.
[466] Opaiţ 2004a, pp. 107-111.
[467] Paraschiv 2010, see esp. p. 1004, table 2.
[468] Opaiţ 2004a, p. 107.

of Molyvoti over easy terrain, would be the logical connection. This city occupies a strategic position on that vital overland route, the Via Egnatia, and offers an attractive comparison to a city of the standing of, say, (L)Ibida. A coastal port facility connected to a larger inland settlement is an established paradigm in the Greco-Roman World, especially where a river exists to facilitate the transport of goods.[469] The modern wetland Northeast of the headland is watered by a stream, which today passes within roughly 2.5 km of the ancient city. A larger river, which today flows south into Lake Metrikon, passes within 3.5 km of the site, and perhaps could have changed its course. In any case, it is mere speculation that any river connected Maxiamianoupolis to the coast in antiquity. Whether or not this proves to be the case through future study could significantly impact our understanding of this settlement; in the absence of a river connection to facilitate the transportation of goods, a direct overland route between Molyvoti and Maximianoupolis would actually be longer than one from Anastasioupolis, just 20 km west along the Via Egnatia. Therefore, the cost of overland transport from Molyvoti, in the absence of a riverine connection, would have been more expensive than from that site.[470] If the river connection should prove implausible, then the headland settlement would be more comfortably viewed as an independent site.

At this juncture, another objection could be raised: sites in the same region of Thrace with similar market access ought to have similar imported amphora assemblages. By this logic, then, one would expect the amphora assemblage from the nearby island of Thasos to closely parallel

[469] Campbell 2012, pp. 201-202; The best known example, of course, is Rome itself, and its relationship with Ostia, see De Sena 2005. Examples without river access include Corinth, with its twin harbours, and Piraeus at Athens. These examples are useful to illustrate port-city relationships, but the 25 km distance between Molyvoti and Maximianoupolis is far more substantial than any of these.

[470] For estimates of the cost of overland transport time, see Avramea 2002, p. 61. For the cost of overland travel vs. water-borne travel, see Morley 2007, p. 4; Morris, Saller, and Scheidel 2007, p. 4; Bandow 2013b, p. 83; Harris 2008, p. 535.

the Molyvoti material. In fact, there are significant discrepancies between the two. From 5th century A.D. contexts Abadie-Reynal and Sodini describe a variety of amphora imports, including Aegean, North African, Baetican, and several Eastern Mediterranean types.[471] Here the presence of Palestinian types such as Carthage LR 4 and LR 5/6 mark an obvious point of contrast with the Molyvoti assemblage. Furthermore, in the 6th century A.D., LR 1, another Eastern Mediterranean amphora type, dominates the Thasian assemblage.[472] While this could theoretically also prove be the case in stratified contexts at Cluster B, it seems unlikely given the abundance of other 6th century A.D. types attested in the survey assemblage. The end result is the impression that, despite their geographical proximity, Molyvoti and Thasos enjoyed different access to markets, or their patterns of amphora imports were subjected to different market forces. This could simply be a matter of context; the Thasian material comes from a villa and a basilica. The function of the Cluster B settlement is unknown, but following Karagiorgou's argument concerning the distribution of LR 2 and LR 1 as container for the *annona militaris*, it is tempting to speculate that this site had a military character. The c. A.D. 480 to 490 destruction deposits from the fortress of Dichin offer a close parallel: both sites have a preponderance of LR 2 and LR 1 fragments in common, as well as LR 3, Samos Cistern Type, Keay 61/62, and 55.

Cluster C from the 2014 survey presents a different character altogether. Here, only LR 1 and LR 2 amphoras are present in significant quantities, while few isolated examples of other types appear alongside, strongly suggesting a primarily 5th to 6th century A.D. time frame. This is the only area from the 2014 survey where LR 1 is the most abundant type, or from another perspective, this is the only area where LR 2 is not the most abundant type. The combination of

[471] Abadie-Reynal and Sodini 1992, p. 88. Curiously, although they note African and Baetican imports, none appear to be present in the catalogue.
[472] Abadie-Reynal and Sodini 1992, pp. 89.

high sherd counts from these two amphora types with very few other amphora types represented by very few examples each is unique in the Molyvoti survey, which suggests this scatter represents a zone of specialized activity. A clue as to the nature of this activity may lie in the two types themselves, LR 1 and LR 2, which have both been associated with the *annona militaris* in Thrace.[473] There is a strong possibility that Cluster C represents an area of activity related to the *annona*. A preponderance of specific one or two amphora types over others is a pattern often found at identified *horrea* elsewhere in the Roman world.[474] . This cluster could represent a *horreum*, or perhaps a staging area associated with one; *horrea* are often situated near port facilities, a situation reminiscent of the relationship between Cluster B and Cluster C.[475]

5.3 Conclusion

The 2014 and 2015 MTAP field surveys brought to light a great deal of fascinating Late Roman amphora data. The 2015 survey amphora assemblage is, on the whole, low-density. The amphora fragments that were collected, however, indicated three Late Roman POSIs in this survey universe perhaps representing small-scale rural settlement. These amphora scatters suggest a peak in activity sometime in the 2nd through early 4th century A.D., with another, smaller spike in the 5th through 6th century A.D. The 2014 assemblage offers a significantly different pattern. Here all Late Roman artifacts are confined to three artifact clusters, with no low-intensity scatters in the surrounding area. Cluster A seems to feature less intense activity than either B or C. Cluster B represents the highest Late Roman amphora sherd density at Molyvoti, and the chronological indicators suggest a relatively narrow range of activity, from the

[473] See Karagiorgou 2001a.
[474] e.g. Blakely 1988, p. 35; Sidebotham et al. 1989, p. 159, fig 19; Kaldeli 2008, p. 200.
[475] e.g. Kaldeli 2008, p. 200; Heath et al. 2015; Blakely 1988; Haggis 1996, p. 422.

late 5th through the first half of the 6th century A.D. Cluster C meanwhile may indicate a zone of special activity, possibly related to the *annona militaris*, also plausibly dating to this period.

The narrow date-range for the peak of activity at Cluster C may coincide with historical events. The mid 5th century A.D. saw Thrace ravaged by the Huns, and it is tempting to speculate that the Molyvoti headland site may have been established either as a defensive refuge or perhaps as a military installation. After all, the amphora assemblage here does contain a preponderance of LR 1 and LR 2 amphoras, which have been associated with the *annona militaris* elsewhere in Thrace. This raises an interesting point with regard to the relationship between Cluster B and Cluster C, the zone of apparent special *annona*-related activity. *Horrea* and port facilities are frequently found in close proximity throughout the Roman world, and as such, it is possible that these two clusters represent a large settlement and an associated storage warehouse. In light of the economic theory discussion in chapter 1, it is also tempting to view this arrangement as an example of Institutional economics at work. It appears as though the military was supplying Cluster C with annonary shipments, as there are virtually no amphora types represented there besides LR 1 and LR 2. At Cluster B, however, there appears a much wider variety of amphora types represented. Perhaps this could be representative of other, entrepreneurial activity, perhaps occurring side-by-side with the Institutional supply system, as discussed in chapter 2.

The central aim of this thesis was to present the Late Roman amphora data collected under the auspices of the Molyvoti, Thrace, Archaeological Project. As such, this research constitutes only one small part of a larger whole; the information presented here will ultimately be interpreted alongside not only other artifact data from the field survey, but also alongside the results of the geophysical survey and excavations. The final interpretation of the data presented

here will be based not only on the historical and geographical context provided above, but on the development of the archaeological record at this site over centuries of human activity.

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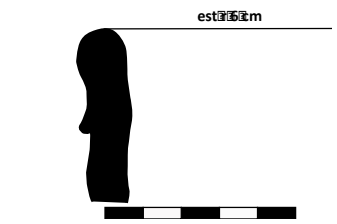
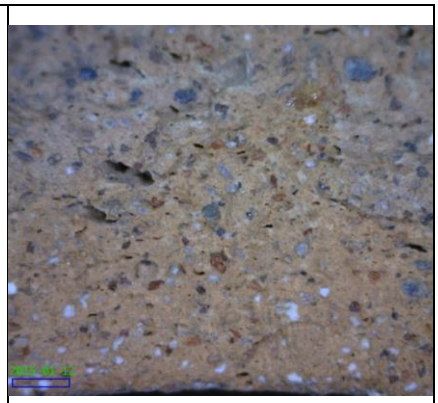
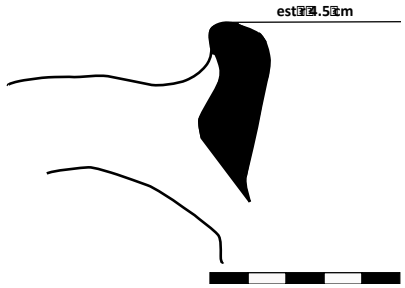
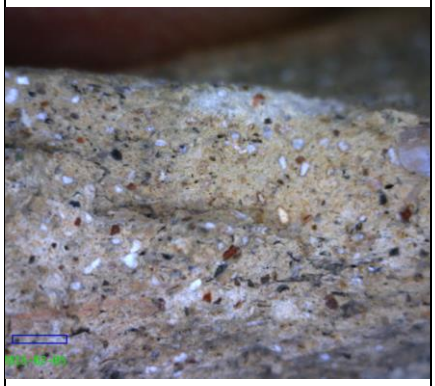
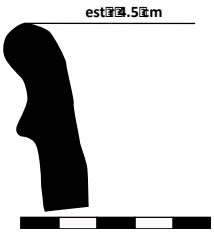
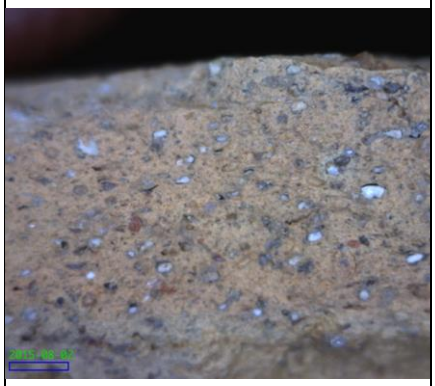
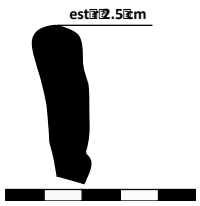
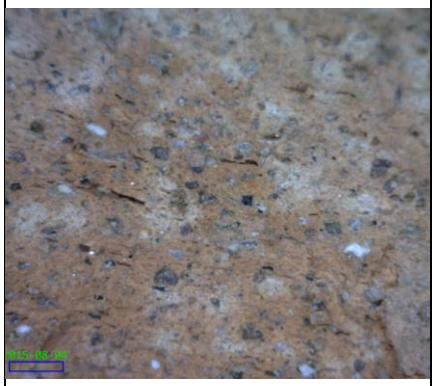
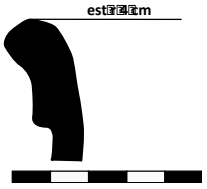
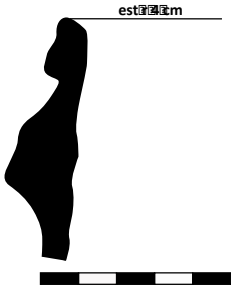
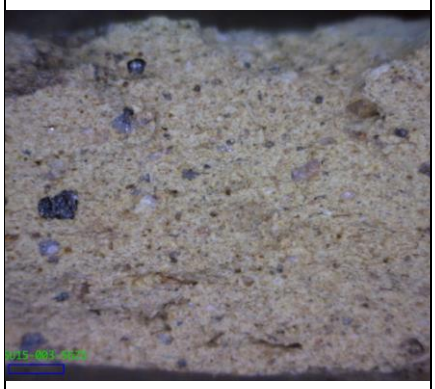
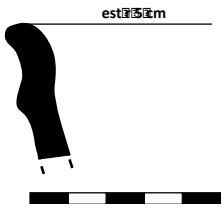
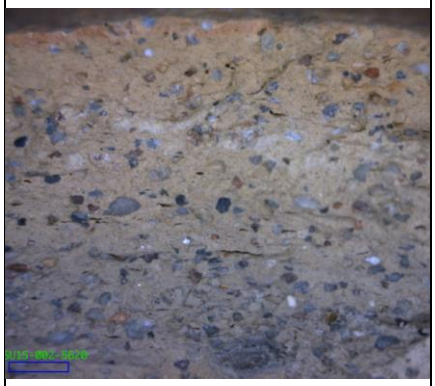
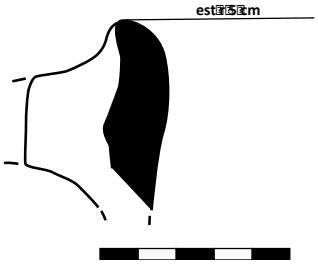
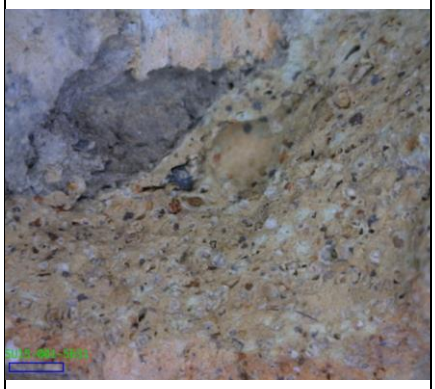
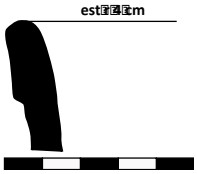
Appendix

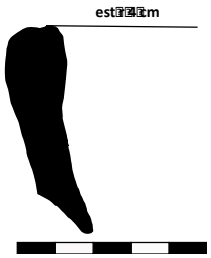
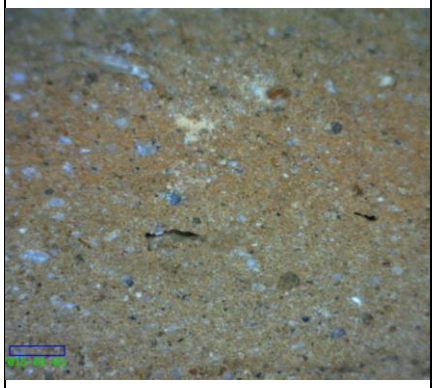
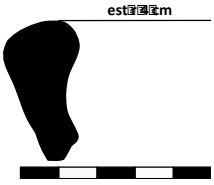
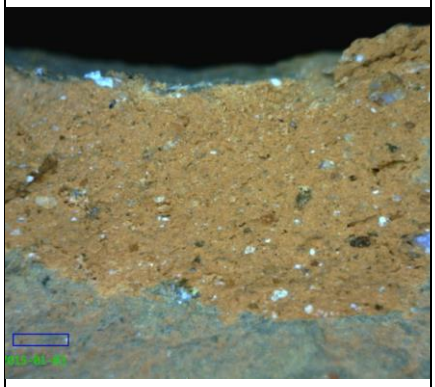
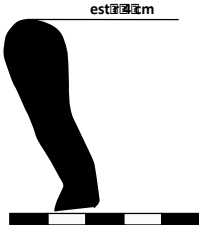
The catalogue is organized by type, according to their order of appearance in chapter 3. Variants within each type are presented in the order by which they were processed:

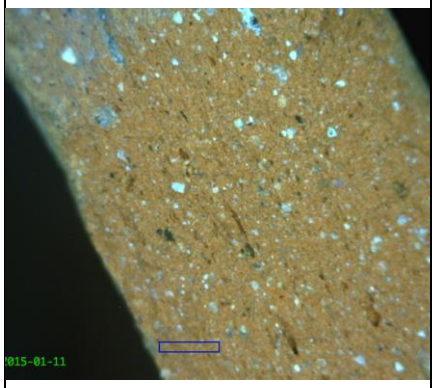
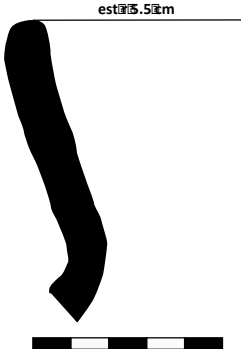
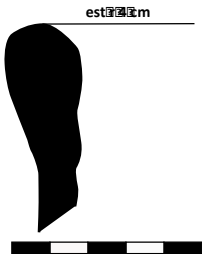
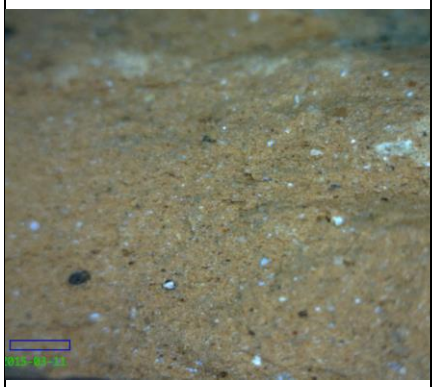
The following abbreviations are used: SU, survey unit. PH, preserved height. D, diameter. LR, Late Roman. The profiles are presented at a 1:2 scale. The small blue rectangle in the bottom-left corner of each photomicrograph is a 1 mm scale. Catalogue sherds were selected to represent both the variety and variation of forms present in the Molyvoti survey assemblage.

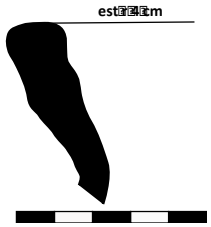
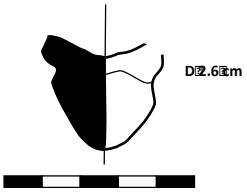
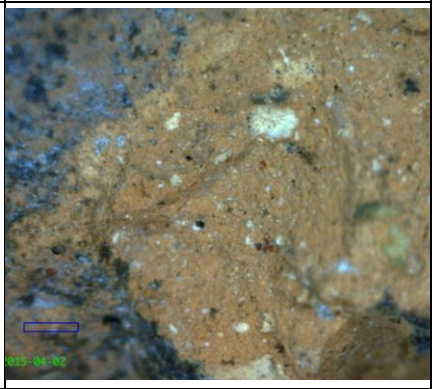
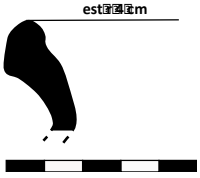
1. LR 1, Rim SU14-002-394 PH 4.6 cm; est D 12 cm. Preserves 1/8th rim with part of neck. Fabric group LR-1 Pink/White 7.5YR 6/6 Reddish Yellow, surface 10YR 8/2 Very Pale Brown.		
2. LR 1, Rim SU14-004-4011 PH 6.4 cm; est D 9 cm. Preserves 1/5th rim with part of neck and handle. Fabric group LR-1 Pink, exterior 5YR 6/6 Reddish Yellow, core 10YR 7/4 Very Pale Brown.		
3. LR 1, Rim SU14-008-401 PH 5.7 cm; est D 9 cm. Preserves 1/8th rim with part of neck. Fabric group LR-1 Pink, 7.5 YR 6/4 Light Brown, Exterior surface 10YR 7/4 Very Pale Brown.		

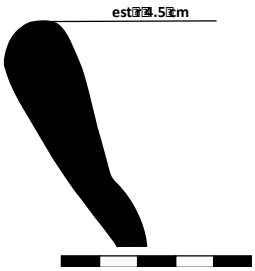
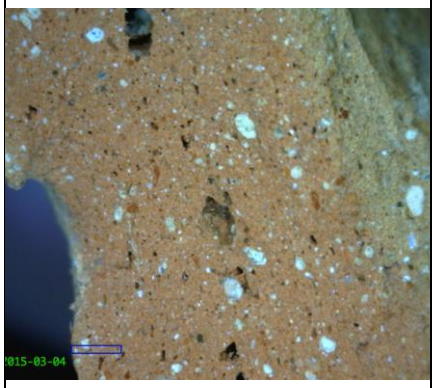
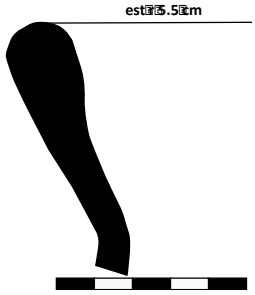
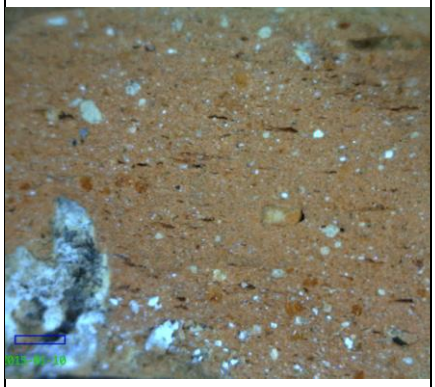
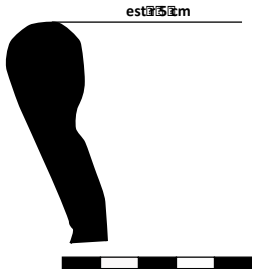
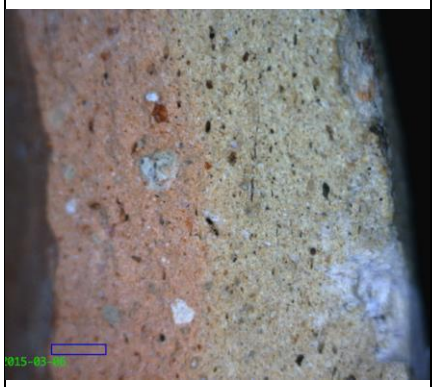
4. LR 1, Rim SU14-011-403 PH 4.3 cm; est D 5 cm. Preserves 1/4th rim with part of neck. Fabric group LR-1 Pink, 5YR 5/6 Yellowish Red, interior surface 10YR 8/4 Very Pale Brown.		
5. LR 1, Rim SU14-011-403 PH 4.4 cm; est D 8 cm. Preserves 1/5th rim with part of neck. Fabric group LR-1 Pink, 10YR 7/3 Very Pale Brown, surface 7.5 YR 6/6 Reddish Yellow.		
6. LR 1, Rim SU15-003-5625 PH 6.3 cm; est D 8 cm. Preserves 1/7th rim with part of neck and handle. Fabric group LR-1 White, 2.5Y 8/3 Pale Yellow.		

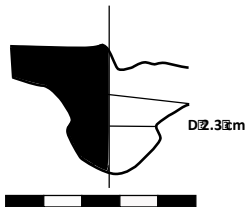
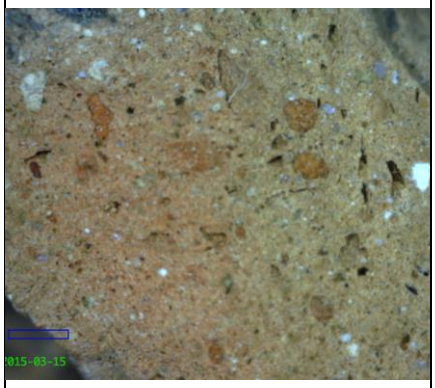
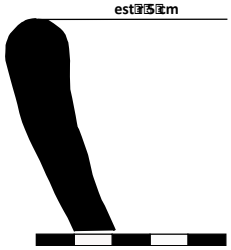
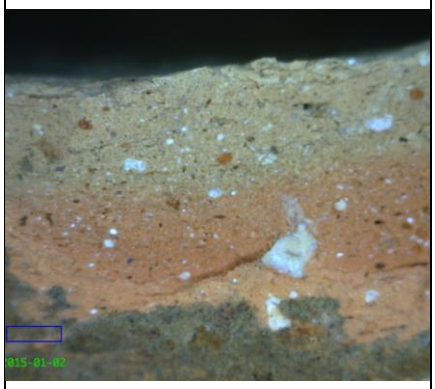
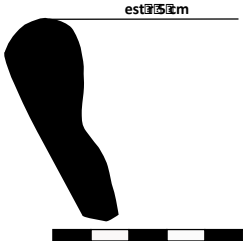
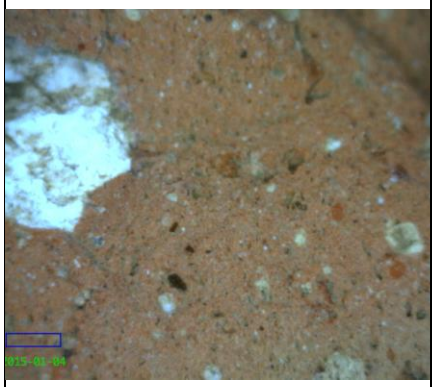
7. LR 1, Rim SU15-002-5620 PH 3.7 cm; est D 10 cm. Preserves 1/8th rim with part of neck. Fabric group LR-1 Pink, 10YR 7/3 Very Pale Brown, surface 5YR6/6 Reddish Yellow.		
8. LR 1, Rim SU15-001-5631 PH 5.2 cm; est D 10 cm. Preserves 1/10th rim with part of neck and handle. Fabric group LR-1 Pink/White, Main fab 10YR 7/3 Very Pale Brown, thin outer layer 5YR 7/6 Reddish Yellow, surface 2.5Y 8/3 Pale Yellow.		
9. LR 1, Rim SU14-004-4011 PH 3.5 cm; est D 8 cm. Preserves 1/7th rim with part of neck. Fabric group LR-1 White, 25 Y 8/3 Pale Yellow.		

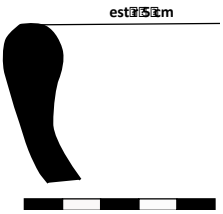
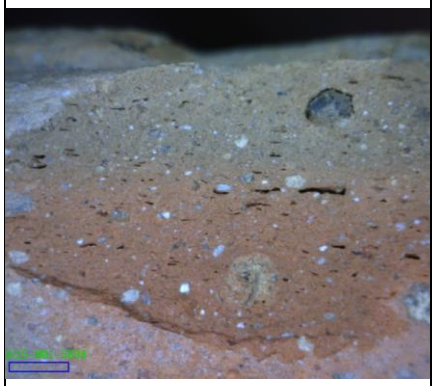
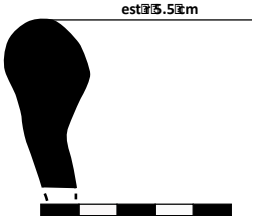
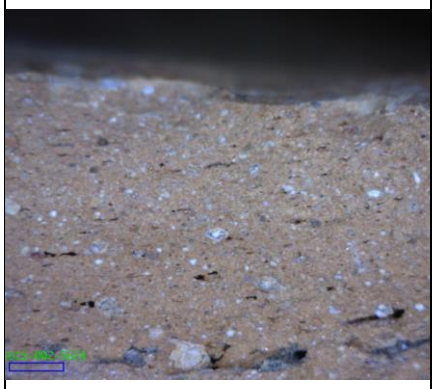
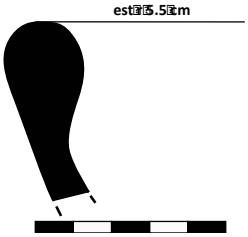
10. LR 2, Rim SU14-018-396 PH 5.8 cm; est D 8 cm. Preserves 1/3rd rim with part of neck. Fabric group LR 2-A, exterior 7.5YR 5/4 Brown, core 2.5YR 5/6 Red.		
11. LR 2, Rim SU14-014-396 PH 3.9 cm; est D 8 cm Preserves 1/4th rim. Fabric group LR 2-A, 2.5 YR 5/8 Red.		
12. LR 2, Rim SU14-011-401 PH 5.1 cm, est D 8 cm. Preserves 1/4th rim with part of neck. Fabric group LR 2-A, 2.5 YR 5/8 Red.		

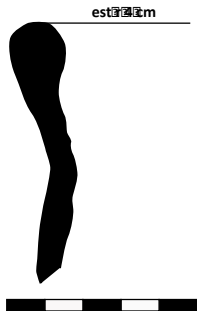
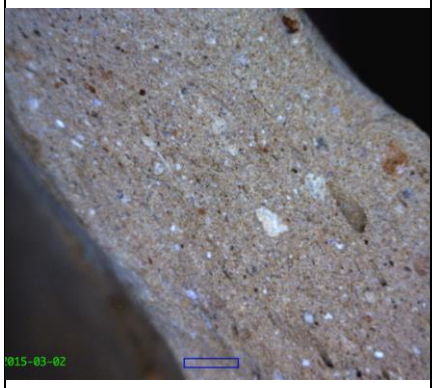
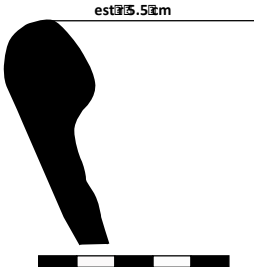
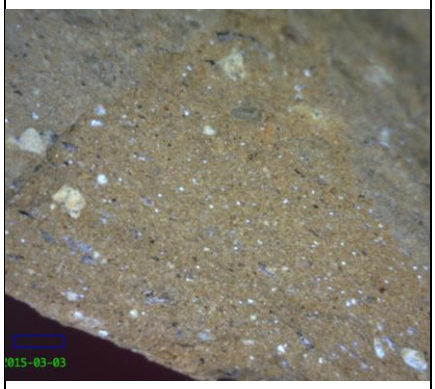
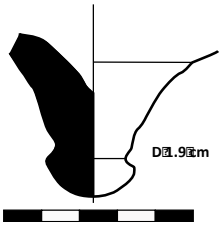
13. LR 2, Rim SU14-002-394 PH 3.9 cm; est D 7 cm. Preserves 1/6th rim with part of neck. Fabric group LR 2-A, 2.5 Y/R 5/8 Red.		
14. LR 2, Rim SU14-004-4011 PH 8.5 cm; est D 11 cm. Preserves 1/6th rim with part of neck. Fabric group LR 2-A, 2.5YR 5/8 Red.		
15. LR 2, Rim SU14-009-403 PH 6.1 cm, est D 8 cm. Preserves 1/4th rim with part of neck. Fabric group LR 2-A, 5YR 5/6 Yellowish Red.		

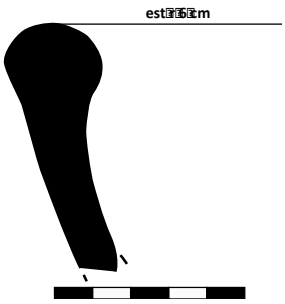
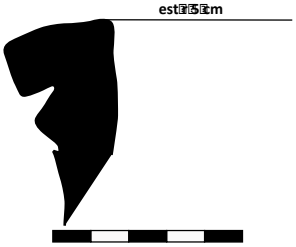
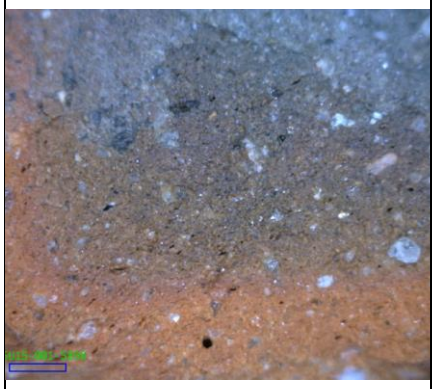
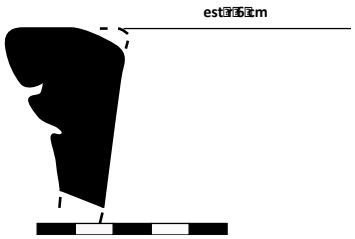
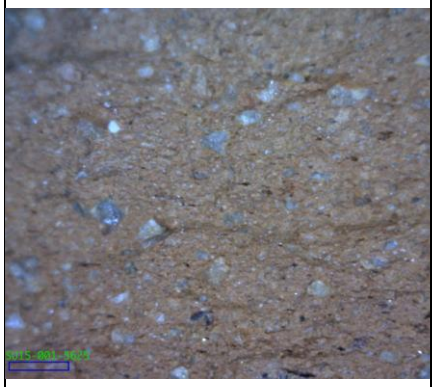
16. LR 2, Rim SU14-002-4011 PH 4.8 cm; est D 8 cm. Preserves 1/6th rim with part of neck. Fabric group LR 2-A, 2.5Y/R 5/8 Red.		
17. LR 2, Toe SU14-008-101 D 2.6 cm (narrowest). Preserves toe fragment. Fabric group LR 2-A, exterior 7.5YR 6/6 Reddish Yellow, interior 5YR 5/6 Yellowish Red.		
18. LR 2, Rim SU15-001-6522 PH 3.1 cm; est D 8 cm. Preserves 1/5th rim with part of neck. Fabric group LR 2-A, 5YR 6/6 - 6/8 Reddish Yellow. Possibly a fractional LR 2, e.g. Heath et al. 2015, fig. 5.		

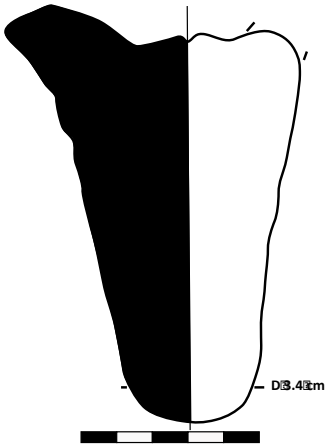
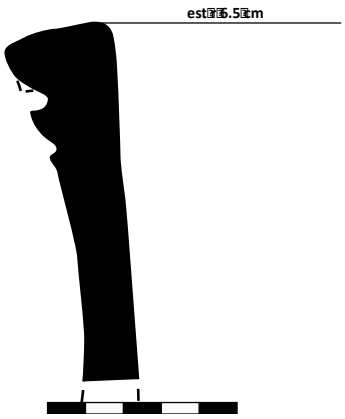
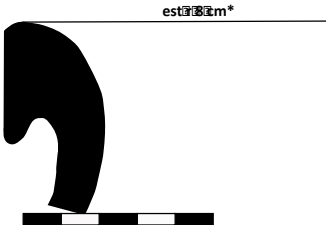
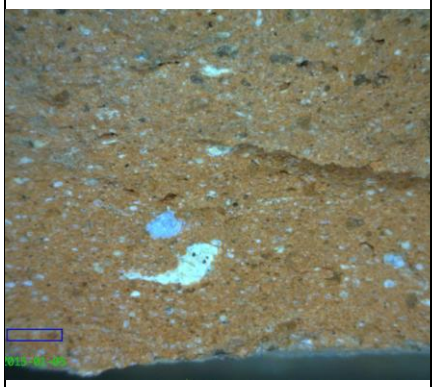
19. LR 2, Rim SU14-004-401 PH 6.7 cm; est D 9 cm. Preserves 1/6th rim with part of neck. Fabric group LR 2-B, surface 7.5 Y/R 7/6 Reddish Yellow, core 2.5 Y/R 5/6 Red.		
20. LR 2, Rim SU14-011-401 PH 6.6 cm; est D 11 cm. Preserves 1/4th rim with part of neck. Fabric group LR 2-B, Ext 7.5 Y/R 7/6 Reddish Yellow, core 2.5Y/R 6/6 Light Red.		
21. LR 2, Rim SU14-008-4011 PH 6.0 cm; est D 10 cm. Presented 1/5th rim with part of neck. Fabric group LR 2-B, surface 7.5 Y/R 6/4 Light Brown, core 2.5Y/R 7/6 Light Red.		

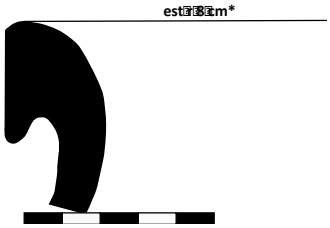
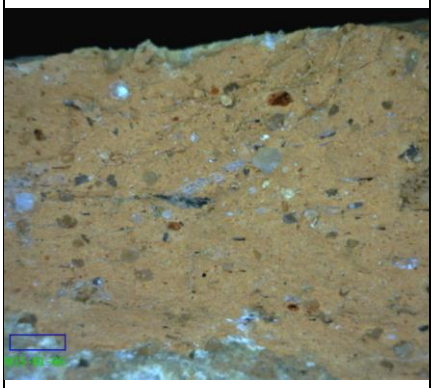
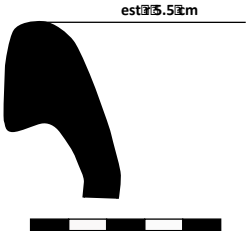
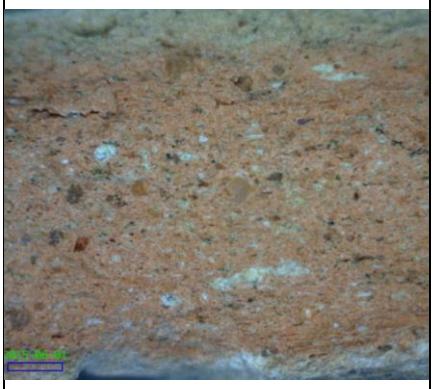
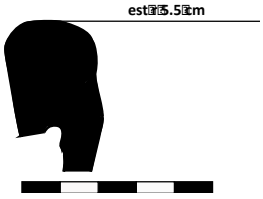
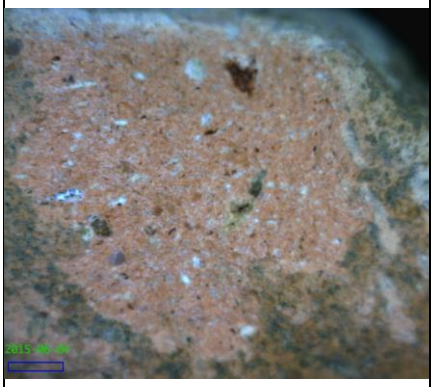
22. LR 2, Toe SU14-009-115 D 2.3 cm (narrowest above ridge). Preserves complete toe with part of body. Fabric group LR 2-B, Ext 7.5 Y/R 7/4 Pink, core 2.5 Y/R 6/6 Light Red.		
23. LR 2, Rim SU14-021-396 PH 5.9 cm; est D 10 cm. Preserves 1/5th rim with part of neck. Fabric group LR 2-B, Ext 7.5YR Reddish Yellow, int 2.5YR 6/8 Light Red.		
24. LR 2, Rim SU14-022-396 PH 5.6 cm; est D 10 cm. Preserves 1/6th rim with part of neck. Fabric group LR 2-B, exterior 10YR 7/4 Very Pale Brown, core 2.5YR Light Red.		

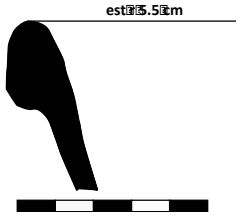
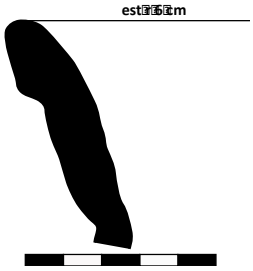
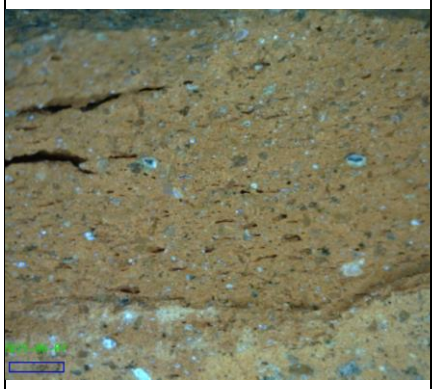
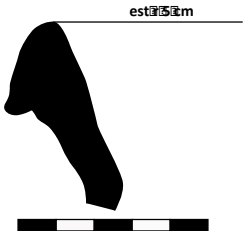
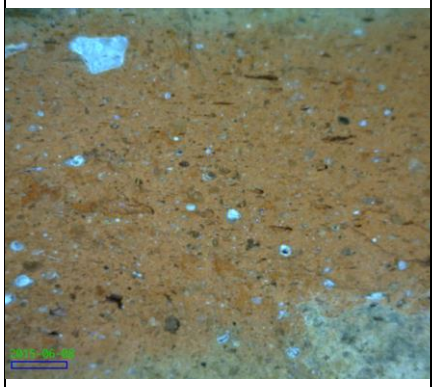
25. LR 2, Rim SU15-001-5898 PH 4.3 cm; est D 10 cm. Preserves 1/6th rim with part of neck. Fabric group LR 2-B, 5YR 5/6 Yellowish Red to 7.5YR 5/6 Strong Brown.		
26. LR 2, Rim SU15-002-5628 PH 5.5 cm; est D 11 cm. Preserves 1/5th rim with part of neck. Fabric group LR 2-B, 7.5YR 5/6 Strong Brown, core 2.5YR 6/6 Light Red.		
27. LR 2, Rim SU15-002-5898 PH 5.1 cm; est D 11 cm. Preserves 1/10th rim with part of neck. Fabric group LR 2-B, 7.5YR 5/6 Strong Brown, core 5YR 5/6 Yellowish Red.		

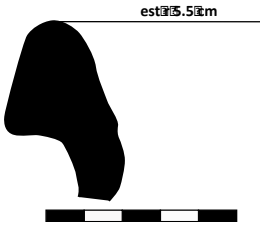
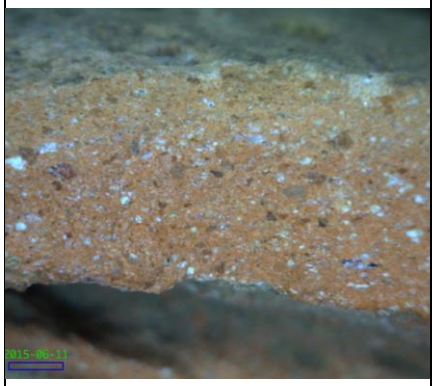
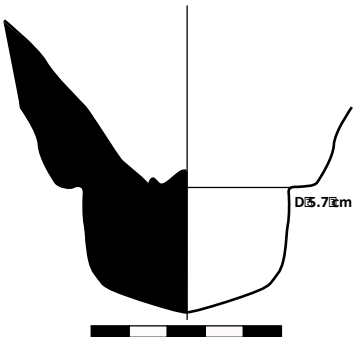
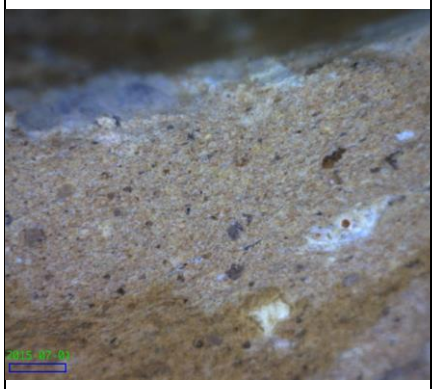
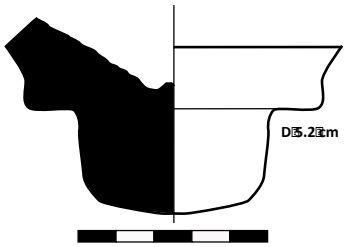
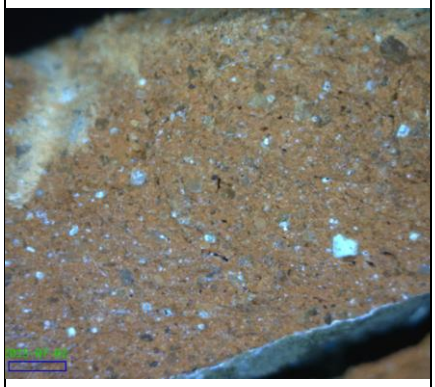
28. LR 2, Rim SU14-008-4011 PH 6.6 cm; est D 8 cm. Preserves 1/4th rim with part of neck. Fabric group LR 2-C, 7.5 Y/R 6/4 Light Brown.		
29. LR 2, Rim SU14-009-403 PH 6.2 cm; est D 11 cm. Preserves 1/4th rim with part of neck. Fabric group LR 2-C, Slip 10YR 8/3 Very Pale Brown, Core 7.5 YR 6/4 Light Brown.		
30. LR 2, Toe SU14-009-115 D 1.9 cm (narrowest). Preserves toe. Fabric group LR 2-C, 5YR 6/4 Light Brown.		

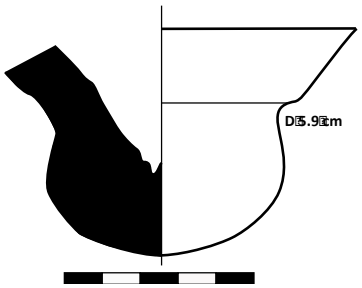
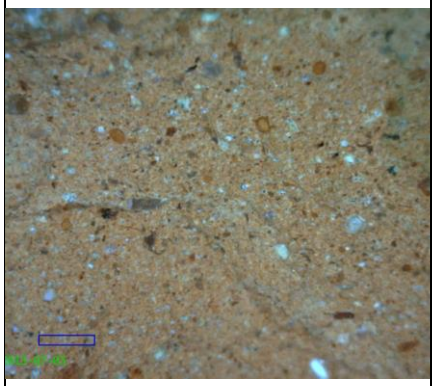
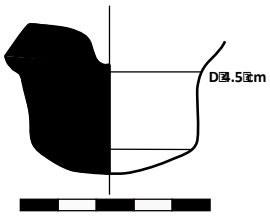
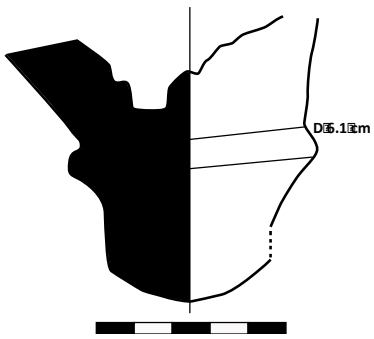
31. LR 2, Rim SU15-002-5899 PH 6.5 cm; est D 12 cm. Preserves 1/8th rim with part of neck. Fabric group LR 2-C, 7.5YR 5/6-5/8 Strong Brown.		
32. Zeest 80, Rim SU15-001-5898 PH 5.4 cm; est D 10 cm. Preserves 1/7th rim. Fabric group Zeest 80, 2.5 Y 5/1 Grey - 7.5YR 4/4 Brown, Outer Layer 5YR 5/8 Yellowish Red.		
33. Zeest 80, Rim SU15-001-5625 PH 4.8 cm; est D 12 cm. Preserves 1/10th rim with part of neck. Fabric group Zeest 80, 5YR 5/6 Yellowish Red.		

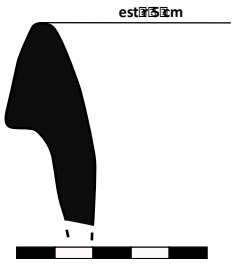
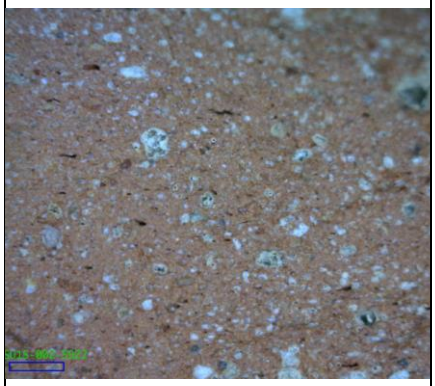
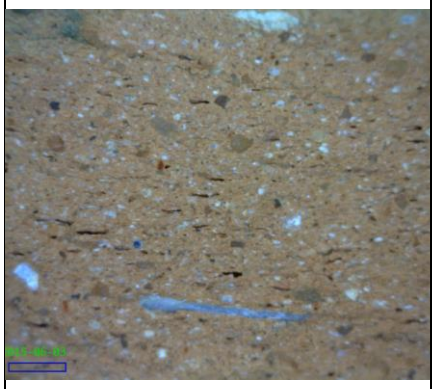
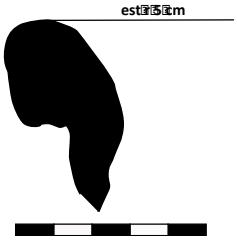
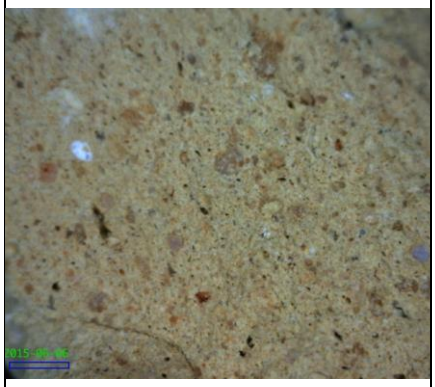
34. Zeest 80, Toe SU15-003-5899 D 3.4 cm (tip begins rounding off). Preserves complete toe with part of body. Fabric group Zeest 80, firing sandwich: outer 2.5YR 6/8 Light Red, inner 10YR 6/2 Light Brownish Grey.		
35. Zeest 80, Rim SU15-003-5099 PH 10.9 cm; est D 13 cm. Preserves 1/5th rim with part of neck. Fabric group Zeest 80, 10YR 7/2 Light Grey to 5YR 5/6 Yellowish Red.		
36. Keay 62 F, Rim SU14-001-403 PH 5.6 cm; est D 16 cm*. Preserves 1/10th rim with part of neck. Keay 1984, p. 327, fig. 149.3. Fabric group North African (Moknine?), 2.5YR 6/6 Light Red, pale finish 7.5YR 8/4 Pink.		

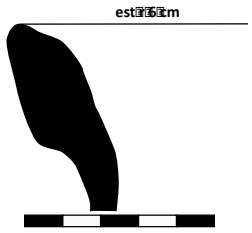
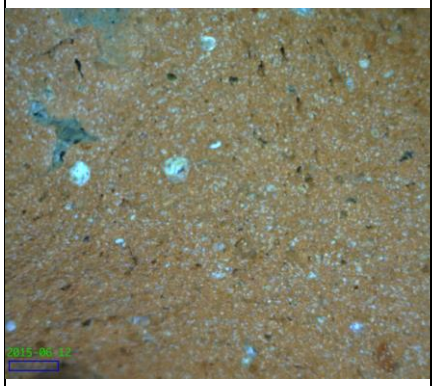
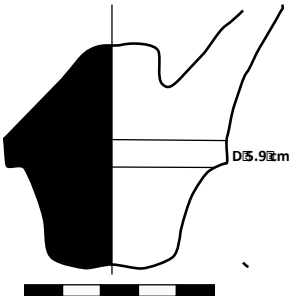
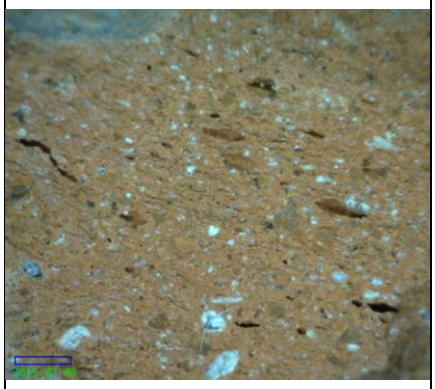
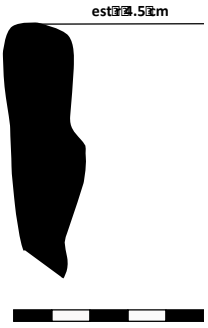
37. Keay 62 A, Rim SU14-001-403 PH 5.5 cm; est D 16 cm*. Preserves 1/5th rim with part of neck. Keay 1984, p. 312, fig. 137.8. Fabric group North African (Moknine or Mejerda?), 2.5YR6/6 Light Red, surface 2.5Y 8/4 Pale Yellow.		
38. Keay 62 A, Rim SU14-004-395 PH 4.7 cm; est D 11 cm. Preserves 1/6th rim with part of neck. Keay 1984, p. 319, fig. 140.11. Fabric group North African (Sidi Zahrouni?), 2.5YR 5/8 Red, surface 5Y 8/2 Pale Yellow.		
39. Keay 62 E, Rim SU14-007-4011 PH 3.9 cm; est D 11 cm. Preserves 1/6th rim with part of neck. Keay 1984, p. 326, fig. 128.4. Fabric group North African (Sidi Zahrouni?), 2.5YR 6/8 Light Red, surface 10YR 8/4 Very Pale Brown. Possibly Keay 61 D, Bonifay 2004 p. 140, fig. 75.1		

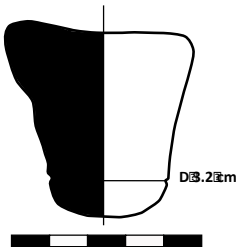
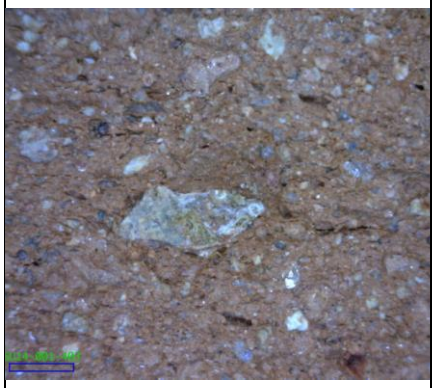
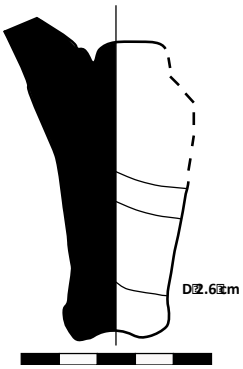
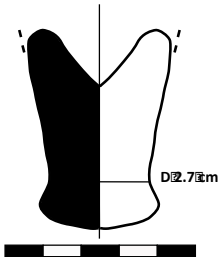
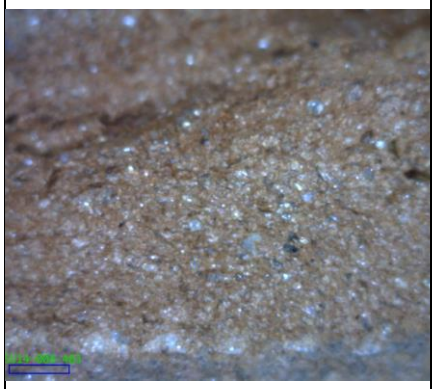
40. Keay 62 C, Rim SU14-010-403 PH 4.5 cm; est D 11 cm. Preserves 1/8th rim with part of neck. Keay 1984, p. 322, fig. 145.7. Fabric group North African (Henchir Ekh-Chakaf?), 5YR 6/6 Reddish Yellow, core 5YR 6/4 Light Reddish Brown, surface 2.5Y 8/3 Pale Yellow.		
41. Keay 62 J, Rim SU14-009-4011 PH 6.0 cm; est D 12 cm. Preserves 1/7th rim with part of neck. Keay 1984, p. 132, fig. 153.2. Fabric group North African (Henchir Ekh-Chakaf?), 2.5YR 5/8 Red.		
42. Keay 62 C, Rim SU14-007-403 PH 5.0 cm; est D 10 cm. Preserves 1/10th rim with part of neck. Keay 1984, p. 322, fig. 145.4. Fabric group North African (Moknine?), firing sandwich: outer 2.5YR 5/8 Red, core 7.5YR 7/4 Pink, surface 2.5Y 8/3 Pale Yellow.		

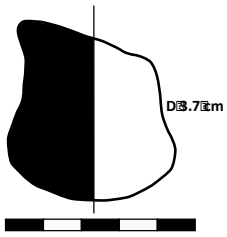
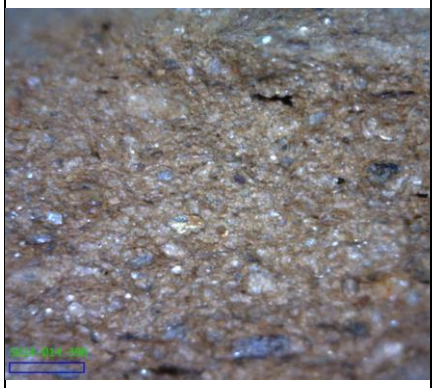
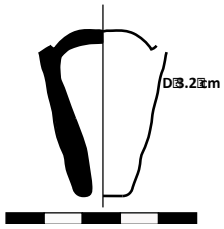
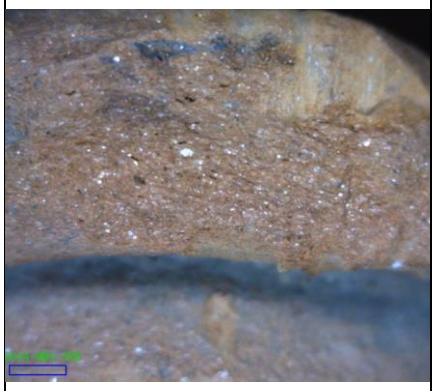
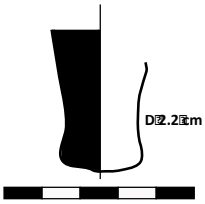
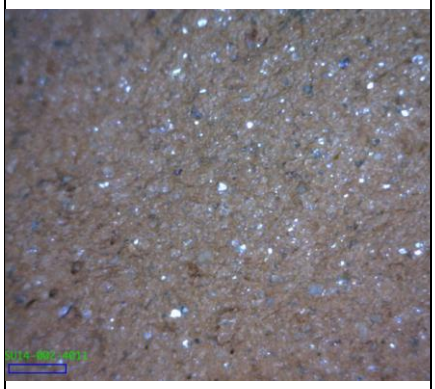
43. Keay 62 A, Rim SU14-007-403 PH 4.8 cm; est D 11 cm. Preserves 1/6th rim with part of neck. Keay 1984, p. 311, fig 136.20. Fabric group North African (Moknine?), 2.5YR 5/6 Red, surface 2.5Y 8/4 Pale Yellow.		
44. Keay 62 E, Toe SU14-015-403 D 5.7 cm (groove). Preserves complete toe with part of body. Keay 1984, p. 340, fig. 158.10. Fabric group North African (Sidi Zahrouni?), 7.5YR 6/4 Light Brown.		
45. Keay 62 A, Toe SU14-011-403 D 5.2 cm (groove). Preserves toe with part of body. Keay 1984, p. 339, fig. 157.2 Fabric group North African (Moknine?), 2.5YR 5/6 Red, surface 2.5Y 8/4 Pale Yellow.		

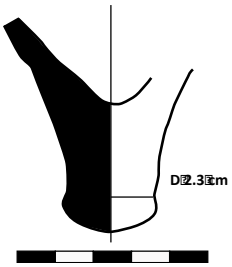
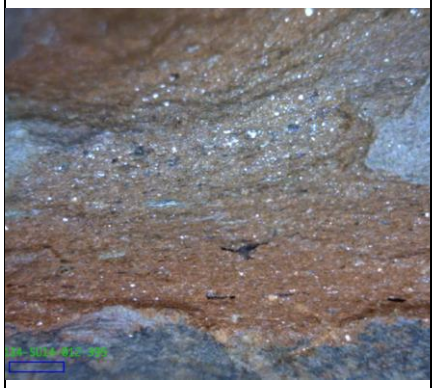
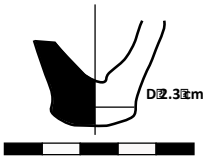
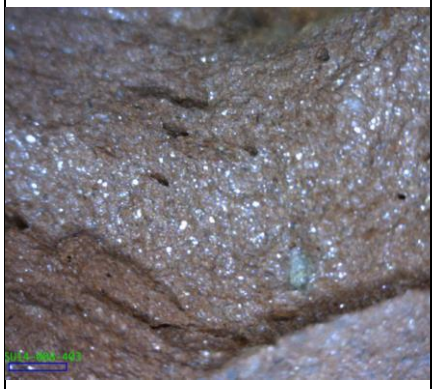
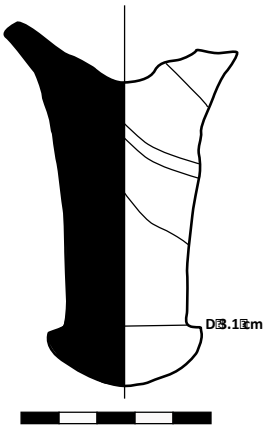
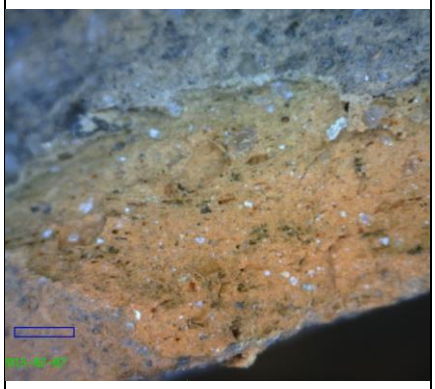
46. Keay 62 E, Toe SU14-016-403 D 5.9 cm (groove) Preserves complete toe with part of body. Keay 1984, p. 342, fig. 160.10. Fabric group North African (Sidi Zahrouni?), 2.5 YR 6/6 Light Red. Possibly Keay 62 A, Keay 1984, p. 341, fig. 159.2.		
47. Keay 62 A, Toe SU14-013-403 D 4.5 cm (narrowest). Preserves toe fragment with part of body. Keay 1984, p. 341, fig. 159.2 Fabric group North African (Sidi Zahrouni?), 2.5YR 5/6 Red.		
48. Keay 62 D, Toe SU14-016-396 D 6.1 cm (top of ring groove). Preserves most of toe with part of body. Keay 1984, p. 342, fig. 160.5 Fabric group North African (Moknine?), 2.5YR 5/8 Red.		

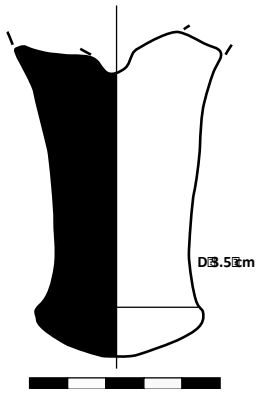
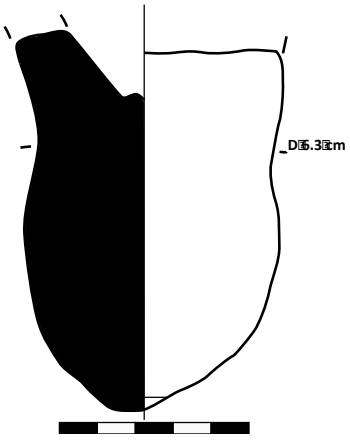
49. Keay 62 A, Rim SU15-002-5922 PH 5.5 cm; est D 10 cm. Preserves 1/7th rim with part of neck. Keay 1984, p. 311, fig. 136.4 Fabric group North African (Sidi Zahrouni?), 2.5YR 5/6 Red.		
50. Keay 61 B, Rim SU14-020-396 PH 5.1 cm; est D 12 cm. Preserves 1/8th rim with part of neck. Keay 1984, p. 306, fig. 132.6. Fabric group North African (Moknine?), 5YR 6/6 Reddish Yellow, surface 7.5YR 7/6 Reddish Yellow.		
51. Keay 61 D, Rim SU14-009-403 PH 5.0 cm; est D 10 cm. Preserves 1/5th rim with part of neck. Keay 1984, p. 308, fig. 134.6. Fabric group North African (Sidi Zahrouni?), 5YR 7/6 Reddish Yellow, core 2.5YR 6/6 Light Red, surface 2.5Y 7/4 Pale Yellow.		

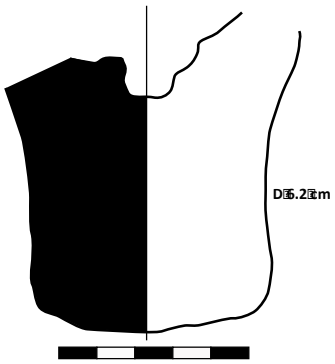
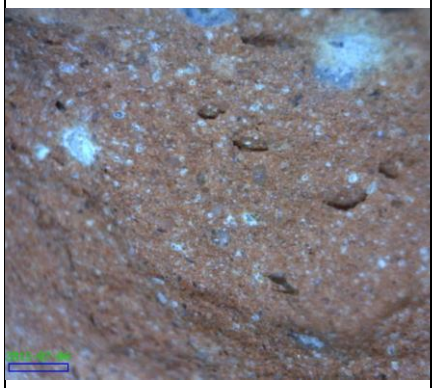
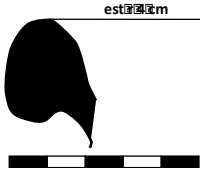
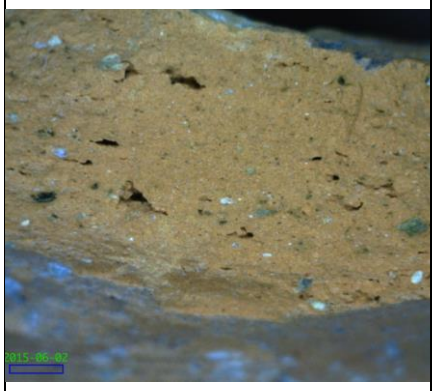
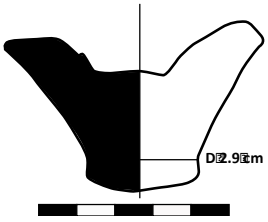
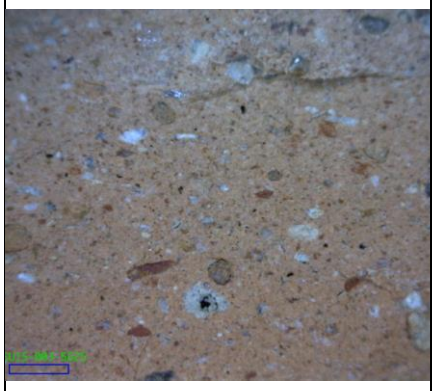
52. Keay 61 B, Rim SU14-010-4011 PH 5.1 cm; est D 12 cm. Preserves 1/4th rim with part of neck. Keay 1984, p. 306, fig. 132.6. Fabric group North African (Moknine?), 2.5YR 5/8 Red. Possibly Keay 25 D, Keay 1984, p. 201, fig. 79.3.		
53. Keay 61, Toe SU14-007-211 D 5.9 cm (ridge). Preserves complete toe with part of body. Keay 1984, p. 308, fig. 134.7. Fabric group North African (Moknine?), 2.5YR 5/6 Red.		
54. Keay 55 A, Rim SU14-007-403 PH 6.8 cm; est D 9 cm. Preserves 1/5th rim with part of body. Keay 1984, p. 291, fig. 125.3. Fabric group North African, 10R 5/8 Red, Surface 2.5Y 8/4 Pale Yellow.		

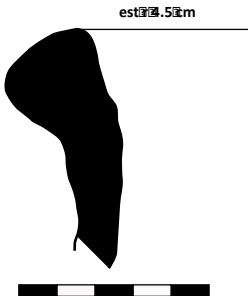
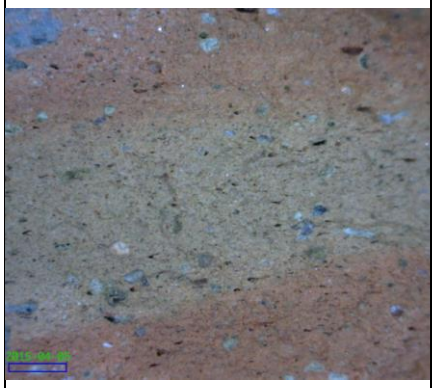
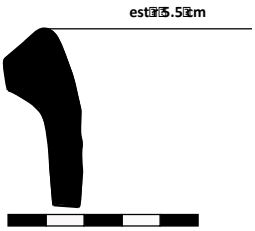
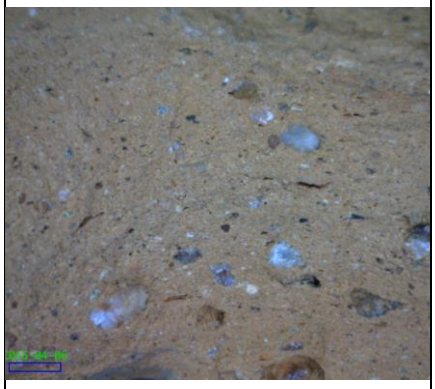
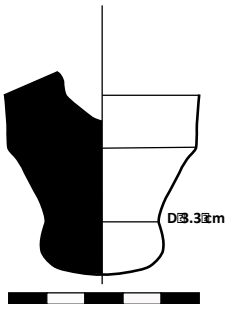
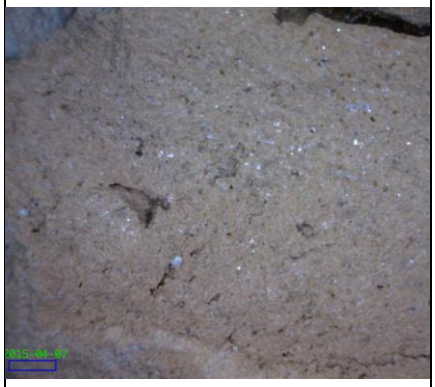
55. Samos Cistern Type, Toe SU14-001-403 D 3.2 cm (slight groove). Preserves toe fragment. Fabric group Samos Cistern Type, 5YR 5/6 Yellowish Red.		
56. Samos Cistern Type, Toe SU14-009-403 D 2.6 cm (narrowest). Preserves toe fragment, with part of body. Fabric group Samos Cistern Type, 5YR 6/6 Reddish Yellow.		
57. Samos Cistern Type, Toe SU14-008-403 D 2.7 cm (narrowest). Preserves toe fragment with part of body. Fabric group Samos Cistern Type, 2.5YR 5/6 Red.		

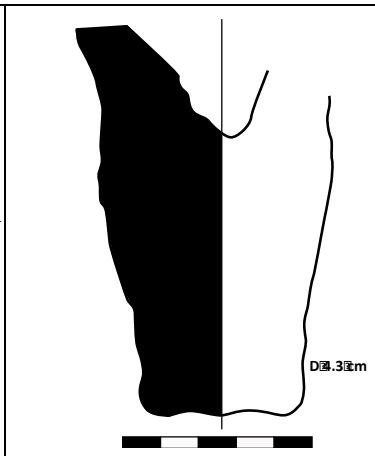
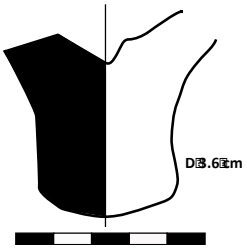
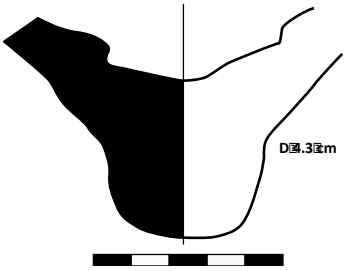
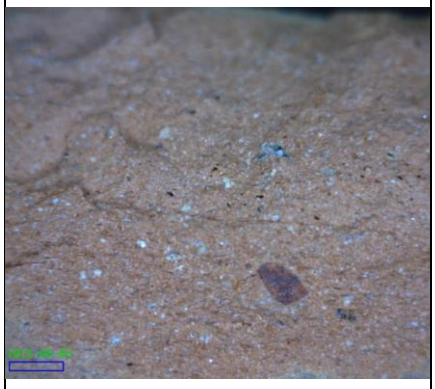
58. Samos Cistern Type, Toe SU14-014-396 D 3.7 cm (narrowest). Preserves toe fragment. Fabric group Samos Cistern Type, 5YR 5/6 Yellowish Red.		
59. LR 3, Toe SU14-001-396 D 3.2 cm (max preserved). Toe fragment. Fabric group LR 3, 5YR 5/8 Yellowish Red.		
60. Ephesus 56, Toe SU14-002-4011 D 2.2 cm (narrowest). Preserves toe fragment Fabric group LR 3, 2.5YR 5/8 Red.		

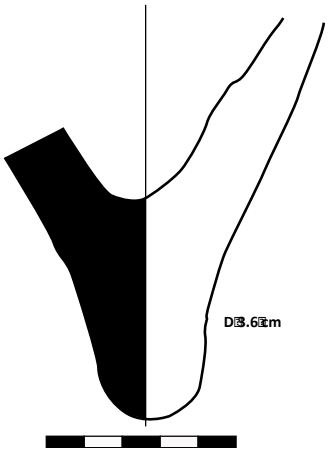
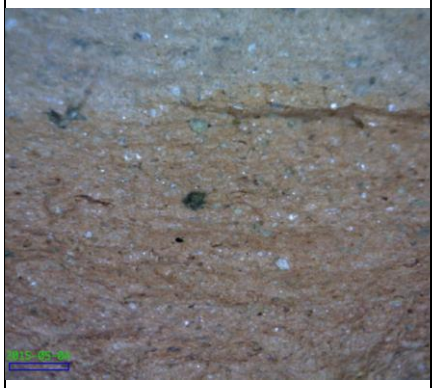
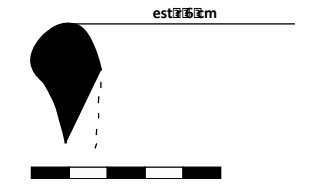
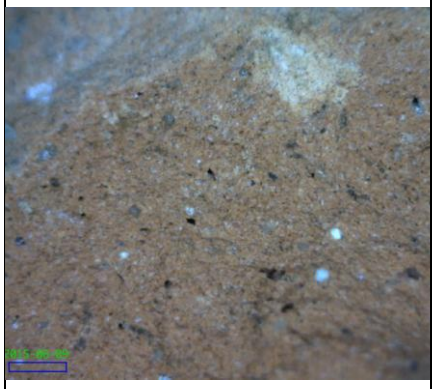
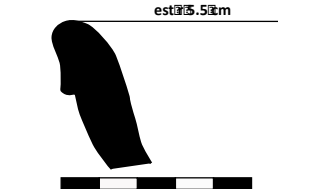
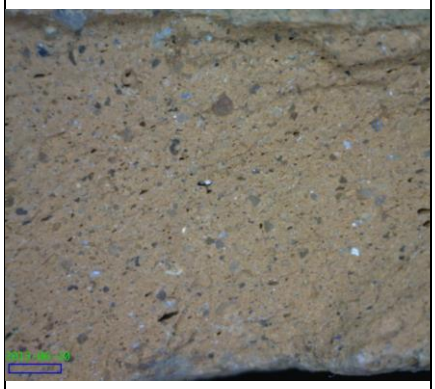
61. Ephesus 56, Toe SU14-012-395 D 2.3 cm (narrowest). Preserves complete toe with part of body. Fabric group LR 3, 2.5YR 5/8 Red, core 5 YR 4/4 Reddish Brown.		
62. Ephesus 56, Toe SU14-008-403 D 2.3 cm (narrowest). Preserves toe fragment, with part of body. Fabric group LR 3, 2.5 YR 4/6 Red.		
63. Pinched-Handle Type, Toe SU14-004-4011 D 3.1 cm (near base). Preserves complete toe with part of body. Fabric group Pinched-Handle Type, 5YR 6/8 Reddish Yellow.		

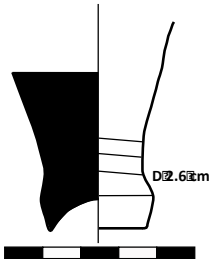
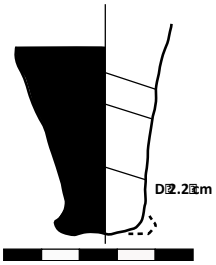
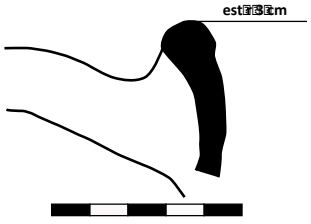
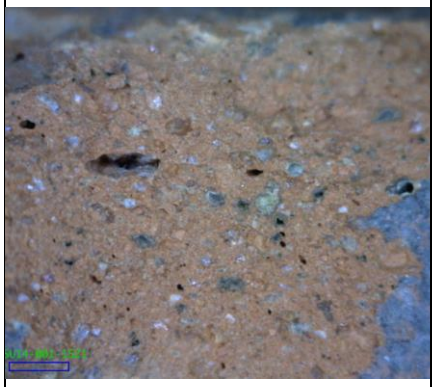
64. Pinched-Handle Type, Toe SU15-001-5899 D 3.5 cm (narrowest). Preserves complete toe. Fabric group Pinched-Handle Type, 5YR 7/6 Reddish Yellow.		
65. Unidentified, Rim SU15-004-5681 PH 5.1 cm; est D 11 cm. Preserves 1/6th rim with part of neck. Fabric group Zeest 80, 2.5YR 4/8 Red, 10YR 6/1 Grey, 10YR 3/1 Very Dark Grey.		
66. Unidentified, Toe SU15-002-5898 D 6.3 cm (narrowest). Preserves complete toe with part of body. Fabric group unknown, 10YR 5/2 Greyish Brown to 10YR 5/3 Brown, core 5YR 5/6 Yellowish Red, surface 5YR 6/6 Reddish Yellow.		

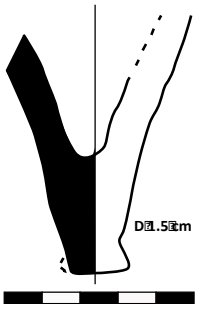
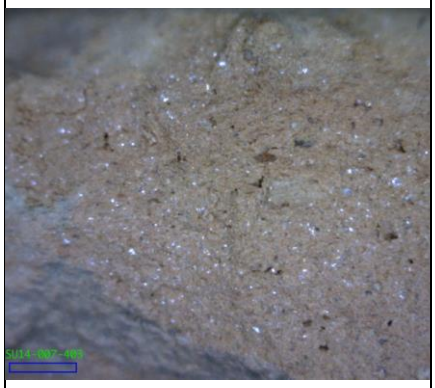
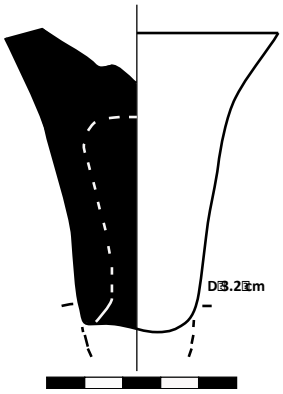
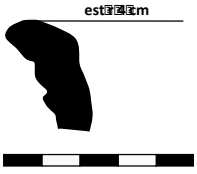
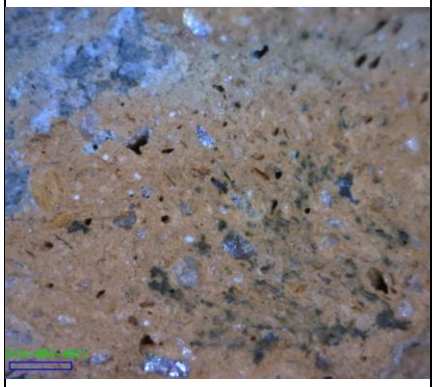
67. Unidentified, Toe SU14-017-115 D 6.2 cm (narrowest). Preserves complete toe with part of body Fabric group unknown (possibly North African?), 2.5YR 5/6 Red, surface 5Y 8/2 Pale Yellow. Possibly Keay 25 var. 1, Keay 1984 p. 209, fig. 87.3.		
68. Unidentified, Rim SU14-016-391 PH 3.4 cm; est D 8 cm. Preserves 1/6th rim. Fabric group (possibly North African?), 5YR 5/8 Yellowish Red.		
69. Unidentified, Toe SU15-003-5625 D 2.9 cm (narrowest). Preserves complete toe with part of body. Fabric group unknown (North African?), 5YR 6/6 Reddish Yellow, surface White.		

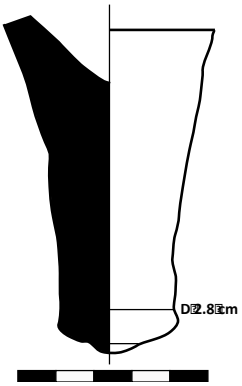
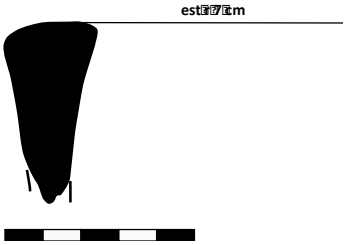
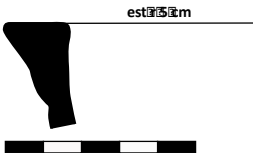
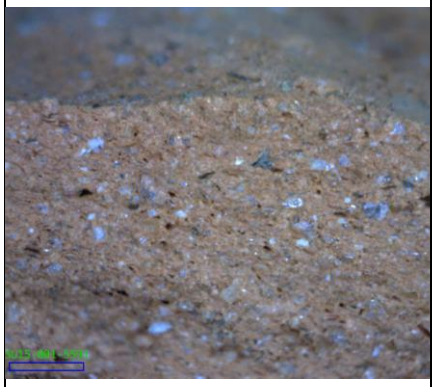
70. Unidentified, Rim SU14-016-114 PH 6.3 cm; est D 9 cm. Preserves 1/6th rim with part of neck. Fabric group unknown, 2.5YR 5/8 Red, core 7.5YR 6/6 Reddish Yellow.		
71. Unidentified, Rim SU14-008-115 PH 4.9 cm; est D 11 cm. Preserves 1/6th rim with part of neck. Fabric group unknown, 5YR 5/6 Yellowish Red.		
72. Unidentified, Toe SU14-016-403 D 3.3 cm (narrowest). Preserves toe fragment. Fabric group unknown, 7.5 YR 6/4 Light Brown.		

73. Unidentified, Toe SU14-012-403 D 4.3 cm (narrowest). Preserves complete toe with part of body. Fabric group unknown, Grey 1 7/1 Light Greenish Grey.		
74. Unidentified, Toe SU14-005-403 D 3.6 cm (narrowest). Preserves complete toe with part of body. Fabric group unknown, 7.5 YR 6/6 Reddish Yellow, core 2.5YR 5/6 Red.		
75. Unidentified, Toe SU14-008-403 D 4.3 cm (toe begins flaring out into body). Preserves complete toe with part of body. Fabric group unknown, 2.5YR 5/8 Red.		

76. Unidentified, Toe SU14-014-211 D 3.6 cm (base of ridge). Presreves complete toe with part of body. Fabric group unknown, 2.5YR 6/6 Light Red, core 7.5YR 6/4 Light Brown.		
77. Unidentified, Rim SU14-017-115 PH 3.5 cm; est D 12 cm. Preserves 1/10th rim. Fabric group unknown, 2.5YR 5/6 Red, surface 2.5Y 8/1 White.		
78. Unidentified, Rim SU14-015-403 1/2 PH 4.3 cm; est D 11 cm. Preserves 1/10th rim. Fabric group unknown (possibly North African?), 2.5YR 6/6 Light Red, surface 7/5YR 7/6 Reddish Yellow.		

79. Unidentified, Toe SU14-004-4011 D 2.6 cm (narrowest). Preserves toe fragment. Fabric group unknown, 10YR 6/4 Light Yellowish Brown, surface 2.4 YR 6/6 Light Red.		
80. Unidentified, Toe SU14-004-4011 D 2.2 cm (narrowest). Preserves toe fragment. Fabric group unknown, 7.5 YR 7/6.		
81. Unidentified, Rim SU14-001-1521 PH 5.5 cm; est D 6 cm. Preserves 1/7th rim with part of neck and handle. Fabric group unknown, 2.5YR 6/8 Light Red.		

82. Unidentified, Toe SU14-007-403 D 1.5 cm (narrowest). Preserves toe fragment with part of body. Fabric group unknown (Ephesian?), 5YR 7/6 Reddish Yellow.		
83. Unidentified, Toe SU14-016-403 D 3.2 cm (narrowest). Preserves toe fragment with part of body. Fabric group unknown, 5YR 6/8 Reddish Yellow.		
84. Unidentified, Rim SU14-003-4011 PH 3.3 cm; est D 8 cm. Preserves 1/7th rim. Fabric group unknown, 5YR 6/8 Reddish Yellow, core 10 YR 8/2 Very Pale Brown.		

85. Unidentified, Toe SU14-009-403 D 2.8 cm (narrowest). Preserves complete toe with part of body. Fabric group unknown, 5YR 6/6 Reddish Yellow, surface 7.5YR 7/6 Reddish Yellow.		
86. Unidentified, Rim SU15-003-5310 PH 4.7 cm; est D 14 cm. Preserves 1/7th rim. Fabric group unknown, 7.5YR 6/4 Light Brown.		
87. Unidentified, Rim SU15-001-5591 PH 2.5 cm; est D 10 cm. Preserves 1/6th rim with part of neck. Fabric group unknown, 5YR 5/8 Yellowish Red.		

88. Unidentified, Rim SU15-003-6522 PH 7.1 cm; est D 11 cm. Preserves 1/3rd rim with part of neck. Fabric group unknown, 5YR 4/1 Dark Grey, core 2.5YR 5/6 Red.