THE TRANSPORT AMPHORAS FROM A FIFTH CENTURY SHIPWRECK FOUND OFF THE ISLAND OF ALONNESOS, NORTHERN SPORADES, GREECE

A Thesis

Presented to

The Faculty of the Maritime Studies Program

Department of History

East Carolina University

In Partial Fulfillment

Of the Requirements for the Degree

Master of Arts in Maritime History and Nautical Archaeology

By

Eleftheria Mantzouka

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Eleftheria Mantzouka. THE TRANSPORT AMPHORAS FROM A FIFTH CENTURY SHIPWRECK FOUND OFF THE ISLAND OF ALONNESOS, NORTHERN SPORADES, GREECE (Under the direction of Dr. Timothy Runyan) Department of History, Program in Maritime History and Nautical Archaeology, April 2004.

This thesis is the study of the Mendaian and Solokha II transport amphoras recovered from a shipwreck dated to the end of the 5th century B.C. The wreck site, lying 30 meters underwater, was discovered southwest off the islet of Peristera and due east of the modern island of Alonnesos. Both islands belong to the group known as the Northern Sporades, which are strategically located off the northeastern seaboard of Greece filtering the north-south maritime traffic during ancient times.

Personnel from the Department of Marine Antiquities, an official agent of the Greek Ministry of Culture and Sciences, excavated the shipwreck during the summers of 1992 and 1993. Dr. Elpida Hadjidaki, then Director of the Department, is the primary investigator of the excavation, under whose direction the site was mapped, measured, photographed and excavated according to current archaeological standards. Besides the amphoras, a number of tableware, bowls, oil lamps and other utilitarian artifacts were also recovered from the site. They were properly conserved and are currently in the care of the Department in Athens.

The author worked for the Department as a trainee underwater archaeologist during the 1993 summer excavation season, and subsequently was granted permission to study the amphoras. The present research focuses on 142 transport amphoras recovered from the Alonnesos shipwreck site, which were recorded and studied according to standard archaeological methods and procedures. An attempt is made to determine—by

combining the present archaeological data with earlier historical sources and other artifactual evidence from terrestrial and underwater excavations—the provenance, chronology, typology, possible content(s), capacity, and place(s) of distribution of these amphoras. The data collected are also used to calculate the approximate capacity of the 'Alonnesos' merchant ship, estimated to have been loaded with more than 3,000 amphoras. Finally, the author highlights the role of the amphora cargo in maritime trade during the late 5th century, focusing mainly on the wine-producing region of Mende in the Chalkidian peninsula, and the Northern Sporades, which were the cross-roads of trade along the eastern coast of Greece and the final resting place of this 2,500-year-old ship.

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For Theophanis and Eutychia,
& my beloved Epirus

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acquire for me foreign resource material, and the largest percentage of the books and articles, upon which this study is based. No less, I am especially thankful to the Chairman of the History Department, Dr. Michael Palmer, and the Dean of the Graduate School, Dr. Paul Tschetter who granted to me the necessary extension for completing the requirements for graduation in the face of unexpected personal events that delayed the submission of this work.

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This study has benefited in so many ways from the scholarly work of the irreplaceable Virginia R. Grace, whose meticulous work and study of amphoras led a host of archaeologists in search of clues, in every aspect of ancient history, which are stored for eons in the form, fabric and contents, of these widely distributed clay vessels. In addition, my sincere thanks to Dr. Mark Lawall whose detailed study of transport amphoras assisted tremendously my study and analysis of the amphoras from the Alonnesos shipwreck. Throughout the years, he provided me with suggestions, information, and foreign-language articles, which were indispensable for the development of this study. His comments and keen remarks on so many of my questions assisted me in a better understanding of the breadth and depth of the amphora studies. So many other scholars have been most generous in replying to my classical, historical, and statistical oriented questions during my research, especially the members of the scholarly e-lists like sub-arch, classics, greek-arch, and aia-l, that I must be excused if I do not mention them here all by name: Dr. Nick Eiteljorg, Dr. Cynthia Eiseman, Dr. Peter Green, Dr. Anne Mahoney, Dr. George Pesely, Dr. Frank Romer, Dr. Richard Rothaus, Dr. Elias Theodoracopoulos, Dr. Elizabeth Lyding Will, and Dr. Ian Whitbread were among the most prominent of these.

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Eleftheria Theophanous Mantzouka

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LIST OF BIBLIOGRAPHIC ABBREVIATIONS

AA	Archäologischer Anzeiger, Berlin
ArchDelt	Archaiologikon Deltion, Athens
AE	Archaiologike Ephemeris, Athens
AEMTh	To Archaiologiko Ergo ste Makedonia kai Thrake, Thessalonike
AR	Archaeological Reports, British School at Athens
ATL	The Athenian Tribute Lists
AZ	Archäologische Zeitung
BibAR	Biblical Archaeology Review
BAR	British Archaeological Reports, Oxford
BSA	Annual of the British School at Athens, London
BCH	Bulletin de Correspondance Hellénique, Paris
DEGUWA	Deutsche Gesellschaft zur Forderung der Unterwasserarchaologie e.V.
EA	Enalia Annual, Hellenic Institute of Marine Archaeology, Athens
FGrH	Die Fragmente der Griechischen Historiker
GGM	Geographi Graeci Minores
IG	Inscriptiones Graecae
IJNA	International Journal of Nautical Archaeology, England
KSIIMK	Kratkie Soobshcheniia Instituta Istorii Materialnoi Kultury AN SSSR (Abstracts of the Institute of History in Material Culture), Moscow
MDA	Mitteilungen des Deutschen Archäologischen
MIA	Materialy i issledovaniia po arkheologii SSSR (Research Materials in Archaeology), Moscow
NC	Numismatic Chronicle
NE	Numismatika i Epigrafika (Numismatics and Epigraphy), Moscow
PZ	Praehistorische Zeitschrift
RE	Real-Encyclopadie der Classischen Altertumswissenschaft (Pauly-Wissowa)
RN	Revue Numismatique
RSN	Revue Suisse de Numismatique
SA	Sovetskaia Arkheologiia (Soviet Archaeology), Moscow (SA includes translated abstracts after 1968; 1969-1978 in French, and 1979- to date in English)
SGE	Soobshcheniia Gosudavstvennogo Ermitazha (The State Hermitage Research Reports)
ZDGG	Zeitschrift der Deutschen Geologischen Gesellschaft
ZfN	Zeitschrift fur Numismatik
ZPE	Zeitschrift fur Papyrologie und Epigraphik

The abbreviations herein are those followed by the *American Journal of Archaeology* and *L' Année Philologique.*

INTRODUCTION

"'Anemopyles?' He shook his head. 'The Northern Sporades are called the gates of the wind.' He [the fisherman] gestured northward, and raised his hand, fingers outspread. He touched each finger in turn, frowning as he recalled the names of the islands, one by one. 'Skiathos. Skopelos. Alonnisos. Kyra Panayia. Iura.' And then he put his mouth close to his extended hand and blew through his open fingers with a great hissing noise, and laughed. 'Afta einai – those are the gates of the wind.'[1]

The discovery of the Alonnesos shipwreck belongs to those innumerable cases of sheer chance when local inhabitants stumble upon an archaeological site and bring it to the attention of the Greek Archaeological Service.[2] A Greek fisherman, Mr. Dimitris Mavrikis,[3] discovered a mound of amphoras in 1985 and reported it to the Department of Marine Antiquities in Athens.[4] Subsequently, Mr. Peter Winterstein, a German antiquities conservator, filed a report and a video-tape with the Department emphasizing the size and

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[1] Michael Carroll, *Gates of the Wind* (Athens, 1983), 2.

[2] All dates given in this study are B.C. unless otherwise indicated. Circa abbreviated as 'ca.' The Catalogue Numbers from 1 to 149, which correspond to the Mendaian, Solokha II and the Miscellaneous amphoras, appear in the text as "No. or Nos. X, Y., etc." Greek words and names are transliterated from the ancient spelling, except where the Latinate or Anglicized version is in common usage. The following characters might have been used inconsistently, c/ch, c/k, i/e, g/y, and h preceding a word starting with a vowel, depending on the word.

[3] Carroll, *Gates of the Wind*, 152-166, dedicates a vivid and amusing section to the family of Kostas Mavrikis (father of Dimitris), who originate from the island of Ikaria, and shares with us joyful scenes from his daughter's Alonnisiot wedding. The author became integrated with the Greek islanders and built his house overlooking Panormos bay in the mid-1960s on the island of Skopelos.

[4] The Department of Marine Antiquities (hereafter referred to as the 'Department') is the government agency under the auspices of the Hellenic Ministry of Culture and Sciences, responsible for: a) the location and preservation of ancient shipwrecks, submerged ancient settlements or buildings in the sea, lakes or rivers, and the recovery of the material remains from the shipwrecks, b) the preservation of marine antiquities, c) the establishment of museums of marine antiquities, and d) the superintendence of the work of Marine Archaeology and Oceanographic Institutes, and any other underwater expeditions in the Greek

archaeological importance of the site.[5] The large number of amphoras forming two and up to three layers was indicative of the resting ground of an ancient shipwreck. The site is located approximately two hundred meters southwest of the small rocky island of Peristera. This uninhabited islet lies only 1.5 miles due east of the small but well-known island of Alonnesos. Grouped opposite the Thessalian coast of the northern Aegean Sea, both Alonnesos and Peristera, along with twelve more inhabited islands, belong to the Northern Sporades chain of islands (Figs. 1, 2 and 3).

The discovery and the whereabouts of the shipwreck remained on file until 1991, when Dr. Elpida Hadjidaki, then director of the Department and leader of the archaeological investigation, organized a preliminary survey of the site with a small team consisting of personnel from the Department.[6] The wreck lies on a sloping sandy bottom between 22 and 33 meters (ca. 72 and 108 feet) in depth.[7] The amphora mound measures 25 meters long by

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national waters.

[5] Von Markus Haist and Peter Winterstein, "Greece and the Sea," *DEGUWA*, no. 6, issue 3 (June 1993): 21-22 (with two photographs of the amphora mound from 1988 and 1989).

[6] I would like to thank Dr. Elpida Hadjidaki for providing me with the information on the discovery and preliminary investigation of the shipwreck. The details herein come from: the press, J. N. Wilford, "Ancient Greek Shipwreck Found; Cargo was Fine Wine," *The New York Times: Science Times* (April 13, 1993); a presentation on the Alonnesos shipwreck delivered at East Carolina University in the spring of 1994, see newsletter of ECU Faculty and Staff, *Pieces of Eight* 16, no. 15, (April 1994) and subsequent articles: Elpida Hadjidaki, "Underwater Excavations of a Late Fifth Century Merchant Ship at Alonnesos, Greece," *BCH* 120, II (1996): 561-593; "Excavation of a Classical Shipwreck at Alonessos (5th c. BC)," *Enalia Annual 1992*, IV (1996): 37-45; "Νομός Μαγνησίας: Αλόννησος (Prefecture of Magnesia: Alonnesos)," *ArchDelt-Chronika* 46 (1991): 523-524; and "The Classical Shipwreck at Alonnesos," in *Res Maritimae: Cyprus and the Eastern Mediterranean from Prehistory to Late Antiquity*, ed. by Stuart Swiny, Robert L. Hohlfelder, and Helena Wylde Swiny, (Atlanta, 1997), 125-134. Also in David Blackman, "Archaeology in Greece 1996-1997: Southern Thessaly-Alonnesos," *AR* 43 (1996-97): 59.

[7] I have rounded the numbers of the US equivalent unit to the closest foot.

12 meters wide (82 x 39 feet). At least two layers are visible, of which the upper is composed of mingled amphoras facing in different directions. Most of them seem to be intact and in a good condition, despite the fairly shallow depth and close proximity to the shore. The archaeologists noticed a gap in the center of the mound, and it has been suggested that it either accommodated the mast or a bilge pump, or that it is the work of amphora smugglers.[8] Despite the mostly jumbled upper layer, the overall tightly arranged shape of the amphora mound suggests that the ship must have settled on the bottom without capsizing or breaking apart. This, in connection with the fact that there are more amphoras buried in the sand and concretion under the visible ones, is an omen for the discovery of preserved pieces of wood, if not of whole planks, on the very bottom of the pile. It was noted that the axis of the mound lies 120° southeast, which might be an indication that she sank while listing to port. If this is true, then this is where the bulk of the wood should be preserved (Fig. 5).

In 1992 the archaeological team recovered three amphoras for a tentative typological and chronological identification. E. Hadjidaki identified them as belonging to the Mendaian and Peparethian I types (the latter is linked to the Solokha II type), probably originating in the city of Mende and the island of Peparethos respectively, and dated them to the end of the 5th century.[9] It has been suggested that the large number of amphoras, estimated to be more than

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[8] Although thirty meters is a respectable diving depth, it falls within normal open water scuba-diving range. It is not unusual for shipwrecks at these depths to be looted. The wreck lies approximately two hundred meters off the Island of Peristera, which is uninhabited but is frequently visited by local fishermen, by spear fishermen hunting for groupers, and by vacationers who occasionally scuba-dive on the site illegally. It is no wonder, then, how most of the shipwrecks are discovered (or concealed). Fortunately, most of the time the local people act as guardians of their heritage, playing the role of a 'coast guard militia' and monitoring any suspicious activity around archaeological sites.

[9] See Hadjidaki, "Underwater Excavations," *BCH* 120, II (1996): 590, and "Excavations of a Classical

four thousand, reveals a ship larger in tonnage than most modern scholars believe plied the waters during those times. This estimate, along with the amphora identification and capacity measurements, makes it the largest classical era shipwreck carrying such a number of Mendaian and Solokha II amphoras together in a closed deposit.

In the wake of the preliminary survey, E. Hadjidaki determined that the site was of utmost importance for ancient Greek maritime history, and organized a full-scale underwater excavation that was carried out by the personnel of the Department during the summers of 1992 and 1993.[10] During the first summer, the preparatory work before excavation included: a) the production of a photomosaic of the mound; b) the measurement of the overall dimensions of the mound; c) the survey of the site and surroundings up to 30 meters away, to locate scattered artifacts; d) the examination of the thickness of the sand around the mound; e) the establishment of a movable rope grid;[11] f) the use of two complementary

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Shipwreck at Alonnesos," *Enalia Annual 1992* IV (1996): 40. Mende was an ancient coastal city lying on the west side of the Kassandra peninsula (ancient *Pallene*), facing the Thermaic Gulf in North Greece, see Thucydides, *History of the Peloponnesian War*, IV.123, 339. Peparethos (modern Skopelos), located south-west of Alonnesos, belongs to the Northern Sporades group of islands. An initial identification of mostly fragmentary vessels from the islands of Skopelos and Alonnesos to the so-called Solokha II type amphora was made by A. Doulgeri-Intzessiloglou and Y. Garlan, "Vin et Amphores de Peparethos et d'Ikos," *BCH* 114, I (1990): 380-381. In this study I shall continue to use the name 'Solokha II' and shall explain the reasons in the relevant section.

[10] Up to fifty members, including archaeologists, architects, geologists, draftsmen, conservators, photographers, and divers were present during both excavation seasons. Funds were provided by the Greek Ministry of Culture and Sciences and by the European Economic Community within the scope of a program for the training of young marine archaeologists in Greece. In the spring of 1993, the author met with E. Hadjidaki and subsequently worked for the Department during the summer excavation season. While pursuing her graduate studies at East Carolina University, she was given permission to study the amphoras recovered during the excavations. Having a first-hand experience on the site and being familiar with the material, the author was pleased to undertake this task.

[11] Hadjidaki, "Underwater Excavations," *BCH* 120, II (1996): 565, the grid divided the mound into 72 sections (2x2 m each) and was used for the systematic excavation of the site as well as to facilitate the orientation of the divers on the site. It was indexed horizontally (columns) with the Greek letters A

photogrammetric methods to record accurately the location of each amphora and its distance from others; and g) the labeling of 976 amphoras on the top surface and thirty more found on the perimeter of the mound. Proper excavation began in section Θ6 at the west side based on the assumption that she sank while listing to port. By the end of the first excavation season, the archaeological team had recovered a great number of artifacts, including: 65 amphoras, a lead collar from an anchor, and 35 other artifacts such as black-glazed kylikes, oil lamps, a bronze bucket, and a ladle. The recovery of such a number of artifacts was anticipated, and they were commensurate to the size of the mound.

The conservation team treated most of the artifacts recovered from the shipwreck on site, then packed and shipped them to the main conservation laboratory in Athens, where a careful chronological and typological identification of the amphoras was possible in the context of the accumulated material. Dr. Virginia R. Grace, pioneering expert in the study of 'Greek amphorology' and their stamps, after examining the amphoras in photographs, reached the conclusion that they belong to the Mendaian and the Solokha II types and dated them to the end of the 5th century.[12] Dr. Carolyn G. Koehler, a specialist in the study of amphoras with emphasis on Corinthian transport vessels, has identified artifact B 47 (the lower body of an amphora), which was also recovered from the shipwreck, as

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through N, and vertically (rows) with the numbers 1 through 6.

[12] In regards to the production sites in Mende, see Ioulia Vokotopoulou, "Ανασκαφή Μένδης 1989," in *AEMTh* III (1989), 410, and "Cities and Sanctuaries of the Archaic Period in Chalkidike," *BSA* 91 (1996): 326, what might be a pottery workshop and a kiln were discovered on top of a late 5th century layer in the 'suburb', and another kiln from the Roman times at the site of the Sanctuary of Poseidon. For detailed bibliography of the excavations at Mende see Chapter 1. For the production sites on Peparethos, see Doulgeri-Intzessiloglou and Garlan, "Vin et Amphores de Peparethos et d'Ikos," *BCH* 114, I (1990): 361-389. For the discussion of both types of amphoras, see Chapter 2 and 4.

Corinthian B/Corcyraean and dated it to the second half of the 5th century.[13] Hadjidaki suggests a date ca. 420-400 for the cargo, based on the characteristics of amphoras and the dating of black-glazed cup-skyphoi and kylikes.[14]

During the second excavation season, in the summer of 1993, the team continued the excavation in column Θ. A total of seventy-five amphoras was recovered, along with black-glazed bowls, one plate, bits of burned wood and chunks of unburned wood from which samples were taken for C14 analysis at 'Demokritos', the National Research Center for Physical Sciences (NRCPS). The excavation sections were carefully backfilled with sand to preserve the exposed artifacts at the end of the excavation. Once more, the artifacts were given an initial treatment on site, and then shipped to the conservation laboratory in Athens. According to E. Hadjidaki, clay analysis of the ceramics, particularly the kylikes (wine cups), determined that their clay is of Athenian origin. X-ray fluorescence analysis was performed on the metallic objects —the copper bucket and the lead collar— and the C14 analysis dated the cutting of the wood from 480 to 420.[15]

According to Hadjidaki, this is the first recorded example of a late fifth-century ship of high tonnage ever found in the world.[16] Although few sections have been excavated

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[13] Personal communication, July 1995.

[14] Hadjidaki, "Underwater Excavations," *BCH* 120, II (1996): 569, 577-582.

[15] Ibid., 572, n. 45, and 590.

[16] In 1994, a shipwreck was located off the islet of Phagrou (also known as Pelerissa). This islet lies off the bay of Agios Petros located southwest of Kyra Panagia island (the latter has been identified with ancient Halonnesos). A preliminary excavation was launched by personnel of the Department for two consecutive years. The mound measures 18 x 6 m. A two-piece lead anchor and a piece of wood with copper nails were recovered during the excavation. Its cargo is estimated to include up to 1,500 Mendaian amphoras, a

thoroughly so far, the number of artifacts recovered per section indicates that the ship might have been over one hundred metric tons.[17] This stands in contrast to previous assertions that ships over seventy-five tons were rare during the Classical period and did not appear until the first century A.D.[18] Information on ancient ships and shipbuilding comes mainly from literary texts and indirect archaeological evidence (representations on pottery, marble reliefs, and frescoes), which in combination with the scarce, yet emerging, direct archaeological evidence, i.e., shipwrecks, is still controversial. Five other significant shipwrecks have been discovered dating from the middle of the 5th to the end of the 4th centuries, but their size is considerably smaller, ranging from six to thirty metric tons. These are: the Tektaş Burnu shipwreck, lying off the coast of Turkey, estimated to have been up to 7 tons, and the Ma'agan Micha'el, found off the coast of Israel, estimated at 20 tons. Also, the Porticello shipwreck, which was discovered in the Straits of Messina, Italy, the Kyrenia shipwreck found off northern Cyprus, and finally the El Sec shipwreck, found off Majorca were all

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number of them are lined inside with resin/pitch. It has been tentatively dated to the middle of the 5th century. For the shipwreck in the press, see Alexandra Koroxenidou, "Οι Αρχαίοι των Βυθών (The Ancients of the Underwater Depths)," *Vima* (Athens, Greece), Sunday 22 October 1995: 6; and R. A. Tomlinson, "Archaeology in Greece 1995-96: Southern Thessaly-Halonnesos," *AR* 42 (1995-96): 23; G. Touchais, "Chronique des Fouilles et Découvertes Archéologiques en Grèce en 1995," *BCH* 120 (1996): 1290; and D. Kazianes, "Nomos Magnesias: Phagrou Voreion Sporadon," *ArchDelt-Chronika B'2* 51 (1996): 724-5.

[17] Hadjidaki, "Underwater Excavations," *BCH* 120, II (1996): 588.

[18] Early assertions on the size of ancient ships were based on literature and iconography at a time when direct evidence, i.e., shipwrecks, had not been discovered and studied yet. For a full discussion on contradictory opinions, including those of Noettes, Torr and Rouge, see Lionel Casson, *Ships and Seamanship in the Ancient World* (Baltimore, 1995), 170-173. J. Rouge, *Ships and Fleets of the Ancient Mediterranean*, trans. Susan Frazer (Connecticut, 1981): 77, amended his miscalculation on the tonnage of the ship cited in Demosthenes' *Against Lacritus*, XXXV.10. For recent views based upon shipwreck remains, see A. J. Parker, "Cargoes, Containers and Stowage: the Ancient Mediterranean," *IJNA* 21 (1992): 89; and C. J. Eiseman and B. S. Ridgway, *The Porticello Shipwreck* (College Station, 1987): 108-9.

calculated to have been about 30 tons. These thus, fall in the range of small tonnage for coastal navigation serving mostly localized trade.[19]

The Alonnesos shipwreck is an important link in the chain of underwater archaeological discoveries of ancient shipwrecks dating from the 6th to the 4th centuries. It is the largest time capsule of contemporary amphoras from the late 5th century. It should be noted that, in this study, the calculations of tonnage is mainly based on the cargo of amphoras. They constitute excellent material for a future case-study using a unique large sample to complement an otherwise limited database of capacity measurements for the Mendaian and Solokha II amphoras. A close estimate of their capacity provides strong evidence for a high-tonnage merchant ship. However, any suggested numbers should still be used with caution, as the site has not been excavated completely and unknown factors might come into play in the future.

The study of the amphoras from the cargo provides us with new information and generates many questions on: a) the origin of the amphoras, b) the period during which they were manufactured and used, c) the types under which they can be classified, d) the visual identification of the clay color as a possible indicator of their type, e) the sampling and identification of any traces of their contents, and finally, f) the capacity measurements of the vessels. The author presents and discusses herein the results, hoping that they can be used for

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[19] Deborah N. Carlson, "The Classical Greek Shipwreck," *AJA* 107 (2003): 596; E. Linder, "Ma' agan Micha'el Shipwreck," *BibAR* 18 (1992): 26, 31; Eiseman and Ridgway, *The Porticello Shipwreck*, 13, and 108; Michael L. Katzev, "An Analysis of the Experimental Voyages of Kyrenia II," in *Tropis II: 2nd International Symposium on Ship Construction in Antiquity* (Delphi, 1987), 245-256; J. Richard Steffy, *Wooden Ship Building and the Interpretation of Shipwrecks* (College Station, 1994), 42-59; A. Arribas, "El Pecio de El Sec," in *El Barco de El Sec (Costa de Calvia, Mallorca): Estudio de los Materiales*, ed. by A. Arribas, Ma G. Trias, D. Cerdá, and J. De La Hoz (Mallorca, 1987), 33-36.

further research and analysis for transport amphoras and wine trade.

The Alonnesos shipwreck is a valuable archaeological discovery. The director of the excavation hopes that it will shed light on yet another aspect: provided that the hull can be recovered, we will be able to examine for the first time the shipbuilding techniques applied to a large merchant ship.[20] Ultimately, it can contribute significantly to expanding our knowledge about the maritime trade among Greek city-states during the final years of a tumultuous period, that of the Peloponnesian War (431-404).

[20] Hadjidaki, "Underwater Excavations," *BCH* 120, II (1996): 591.

CHAPTER 1: HISTORICAL BACKGROUND

"The barren islands of Sciathus and Peparethus were the bridge from Euboea to the coast of Macedonia, which, between the rivers of Axius and Strymon, runs into a huge three-pronged promontory. Here Chalcis planted so many towns that the whole promontory was named Chalcidice."[21] Who could have imagined that one archaeological discovery was to embody the very essence of J. B. Bury's words and fill a gap in the picture reflected in the readers' mind? Possibly no one did. Not even the small population living in Northern Sporades during the 1900s[22] imagined the rich resources and the geostrategic importance that the islands possessed in antiquity. Nor could one imagine the amazing means by which communication was maintained among the colonies established by the cities of Euboia in North Aegean (Fig. 3).

This is the discovery of an ancient merchant ship, which, like so many other vessels of its kind, plied the Aegean waters in favorable seasonal winds, laden with an array of durable and perishable goods. And, it was the ship, rather than the islands, that served as the 'bridge' between the cities located on the island of Euboia, the Northern Sporades and the Chalkidian peninsula; people, goods and ideas would 'cross' over every time its boarding plank would touch the docks. Thus, the very location of the shipwreck and the provenance of its cargo demand a broader discussion on the geographical and historical background of these

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[21] J. B. Bury, *History of Greece* (London, 1908), 92.

[22] According to the 1907 census, Skopelos' population numbered 6,520 and Alonnesos 729, and in 1981 changed to 4,451 and 1,528 respectively; see George K. Giankakes, *Συμβολή στη Μελέτη του Αρχιπελάγους των Βορείων Σποράδων (Contribution to the Study of the Archipelagos of Northern Sporades)* (Tenos,

regions bordering the northern Aegean Sea, focusing on the islands of Ikos, Peparethos, and the city of Mende.

The shipwreck lies off the rocky islet of Peristera (Xero or Xeronesi), the latter name referring to its barren or dry terrain (Fig. 2).[23] However, the islet seems to have been anything but barren in antiquity, as it belongs to the same geomorphologic zone of the Northern Sporades group of islands; their peaks parting the waters are "the tops of the mountains of an extended submarine ridge which starts from Thessaly and continues in a north-easterly direction to the north Aegean basin."[24] In spite of the variant degree of natural resources among the islands, the land was covered with Aleppo pines, evergreen oaks, and some fertile valleys strewn with olive trees during ancient times. The inhabitants occupied themselves

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1989), 31-32; and Great Britain - Foreign Office, *The Balkan States* (London, 1920), 15.

[23] Peristera is said to have taken its popular modern name from its characteristic shape of a dove. Among the locals it is known as Xero, because of its dry land, devoid of fruit-bearing trees. In 1836, the Greek Ministry of Interior officially named it 'Euoenymos' as it was identified by this name in Pliny's *Natural History* IV, XII 72. That name refers to its geographical position, meaning 'lying to the left of' Alonnesos. Hammond, however, marked on a map the island with the name 'Eudemia' (same passage in Pliny) and placed a question mark beside it, *Atlas of the Greek and Roman World in Antiquity* (N.J., 1981), 7b BCc; but others have also identified the neighboring island of Psathoura with the name 'Eudemia'. For ancient and modern name attributions, see Christos G. Athanasiou, *Η Νήσος Αλόννησος (The Island of Alonnesos)*, (Alonnesos, 1962), 23-4; Adamantios A. Sampson, *Αλόννησος -Ερημόνησα (Alonnesos-Isolated Islands)*, (Athens, 1971), 51; and Sampson, "Ικος - Αλόννησος και αι Ερημοι Νησίδες των Β. Σποράδων κατα την Αρχαιότητα (Ikos - Alonnesos and the Isolated Islets of Northern Sporades in Antiquity," *Archive of Euboic Studies* 17 (1970): 368-370.

[24] To the east and north-east of Peristera are several other rocky islands whose name became the subject of a complicated toponymic puzzle: Kyra Panagia (also known in modern times as Pelagonesi, or Pelago/s), Gioura (ancient Gerontia), Piperi (ancient Irresia), and Psathoura (ancient Euthyra or Eudemia), and south of Peristera, the islet of Skantzoura (Skandyra); see Sampson, "Ikos - Alonnesos and the Isolated Islets," *Archive of Euboic Studies* 17 (1970): 358-370. On the different names of the islands appearing in maps from 1575-1828, see Nikos Efstratiou, *Agios Petros: A Neolithic Site in the Northern Sporades* (Oxford, 1985), 8; and Giankakes, *Contribution to the Study of the Archipelagos of Northern Sporades*, 39. For a list of bibliographic references for the Northern Sporades to the 1930s, see Dionysios P. Kalogeropoulos, *Συμβολή εις την Βιβλιογραφίαν της Νήσου Ευβοίας και των Θεσσαλικών Σποράδων, 1471-1937 (Contribution to the Bibliography of the Island of Euboia and the Thessalian Sporades, 1471-1937)* (Athens, 1937), 196-202 no. 715, 254 no. 833; and the three-volume work covering the years from 1473 to 1955 by G. I. Foussaras, *Ευβοϊκή Βιβλιογραφία (Euboic Bibliography)* (Athens, 1955).

with agriculture, fishing, animal herding and shipbuilding, but geological changes, heavy deforestation, and shifting socio-economic priorities progressively altered the picture for the modern visitor.[25]

Today, shepherds with their flocks can be seen on Peristera, and, occasionally, tourists hopping across from neighboring Alonnesos. The closest distance in the channel separating the two islands is only half a mile of azure sea. So, small hills, pastoral terrain, sandy beaches, and tiny bays comprise this small peaceful patch of land stretching 16 km^2; yet the channel is known to have been a pirates' lair during the Greek War of Independence in the 1800s.[26] A number of ancient graves were found on the islet, but its identity—let alone its history—remains uncertain for lack of other literary or archaeological evidence.

West of Peristera lies the island of modern Alonnesos[27] (ancient *Ikos*) and further

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[25] The geomorphologic composition of the Northern Sporades has been studied in great detail. We are informed that Alonnesos, Peristera, and Kyra Panagia belong to a different geological unit (than Skiathos, Skopelos and Skyros), the so-called Vardar zone, which includes central Macedonia and Thrace, see A. Kelepertsis, "Geological Structure of Alonnisos and Peristera Islands," *ZDGG* 125 (1974): 225-236. On the geology of the area and insight on the maritime activities discussed for periods as early as Palaeolithic times, see N. C. Flemming, "Preliminary Geomophological Survey of an Early Neolithic Submerged Site in the Sporadhes, N. Aegean," in *Quaternary Coastlines and Marine Archaeology*, ed. by P. M. Masters and N. C. Flemming, (London, 1983), 233-268. For a general discussion on the geology and vegetation on the islands in connection to the study of the Neolithic settlement (7,000 - 6,000 B. P.) on the islet of Agios Petros (located in the bay of Kyra Panagia), see Efstratiou, *Agios Petros*, 3-5.

[26] During Byzantine times, Peristera was known as 'Sarakinonesi, Sarakonesi, or Sarakino' in reference to the Saracen pirates who took the harbor in the Bay of Vasiliko, in 904 A.D., after having plundered the city of Thessalonike. Peristera appears as 'Saraquino' on the original map of Greece in Blaeu's *Atlas Major* published in Amsterdam in 1662; see recent edition with reproductions in John Goss and Joan Blaeu, *Blaeu's The Grand Atlas of the 17th century World* (Hong Kong, 1997), 120-121.

[27] Before the formation of the independent Greek State, Alonnesos was known as Chiliodromia, Khelidhromi, Liadhromia, Iliodromia or Diadromia. In 1836, the Greek Ministry of Interior officially named the island 'Alonnesos' in an erroneous toponymic identification; see Giankakes, *Contribution to the Study of the Archipelagos of Northern Sporades,* 39; and Sampson, "Ikos - Alonnesos and the Isolated Islets," *Archive of Euboic Studies* 17 (1970): 358. The name 'Iliodromi' appears in a portolan (cartographic chart) in Armand Delatte, *Les Portulans Grecs* (Paris, 1947), 274.

west lies the island of modern Skopelos (ancient *Peparethos*). Both islands are mentioned by Strabo: "Off the country of the Magnetans lie numerous islands, but the only notable ones are *Skiathos*, *Peparethos*, and *Ikos*, and also *Halonnesos* and *Skyros*, all having cities of the same name. [...,] so he [Philip] also seized the islands off Magnesia and made those which were previously well-known to nobody objects of contention and hence well-known."[28] This description may be confusing to the modern reader, as it has been for geographers and historians alike who have attempted many times to attribute the ancient place-names to the islands, and particularly those of ancient Ikos and Halonnesos.

Over the years, many considered either the islands of Kyra Panagia, Psathoura or Agios Eustratios, and not modern Alonnesos, to have been the ancient Halonnesos.[29] Quite interestingly, though there is no mention of it before the middle of the 4th century, Halonnesos became known as the apple of discord between the Athenians and Philip of

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[28] Strabo, *Geography*, IX.5.16

[29] Athanasiou, *The Island of Alonnesos*, 7, 27-28: The author convincingly examines the reasons requiring Kyra Panagia to coincide with ancient Halonnesos. He notes that this island is the easternmost piece of land (of substantial size) neighboring ancient Ikos. It is strategically located at the junction of the Northern, Eastern and Southern Aegean Sea, with two safe bays that during modern times harbored pirates and later steam ships in bad weather. The discovery of the Neolithic site on Agios Petros islet, the remains of a Byzantine shipwreck lying south-west off the Agios Petros bay, and the discovery of the classical shipwreck off Phagrou islet makes even more compelling the launching of a full-scale underwater and terrestrial survey in search of more clues about the history of this island during ancient times. A large number of shipwrecks were lost in the straits of Northern Sporades, among them the aforementioned Byzantine shipwreck dated to the 12th c. AD; see A. J. Parker, *Ancient Shipwrecks of the Mediterranean and the Roman Provinces* (Oxford, 1992), 306 (Cat. no. 796, 'Pelagos'). On Psathoura islet, the northernmost of the group, where a submerged ancient settlement lies underwater, see Sampson, "Ikos - Alonnesos and the Isolated Islets," *Archive of Euboic Studies* 17 (1970): 365-7, and Athanasiou, 33-34. Gunther, s.v. Halonnesos, *Griechenland: Lexicon der Historischen Statten*, 256: identifies ancient Halonnesos with Agios Eustratios, a small islet located south of Lemnos in the north Aegean Sea. However, its remote location, unrelated to the group of Northern Sporades, makes it an improbable candidate for ancient Halonnesos. Also see IG.XII.8, 17-18 and map, where Halonnesos is identified with 'Hagiostrati (Agios Eustratios).

Macedon. The island was an Athenian possession, and it served as an advanced naval base along with Skiathos for Athenian troops to counteract Philip's increasing power in the Aegean.[30] In 343, shortly after it was seized by the Peparethian pirate Sostratos, Philip recovered it, but kept if for himself, thus renewing hostilities with Athens. It was on that occasion that Demosthenes delivered one of his famous orations.[31] Peparethians occupied the island briefly, but Philip responded forcefully by taking it over and laid waste both Peparethos and Halonnesos to punish the Peparethians.[32]

Modern Alonnesos[33] is believed to have been ancient Ikos on the basis of a coin and amphora stamps bearing the inscription *IKIΩN*, which were found on the island (Fig. 6).[34] As

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[30] Demosthenes, *First Philippic*, IV.32. The name of the island of Halonnesos does not appear in the Athenian Tribute Lists; it is not to be confused in the quota lists with Halone (Αλώνη) which was a tributary located in Propontis; see Benjamin D. Meritt, H. T. Wade-Gery, and Malcolm F. McGregor, *The Athenian Tribute Lists*, I (Cambridge, 1939), 207, and IV (Princeton, 1953), 47, from now on cited as ATL followed by the volume number.

[31] Demosthenes, *On Halonnesus,* VII.1-46, and introduction 148-9 for the author of the speech. Critics have attributed this oration to Hegesippos, who was one of the members of the embassy sent in 343 by the Athenians to demand the restoration of the island from Philip; Hammond, *A History of Greece to 322 B.C.*, 561. Later, the matter is discussed by Aeschines, the life-long rival of Demosthenes, in the law suit *Against Ctesiphon*, 83 (dated 330 BC): "Philip offered to give us Halonnessus, Demosthenes forbade us to accept it if he 'gave it', instead of 'giving it back', quarreling over syllables."

[32] Demosthenes, *Philip's Letter*, XII.13-15; *De Corona (or in Defense of Ctesiphon)*, XVIII.69-70.

[33] For early references on the identification of ancient Ikos, see Paul Girard, "Antiquités des Sporades Septentrionales," *BCH* 3 (1879): 188-190. Sometime after the 2nd century AD and during medieval times, the island was called Chilliodromia, Khelidhromi, Liadhromia, Iliodromia, Diadromia, or Dromos: a progressive linguistic alteration of the same word deriving from Achilliodromia = Chilliodromia, which alluded to the ancient legend that wants Peleus, the father of Achilles, to have been buried on the island of Ikos; see Fredrich, s.v. Ikos, *RE* 9.1 (1965), 991-2; and IG.XII.8, 166ff. for references to Peleus (cf., Antipater of Sidon, *Anthologia Graeca*, VII 2, 9); and Sampson, "Ikos - Alonnesos and the Isolated Islets," *Archive of Euboic Studies* 17 (1970): 352, 357.

[34] Albert Dumont, *Inscriptions Ceramiques de Grece* (Paris, 1872), 387, no. 5: one of the earliest stamps was found in 1846. See IG.XII.8, no. 665 (Ικίων); and recently in Doulgeri-Intzessiloglou and Garlan, "Vin et Amphores de Peparethos et d'Ikos," *BCH* 114, I (1990): 371-3, Fig. 7. For the copper coin bearing the ethnic name, see F. Imhoof-Blumer, *Monnaies Grecques* (Paris, 1883), 134; and B. V. Head, *Historia*

Strabo noted, and as we read in *Periplus* and *Periegesis*, the island had two ancient cities and was geographically located next to Peparethos.[35] The early history of the island blends in with the legends of Greek mythology; at the beginning it might have been occupied by Minoans, later by Mycenaeans and in the Geometric times by Dolopes (people from Thessaly). Its natural resources and geographical proximity to Euboia made it an appealing foothold for the people of Chalkis, who colonized it in the 8th century. In this we detect the familiar trend of intensive colonization in many directions by the cities of Euboia, especially Chalkis and Eretria, which spread out to North Greece and the Chalkidian peninsula.[36]

In spite of the limited terrestrial archaeological work conducted on the island and the scanty evidence consisting of a few artifacts that date after the 7th century, it seems probable that its inhabitants developed skills in viticulture and ceramic production. The importance of the island as a wine exporter is testified to by the large mounds of broken amphoras found

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Numorum: A Manual of Greek Numismatics (N.Y., 1983), 312: on the obverse side appears Poseidon's head wearing a laurel wreath, and on the reverse the inscription *IKIΩN* encircling a trident between two dolphins.

[35] *Periplus* [Pseudo-Skylax of Caryandus], 58: "...κατ' Ερέτριαν Σκύρος και πόλις· Ικος αυτή δίπολις· Πεπάρηθος, αύτη τρίπολις και λιμήν· Σκίαθος, αύτη δίπολις και λιμήν."; *Periegesis* or *Orbis Descriptio* by Anonymous [attributed to Skymnos of Chios], 579-585: "Κείνται δε και νησίδες αυτής πλησίον, Σκύρος, Πεπάρηθος, Σκιάθος, ων-Κρήτες μεν οι μετά Σταφύλου διαβάντες εκ Κνωσσού ποτε Πεπάρηθον εγγύς κειμένην τ' αυτής Ικον νήσον συνοικίζουσι, την Σκύρον δε και [την] Σκιάθον εκ Θράκης διαβάντες, ως λόγος, Πελασγιώται. Παλι δ' ερήμους γενομένας αυτάς απάσας Χαλκιδείς συνώκισαν," in C. Mullerus, *Geographi Graeci Minores*, Vol. I (1855), from now on cited as *GGM*. *Periplus* is dated to the middle of the 4th century and *Periegesis* to the 1st century, see S. Casson, *Macedonia: Thrace and Illyria* (Westport, CT, 1971), 272.

[36] Fredrich, s.v. Ikos, *RE* 9.1 (1965), 991-2; and Gunther, s.v. Halonnesos, *Griechenland*, 256. Euboian colonies in the West were founded well before the middle of the 8th century and Eretrians pioneered in trade in those waters, including the Ionian Sea. They showed an early interest in the Thracian coastland, focusing on what we now call Chalkidike, see A. J. Graham, "Patterns in Early Greek Colonization," *JHS* 91 (1971): 35-47; John Boardman, *The Greeks Overseas* (London, 1988), 229-232; and Keiji Baba, "The Makedonian/Thrakian Coastland and the Greeks in the Sixth and Fifth Centuries B.C.," *Kodai* I (1990): 1-23.

scattered on the hillsides of Tsoukalia Bay, where a ceramic workshop is believed to have existed.[37] The great number of shipwrecks lying around its waters supports the assumption that Ikos must have been a well-known trading stop in the crossroads along the north-south axis of the east coast of Greece during classical and medieval times.[38]

We know that both Ikos and Peparethos joined the Delian League, and as early as 478/7 paid an annual tribute of 1,500 drachmas and 3 talents respectively.[39] Their names appear in the assessment list of 454/3, the tribute lists of 454/3, 449/8, 443/2, and 425/4, and in the Charter of the Second Athenian Confederacy in 377.[40] The amount of tribute was

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[37] Ikos, the ancient city which gave its name to the whole island, has been identified with the coastal remains at Kokkino-Kastro in the southeast side across from the island of Peristera. In 1835 numerous graves and ceramic debris including fragmented amphoras were discovered dating to the Mycenaean times, see Girard, "Antiquités des Sporades Septentrionales," *BCH* 3 (1879): 189. For the survey and the finds from the ceramic workshop at Tsoukalia, see Doulgeri-Intzessiloglou and Garlan, "Vin et Amphores de Peparethos et d'Ikos," *BCH* 114, I (1990): 371-5. This was a preliminary survey and there is no doubt that more will come to light with a full-scale archaeological survey of the island. C. Koehler, reminded me of a survey conducted at the site of Tsoukalia on the island of Skopelos by Dr. Effie Athanassopoulos (Univ. of Nebraska-Lincoln) and Mrs. Argyroula Doulgeri-Intzessiloglou (13th Ephorate of Prehistoric and Classical Antiquities, Volos, Greece) in the late1990s, but time constrains did not permit me to access the report with the results from this work.

[38] Unfortunately, one of the works that would have shed light on the history of the island, the *Ikiaka*, no longer exists. The author was an Athenian, Phanodemos, who may have been commander of Ikos during the conflict with Philip of Macedon in 340. A member of the Athenian Council, he was involved with the festival and sanctuary of Amphiaraos, and matters of public worship and education under Lykourgos. He also wrote an Atthis (history of Athens), see *FGrH*, text: 171-196, no. 325, and notes: 156-164, no. 325; see also, C. J. Schwenk, *Athens in the Age of Alexander* (Chicago, 1985), 201-205, on the stele found at Oropos by which Athens honored Phanodemos.

[39] It is believed that both island states were among the original members of the confederacy; note that their names (and the Northern Sporades as a group) appear under the Thracian panel of the Athenian tribute lists (ATL III, 223). Cities based their currency upon the drachma (of varying weight) that was exchanged in the market according to weight of silver. A talent was a measure of weight for large amounts of money: 1 talent was equal to 60 mnai, and to 6,000 drachmas.

[40] M. N. Tod, *Greek Historical Inscriptions* (Chicago,1985): Vol. I, 50, 76, 95-6, and 156; Vol. II, 62-68. The primary aim of the new alliance in 377 was to secure the rights of the members under the Spartan Hegemony. The name of Ikos was added along with the Euboian cities, and Peparethos was added after it was taken by the Athenian general Chabrias; see IG.XII.8, 166-8. Philippe Bruneau, "Peparethia," *BCH* 111

significant and surely assessed on the basis of resources, and geographical, political and commercial importance. Ikos paid a higher amount than Skiathos, and Peparethos ranked high among the prosperous allied city-states.

Modern Skopelos,[41] lying west of Alonnesos, has been identified with certainty from inscriptions bearing the name *ΠΕΠΑΡΗΘΟΣ* and *ΠΕΠΑΡΗΘΙΑ*, to the ancient city of Peparethos, which gave its name to the whole island (Fig. 2). Its early history follows that of Ikos: it was allegedly colonized in 1,600 by Cretans under Staphylos, the son of Dionysos and Ariadne, then after the Mycenaean era it was occupied by Dolopes. Later in the 8th century it was colonized by the people of Chalkis who established the three cities of Peparethos, Panormos and Selinous on the island. A great number of ancient texts refer to its natural resources and prosperity, emphasizing viticulture and the bountiful fruit-bearing trees covering the land.[42]

(1987): 474, Skiathos paid 1,000 drachmas. Peparethos by paying 3 talents ranked 6th among the 39 cities included in the Thracian list, and 10th among the 73 Ionian cities. See also ATL I, 290-1, 372-3, and ATL III, 23, 26.

[41] The name 'Skopelos' (reef) alludes to the treacherous reefs surrounding the island. The name first appeared in Ptolemy (III 13, 47) in the 2nd century AD (IG.XII.8, 166), and continues to be the name of the island.

[42] Staphylos (meaning grape) still remains the name of a bay located on the south side. According to one of the legends, it was this Cretan prince who introduced the art of viticulture to these islands. In *Periegesis*, 579-585 we read that Peparethos had three cities and a harbor. A great number of works have been written on the history and archaeology of the island; the bulk of scholarly bibliography is included in Girard, "Antiquités des Sporades Septentrionales," *BCH* 3 (1879): 180-186; C. Fredrich, "Skiathos und Peparethos," *MDA* 31 (1906): 99-128; Demosthenes G. Nasoules, *Σκόπελος:Η Αρχαία Πεπάρηθος (Skopelos: The Ancient Peparethos)*, (Athens, 1950), 15-16. In 1936, the rich remains from a royal grave dated to Minoan/Mycenaean times (1500-1450 B.C.) came to light on the bay of Staphylos; also in Adamantios Sampson, *Η Νήσος Σκόπελος: Ιστορική και Αρχαιολογική Μελέτη (The Island of Skopelos: Historical and Archaeological Study)*, (Athens, 1968), 14-52; and Bruneau, "Peparethia," *BCH* 111 (1987): 471-494. For ancient sources on the famous Peparethian wine and the worship of Dionysos on the island, see Doulgeri-Intzessiloglou and Garlan, "Vin et Amphores de Peparethos et d'Ikos," *BCH* 114, I (1990): 361-6.

It had its place among the major exporters of wine, as Demosthenes informs us: "Wine is carried to Pontus from places around us, from *Peparethos*, and *Kos*, and *Thasos* and *Mende*, and from all sorts of other places."[43] It is not surprising, then, that its coins are stamped invariably with the ethnic inscription *ΠΕ* or *ΠΕΠΑ*, but mostly with a bunch of grapes on the obverse, and various images of the reverse; one of them representing a seated Staphylos holding a kantharos (wine cup) and a thyrsos.[44] Peparethos struck silver coins as early as the end of the 6th century following the Euboic-Attic standard like the city of Mende. Many were recovered in the regions of Thessaly, modern Chalkidike and Kos, indicating wide-spread trade relations, not only in the immediate region but further, to the southern Aegean Sea (Fig. 7).[45]

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[43] Demosthenes, *Against Lacritus*, XXXV.35.

[44] The theme on the coins brings instantly to mind the words of praise: "I was sailing as a merchant back from Troy with a small crew to my grape-clustered home Peparethus," Sophocles, *Philoctetes*, 548-549. A thyrsos was a staff covered in vines and ivy leaves, associated with Dionysos. There is little doubt that the legends coupled with the coinage representing the chief divinity of the island or his attributes, along with the recent finds of amphora workshops combine to proclaim the importance of and the integral part played by the wine industry in the diverse commercial economy of the island.

[45] On the coinage of Peparethos, see W. Wroth, "Peparethus and Its Coinage," *JHS* 27 (1907): 90-98; Head, *A Guide to the Principal Coins of the Greeks* (London, 1959), 7-8; Head, *Historia Numorum*, 312-313; and Colin M. Kraay, *Archaic and Classical Greek Coins* (Berkeley, 1976), 119-120. For an overview of the diverse opinions on the provenance of the series of coinage with the grape-cluster and reappraisal of their dating, see J. M. Balcer, "Peparethos: The Early Coinage Reconsidered," *RSN* 46 (1967): 25-33: three early archaic Peparethian and one early Mendaian tetradrachm were found together in the Kos Hoard. According to present numismatic evidence, the mint stopped issuing coins after Peparethos was taken over by Athens; it resumed producing coins, but in bronze, in the middle of the 4th century. In spite of the brief period of minting, the early coinage has several interesting and very different reverse types whose choice of theme has puzzled numismatists. One of them is a winged running figure carrying two wreaths, which has been interpreted as the representation of Agon (male personification of Victory) or Boreas (the North Wind; Herodotus, *The Histories*, VII.189 (from now Hdt.); Wroth (supra, 93) had no explanation for the choice of this theme and Baba similarly did not identified the figure, but pointed to the similarity with a winged man on a Thraco-Macedonian tribal silver coin suggesting influence from the Greek world to the north through an itinerant craftsman, "The Macedonian/Thracian Coastland and the Greeks," *Kodai* I (1990): 14. Could it be that another important piece of Peparethian history is represented in this coin, an the allusion to the Peparethian athlete (H)*agnon* who won the stadion race during the 53rd Olympiad in 569/8 (Eusebius,

Besides plentiful vines covering the low hillsides, olive trees grew in the fertile valleys around the towns, and the mountainous range running in the center of the island was well-wooded with Aleppo pines and oak trees. They constitute another substantial resource which was exploited by the islanders throughout the centuries and whose importance as a strong economic driving force, has been overlooked in studies of the island.[46]

Its geographical position determined the fate of the island from the beginning of the 5th century when, along with its neighbors, it became an advance look-out for the Greek forces during the Persian Wars. There seems no doubt that Peparethos was against the Persians and the island must had its own ships for during the operations they captured two Karian ships, with whose spoils they erected a dedication at Delphi.[47] Later, Kimon obliterated the pirates nesting at the nearby island of Skyros, and brought Peparethos

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Chronicle 202)? Sampson, believes that this symbolism is most probable, *The Island of Skopelos*, 88-90, note 7; See IG.XII.8, 167; also R. Herbst, s.v. Peparethos, *RE* 19.1 (1937. Reprint, 1964): 553; and Nasoules, *Skopelos: The Ancient Peparethos*, 20.

[46] Ovid, *Metamorphoses* VII 470: "...and Peparethos rich in its glossy olives...". Scanty references have been made to the richly wooded land (mainly within the context of the geological and the topographical changes on the islands over the centuries) and the modern shipbuilding tradition that dwindled a long ago due to declining demand for wooden-built boats and depletion of resources from 'heavy deforestation'. Great Britain, Foreign Office, *The Balkan States*, 12: "These islands are not only of considerable strategic importance, but have always maintained a lively shipping trade, their pine-woods, better preserved than on most islands, furnishing materials for shipbuilding."; also in Efstratiou, *Agios Petros*, 3; and Wroth, "Peparethus and Its Coinage," *JHS* 27 (1907): 91. We can only infer from the ancient texts that the island had more than sufficient timber to put into use or sale; the Peparethians had their own ships, which they used in 360, with the assistance of the Athenians, to blockade the detachment of Alexander of Pherae at Parnormos (cf. Diodorus, *Library*, XV.95.1-2; Polyaenus, *Strategems of War*, 6.2.2), and later in 342 to attack and capture the island of Halonnesos whose ownership the Athenians and Philip of Macedon contested, Demosthenes, *De Corona*, XVIII.69-70 (and introduction to the *De Corona*). The wood used for triremes was preferably fir, but also pine; for the round (merchant) ships, mainly pine, and for the keel they preferred oak, see J. S. Morrison and J. F. Coates, *The Athenian Trireme* (Cambridge, 1992), 180-1.

[47] IG.I^2.523; cf., ATL III, 100 note 22, and 223 note 138.

under Athenian influence. It eventually joined the Delian League and was assessed a high tribute. All three islands, Peparethos, Ikos and Halonnesos remained, with brief interruptions in the 4th century, under Athenian control, but they were eventually taken over by Philip of Macedon in 338.[48]

In light of the discovery of the Alonnesos shipwreck, the not so barren 'scattered' (Sporades) Islands seem to have been even more important as a geographical avenue where "the sea trade along the east coast of Greece must pass through...";[49] they were linked by close ties, probably in more ways and means than we can understand at present, to the peninsula of Chalkidike. Both regions were settled by the pioneers of colonization and trade, the people from the cities of Euboia. It was on the south-west side of Pallene, commanding the entry to the Thermaic Gulf, where one of the most important Euboian colonies prospered, and became famous for its high-quality wine, the *polis* of Mende.

The most notable literary sources referring to Mende span the time from the early 5th century (Herodotus) to the 2nd century AD (Pausanias).[50] The most reliable information

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[48] Three Greek ships advanced on Skiathos to mark the move of Xerxes' fleet according to Herodotus, VII.179; For Kimon's operation against Skyros in 476 to clear the area from the Dolopes (who were said to be addicted to piracy), see Pausanias, *Description of Greece*, III.3.7, and I.17.6; could it be possible that the island was a thorn in the side of the Athenians since 480, when Pammon of Skyros helped guide the Persian fleet to Magnesia by showing them the treacherous reef, whereupon they placed a pillar of stone for the main fleet to advance safely? (Hdt. VII.183); Hammond, *A History of Greece to 322 B.C.*, 231, 258. It has been assumed that around the same time Kimon must have subdued the other islands of the Sporades group, as they were in close proximity to Skyros.

[49] Great Britain - Foreign Office, *The Balkan States*, Vol. III, (London, 1920), 12.

[50] Hdt., VII.123; Pausanias V.10.8, V.25.7, V.26.1, and V.27.12. Pausanias' last reference to Mendaians—living 'by the city of Aenus' (in Thrace), with which he probably refered to the city of 'Aenea' (in Thracian Chalkidike)—became the cause of misunderstanding and the beginning of the debate over the existence of two cities named 'Mende'. The issue seems to have been settled by Georgios P. Oikonomos, "Minde-Mende: the Birthplace of Paionios," *AE* (1924): 27-40.) For an overview of the history and a long list of

comes from the authors of the classical period, the years during which the city-state flourished and became widely known beyond the boundaries of the Aegean Sea.[51] Nevertheless, all authorities combined provide us with but a sketchy picture of Mende and only hints at the extent of its political importance, commercial power and economic status. There is little substantial information to reconstruct with any certainty its history, especially its internal affairs and relations with the other cities in the peninsula. Besides the few insightful details about Mende's political and economic status, historically it has been treated as lying on the periphery of action centering on Athens. Mostly we read about its being either in revolt or in alliance with the prevailing powers, or words of admiration for its mild or dry white wine, consumed either for pleasure or for medicinal purposes.[52] Fortunately, a number of other sources, such as epigraphy, numismatics, and the archaeological discoveries on land and underwater come to our aid in filling the gaps and expand our knowledge about one of

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ancient and modern references to Mende, see B. Lenk, s.v. Mende, *RE* 15.1 (1931. Reprint, 1965): 777-780; and S. G. Miller, s.v. Mende, in *The Princeton Encyclopedia of Classical Sites*, ed. by Richard Stillwell (Princeton, 1976), 572. I would like to thank Ms. Katrin Henning for translating sections of the German articles for me.

[51] Mendaian transport amphoras dated from the third quarter to the end of the 5th century were found during excavations at the burial mounds in Elisavetovskaya, Maritsyn (near the village of Adzigola), and Niconium in the Black Sea, see I. B. Brashinsky, "Amfory Mendy: o lokalizatsii gruppy amfor s 'ryumkoobraznymi nozhkami' (Amphoras from Mende: on the origin of the group of amphoras so-called 'with feet in the form of a glass')," in *Khudozhestvennaia kul'tura i arkheologiia antichnogo mira; sbornik pamyati B.V. Farmakovskogo (Artistic Culture and Archaeology of the Ancient World; collection in memory of B. V. Pharmakovsky)* (Moscow, 1976), 72.

[52] For the literary evidence on Mendaian wine cited in ancient Greek comedy of the 5th and 4th centuries, the Hippocratic corpus, and other ancient sources, see François Salviat, "Vignes et Vins Anciens de Maronée à Mendé," in *Μνήμη Λαζαρίδη: Πόλις και Χώρα στην Αρχαία Μακεδονία και Θράκη (In Memory of Lazarides: City and Region in Ancient Makedonia and Thrake)*, 470-477 (Thessalonike, 1990).

the most important coastal Greek cities in Chalkidian peninsula (Fig. 3 and 4).[53]

[53] According to Casson, *Macedonia: Thrace and Illyria*, 37-42, "Chalcidice was essentially the Greek Thrace bounded on the north by Macedonia." cf. ATL III, 318: "But Chalkidike was not and had never been Makedonian,..." Here, it is important to note the concerns raised by the author about the geographical term 'Chalkidike' often used interchangeably with the word 'Thrace' by the ancient authors (within the context of the uncertain and shifting boundaries of Macedonia and Thrace). The issue of determining the boundaries of Chalkidike region (delineated by which city belonged within the peninsula or was lying past its borders) is further obscured by inconsistencies in modern translations of the ancient texts. Primarily, it is believed that the cities that were established on the peninsula "contained a culture more homogeneous probably than that of any other part of Thrake" based on their common Greek ancestry (supra, 86). But it seems that they also grouped according to their natural geographical location (on the three sub-peninsulas: Pallene, Sithonia, and Akte) and in all likelihood they carried with them political seeds from their mother-cities that often determined who their friends and foes were in the same region. Thus, it seems from what Casson says, one should be cautious in applying the concept of a regional economy to the peninsula of Chalkidike at least for the period during the 5th and possibly for the 4th century. The boundaries of this region "were no more clearly conceived in antiquity" from the ancient historians and geographers (supra, 188-9) than they are today. Consequently modern connotations of a common regional economy may be incorrect or fall short in explaining the ever-changing relations among the Greek, the non-Greek, and mixed population city-states on the peninsula and their individual interests for freedom, independence, and wealth. One might argue that the formation of the Chalkidian League (432) led by Olynthos, with the help of the Macedonian king Perdikkas II, is an example of a formal confederacy in progress of unifying all the cities of the peninsula under its protection. However, our knowledge about the formation and status of the 'sympolity' (League) is fairly limited, and although it drew together independent some settlements or cities, there is still much to be learned about the opposing stance of some cities in Pallene such as Mende (which almost came to war with Olynthos) or Akanthos and Apollonia, which resisted joining the League. The speech by Kleigenes of Akanthos given in 383 before the Lacedemonian Assembly requesting help against Olynthos sounds quite strong and opposes the *Koinon* of the Olynthians: "As for ourselves, however, men of Lacedaemon, we desire to live under the laws of our fathers and to be citizens of our own city; but unless some one shall come to our aid, it will be necessary for us also to be united with them [Olynthians]," and he continues, "Furthermore, since the Olynthians are in possession of Potidaea, which is on the isthmus of Pallene, be sure that the cities included within Pallene will also be subject to them. And let this fact also be a further evidence to you that these cities have come to fear the Olynthians mightily—that although they feel the utmost hatred toward the Olynthians, nevertheless they did not dare to send ambassadors with us to set forth these things," Xenophon, *Hellenika*, V.2.11-15. So, currently there is limited information, at least for the period with which we are concerned, of how the residents of each city in any of the three sub-peninsulas in Chalkidike might have viewed themselves in relation to their neighbors, let alone if they formally participated and acted as part of an economic force within the boundaries of what they might have described as 'their' region. Harrison was one of the first to debate the origin and the use of the ethno-geographical term 'Chalkidike' in relation to the prominent colonization of the area by the city of Chalkis in Euboia, "Chalkidike," *Classical Quarterly* 6, no. 2 (1912): 93-103, and 6, no. 3 (1912): 165-178. Recent studies have clearly showed that a distinction should be made between the 'Chalkidian race/Chalkidic tribe', the Greek-speaking people (led by Athens) who migrated into the Chalkidian peninsula from ca. 1020 onwards, establishing small settlements, and the Greeks led by Chalkis and the other Euboian cities who colonized the peninsula, forming autonomous city-states from the 8th century onwards. The former were the ones who formed the Chalkidian League in the second part of the 5th century, exercised heavy influence and tried to force all the others, including the autonomous ones, to join; see Hammond, "The Chalkidians and 'Apollonia of the Thraceward Ionians'," *BSA* 90 (1995): 308-311. Also, see Pernille Flensted-Jensen, "The Chalkidic Peninsula and its Regions," in *Further Studies in the Ancient Greek Polis*, ed. by P. Flensted-Jensen (Stuttgart, 2000), 126-131 "...down to the eve of the Hellenistic period there was certainly a region

In *Periplus,* the author calls Mende a "Greek City", and during Xerxes' advance along the Thracian coast, Herodotus informs us that it supplied, probably under duress, ships and men to the Persian military forces. However, it is believed that, after the battle of Salamis in 480 and following Potidaia's example, the city probably revolted in consent with the "other people of Pallene" against the Persian rule.[54] In the absence of a list with the names of the original members of the Delian League in 478/7, the date the city aligned itself with Athens is unknown. But, it should not have been too long before it sought her protection, like the rest of the cities in Pallene.[55] Later, the name of Mende appears in the assessment of 454/3 and on the Athenian tribute lists from 452/1 to 415/4, when the city regularly paid the high annual tribute of 8 talents to the Treasury, with fluctuations from 5 to 15 talents. These amounts put her on a par with the wealthiest cities of Abdera, Ainos, Maroneia, and Potidaia.[56] This assessment indicates a certain affluence that was based, to a

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called 'Chalkidike', but 'Chalkidike' was not the name of the entire Chalkidic peninsula," and she continues, "...the use of the name 'Chalkidike' for the whole peninsula is a modern convention."

[54] *Periplus*, 66 in *GGM*; Herodotus still stands as our earliest written source about Mende, VII.123, and VIII.126.

[55] ATL III, 214-224, the authors combined all available evidence (Serpent Column, assessment, tribute lists, and literary texts) in an attempt to reconstruct the original membership of the Delian League. Under the 'Thrakian panel', the name of Mende appears along with the other cities on Pallene (Poteidaia, Aphytis, Skione, Theramvos).

[56] Tod, *Greek Historical Inscriptions*, 50, 77, 96; R. Meiggs and D. M. Lewis, *A Selection of Greek Historical Inscriptions to the End of the Fifth Century B.C.* (New York, 1988), 83-89, no. 39, and 133-136, no. 50, 225-227 no. 75; also, see ATL I, 340-341. The tribute fluctuations of Mende and some of the other cities under the Thracian list cannot be determined with certainty. There might have been many contributing causes, such as local socio-economic problems (a bad harvest, internal political problems); and possibly general ones (variations in the output from the Thracian gold mines, causing a variable rate of exchange with silver, unexpected outside threats or antagonism for revenue from common natural resources), see Casson, *Macedonia: Thrace and Illyria*, 281; cf. Lenk, s.v. Mende, *RE* 15.1 (1965): 778. On the coin standards and the exchange rate between gold and silver, see Head, *Historia Numorum*, xli-xliv. However, there might be a third explanation for these fluctuations, such as payment by a group of cities

great extent, on Mende's coastal location at the crossroads of bi-directional maritime traffic originating from the Black Sea, Hellespont, and Ionian coast to the Thermaic Gulf, or from the Thracian coastal waters heading to southern Greece.[57] In all probability, Mende's revenue must have come from collecting harbor and other duties, and exploiting the bountiful natural resources of grain and the sought-after, high quality, timber of Chalkidian peninsula, in addition to the wine production from the prolific vines growing in the sub-peninsula of Pallene.[58]

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under the name of an important one: Meritt and West proposed that the marked increase from 8 to 15 talents during only the second period (450/49 – 447-6) and subsequent decrease in tribute happened because Mende's payment included the tithes of its neighbors, Skione and Theramvos (or Therambos), "Correspondences in I.G., I^2 196 and 198," *AJA* 32, no. 3 (1928): 294; and ATL I, 177, 340. To understand the value of Mende's contribution to the Treasury we only need mention few comparative figures for the last quarter of the 5th century: e.g. in Athens, 1 medimnos (25 kg) of wheat cost 6 drachmas; normally a hoplite, rower, or laborer received 1 drachma as daily wage (recorded in the building accounts of the Erechtheum on the Acropolis); a hoplite received 2 drachmas at the siege of Potidaia in 429 (Thuc.III.17), and the cost to keep the crew of a triereme fed amounted to 2,000 drachmas per month. On pay, provisioning, logistics and funding of a triereme, see Vincent Gabrielsen, *Financing the Athenian Fleet* (Baltimore, 1994), 110-121.

[57] "There is practically no harbor on the North Aegean coast and no protected haven or roadstead of any size or importance, excluding those in Chalcidice, between the Thermaic Gulf and the Dardanelles," states Casson. Pallene, though, was the least gifted in secure havens among the three sub-peninsulas, *Macedonia: Thrace and Illyria*, 30.

[58] [Aristotle], *Oeconomica*, II.2.21: "The people of Mende used to meet expenses of administration from harbor and other duties...." It has been noted that the cities on the Pallene sub-peninsula had the highest tribute assessment in Chalkidike. Although the region was renowned for its wine, it seems improbable that this crop alone, the vine, would have been the source of such wealth. As difficult as it is to obtain archaeological evidence for timber trade, and lacking ample documentation for the exact sources of timber during the 5th century, we have to rely mostly on the 4th century literature. The texts indicate the extreme importance placed in those areas where timber of the best quality could have been obtained in large quantities, especially for the purpose of building ships, laying out keels and making oars. In the defensive alliance drawn between Amyntas (grandfather of Alexander the Great) and the Chalkidians ca. 393, a paragraph relates to the export of timber stating that the League "may export whatever it does not itself require of pitch and of every kind of construction timber and timber for shipbuilding with the exception of fir, and this too may be exported after previous notice has been given to Amyntas, on payment of the statutory dues." An exclusive clause is added stating that each party cannot open trade relations "save by common consent and concerted action," with Amphipolis, Akanthos, Mende, and the Bottiaeans, as probably these cities were not members of the League at that time; in Tod, *Greek Historical Inscriptions*, Vol. II, 30-34, no. 111.10-15. The exclusion might have been a form of pressure upon them to join the

Thucydides tells us that Mende was founded by the Euboian city of Eretria,[59] information that was first corroborated indirectly by numismatic evidence. The earlier archaic coinage with the type of the ass (dated to the third quarter of the 6th century) was based on the Euboic weight standard in accordance with the mother-city, and appeared to

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league, but it also shows that these cities had an interest in the timber of the region, especially fir, which was the most suitable for building triremes. Theophrastus, *Enquiry into Plants*, V.2.1, referring to timber used for general carpentry, he notes that Macedonia and Thrace produced first-rate timber, and that the former was of the best quality; and talking about the use of timber according to variety informs us that (V.7.1-3): "...triremes and long ships are made of fir..." cf. Russell Meiggs, *Trees and Timber in the Ancient Mediterranean World* (Oxford, 1982), 118-120, 211. From the above treaty it seems that Amyntas, and possibly the previous kings of Macedonia, exploited the wood of the Chalkidian peninsula under agreements, as the demand was high by Athenians and other interested parties. There seems no doubt that the Athenians, after they lost their foothold in Amphipolis in 424 (Thuc. IV.108), were pressured to be on good terms with the Macedonian King, and he with Athens, for many reasons. In the decree, dated ca. 407/6, by which Athens honored King Archelaos for his generosity and benefaction to allow access to his timber resources, we read that Athens ordered the building and manning of ships, which were to sail as quickly as possibly from Macedonia to Athens, accompanied by his gift of oars (Tod, supra, 222-224, no. 91); also in Charles W. Fornara, *Archaic Times to the End of the Peloponnesian War* (Cambridge, 1983), 192-3. The same king earlier in 411 had allowed again the export of oars from Macedonia when Andokides (II.11) proclaims, "I at once proceeded to supply your forces in Samos with oar-spars—this was after the Four Hundred had seized power at Athens—since Archelaus had hereditary connections with my family and offered me the right of cutting and exporting as many as I wished." Archelaos' father, King Perdikkas (454-414) had played politics of duplicity and intrigue with the Athenians and in supporting Olynthos for the formation of the League (432). In this way, he and his successors must have tapped periodically into the resources of the peninsula, instead of depleting theirs, to trade with any interested parties. Finally, it is in the words of Kleigenes of Akanthos that the overall prosperity of the peninsula, being self-sufficient in food and a major timber supplier, is revealed: "You [Spartans] should consider this question also, how you can consistently, after having taken care in the case of Boeotia to prevent its being united, nevertheless disregard the gathering of a much greater power [the Chalkidian League], and what is more, a power which is becoming strong not by land only, but also by sea. For what indeed is there to hinder such expansion, seeing that the country [Chalkidian peninsula] itself possesses ship-timber and has revenues from many ports and many trading-places, and likewise an abundant population on account of the abundance of food?" in Xenophon, *Hellenika*, V.2.16.

[59] Thuc. IV.123.1. During the last quarter of the 8th century Eretria planted three well-known trading colonies in key points around the Thermaic Gulf: Methone, Mende and Dikaia. According to Hammond, Methone was probably founded first ca. 730. Then followed the foundation of Mende in the third quarter of the 8th century, and not long after Dikaia, which he tentatively identifies on the evidence of Euboian Geometric pottery with the district of Lebet, north-west of the Thessalonike plain. He emphasizes the fact that both Methone and Dikaia were strategically placed at the outlet of a prosperous hinterland for ship-building timber and gold coming from the river Echedoros ('the one that bears gifts'), while Methone and Mende controlled the entry to the Gulf and probably supported the establishment of Dikaia, in "Eretria's Colonies in the Area of the Thermaic Gulf," *BSA* 93 (1998): 393-399.

have been didrachms.[60] This main inscribed series of its silver coinage, ca. 520 to 460, were struck in the Euboic-Attic standard (after assimilation), with the largest denomination being the tetradrachm (Stater).[61] On the obverse of the coins appears an ithyphallic 'Dionysian' ass (or "Mendaian Ass") with a crow or starling perched on its back pecking at the root of the ass's tail, and occasionally a vine branch or ivy is added above in the field, no doubt symbolically referring to the local wine production.[62] More important, the legend on the early coins appears as MIN, or MINΔAION, or MINΔAON, which is believed to link the city

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[60] E. Babelon, *Traité des Monnaies Grecques et Romaines* (Paris, 1907), 1131-1132, nos. 1596, 1598; and Noe, *The Mende (Kaliandra) Hoard* (New York, 1926), 41.

[61] The 'Stater' was the principal coin of a city used mainly for large-scale transactions. For the history of the Euboic and Attic standard, see Head, *Historia Numorum*, xlv-xlix, "the early coins of Euboea were divided into didrachms. The Euboic standard in its 'heavy' [early] form was: Didrachm 17.49 g (Stater), and Drachm 8.74 g. Later, it was substituted (by Hippias? ca. 525) by the 'light form' by doubling the denominations (Euboic-Attic standard): Tetradrachm 17.49 g (stater), Didrachm 8.74 g, and Drachma 4.40 g." Kraay points out that in Chalkidike the cities followed the Euboic-Attic standard, but the coinage was divided into thirds, sixths (tetrobol) and twelfths, *Archaic and Classical Greek Coins*, 133 which is explained by Head as an influence from the Corithian system. Corinth also based her coinage on the Euboic system, but "unlike the early coins of Euboea, the Corinthian stater was not divided into 2 drachms, but into 3." That system of division prevailed also in the Chalkidian peninsula, (supra, xlvii). Now, the first issues of the archaic coinage of Athens (Wappenmunzen) were didrachms (of 8.6 g) "which is distinctively the Athenian version of the weight system known as the Euboiec-Attic." The main series of Attic owls was fixed at: tetradrachm 17.20 g, drachm 4.30 g, and obol 0.72 g (Kraay, supra, 57, 329). On the archaic owls and Hippias' reform, Kraay, supra, 60.

[62] The first thorough study of the coinage of Mende, including numerous references, was done by K. Regling, "Mende," *ZfN* 34 (1923): 7-35, the older pieces were didrachms, and not tetradrachms, according to the Euboic system. It is lucky that the greatest number of Mendaian coins were part of two hoards, which were found in the environs of the ancient city by the modern town of Kaliandra. The first was discovered in 1897; some early pieces are published in H. Weber, "A Small Find of Coins of Mende, &c.," *NC* 28 (1898): 251-258. The second and largest hoard, which probably exceeded 320 pieces, was comprised of tetradrachms dated in the third quarter of the 5th century, and was first reported in E. Babelon, "La Trouvaille de Mende," *RN* 2 (1922): 103-120; Noe followed with his comprehensive publication, *The Mende (Kaliandra) Hoard*, wherein he attempted to sort out the sequence of the dies and assign a chronology. He believes that this hoard was buried ca. 423, coinciding with the short-lived revolt of Mende from Athens. Another hoard was found more recently of some 250 silver coins, 101 tetradrachms of which are Mendaian similar to those of the Kaliandra hoard; burial date ca. 425, see *Coin Hoards VIII* (London, 1994), 8, no. 63 (Scione, Greece, 1991). This date strengthens the belief that the Kaliandra hoard was buried probably as a result of the imminent siege of Mende by the Athenians in 423. For an overview of the coinage, see Kraay, *Archaic and Classical Greek Coins*, 134-138.

etymologically to an Eretrian demos (Fig. 8).[63] Significant is the evidence of dispersal of these earlier (Archaic) coins outside the area of Chalkidike. A number of them were included, along with other coins from northern Greece, in hoards discovered in Greek city-states, the West, and the Near East. The greatest percentage of them, as a matter of fact, appeared in Egypt. And although, there are no definite answers that can explain the nature of relationships requiring or affected by such a distribution to a particular place, most likely product(s) or services in demand must have created the need for such a circulation, and triggered a number of official or private trade transactions directing the Mendaian coinage to a particular place.[64] Kraay, in examining the extant coins, detected a general trend in the Thraco-Macedonian mints in dispersing their silver coinage abroad before the emergence of the dominant Athenian owls in the late 6th and the beginning of the 5th centuries. In addition the coinage was mostly struck in large denominations, so that it is believed to have been

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[63] The early form of the name (*Minde*, instead of Mende) was linked to the Eretrian demos 'Minthous' (Μινθούς: probably alludes to the plant mint, Μίνθη-Minthe). Oikonomos, "Minde-Mende: the Birthplace of Paionios," *AE* (1924): 27-30, explores in length the etymological origin of the word Minde. He believes that the name alludes to the plant abundantly found in Eretria and Pallene, but he also suggests a playful, almost Aristophanic, allusion to Minthos/Minthe in the puzzling depiction and representation of the starling or crow removing parasites from the rear of the ass contributing in a way to the ithyphallic state of the animal. 'Mint/Minthe/Minthos' used to refer to animal dung, both it and the plant having a strong odor, and it also had a latent erotic connotation deriving from its alleged aphrodisiac properties. So, the mere representation of ass-crow theme on the coins suggested the name of the city for one who was versed in the subtleties of local dialect at the end of the 6th century. In the same article the author objects to the assertions for the existence of two cities named Mende, cf. Noe, *The Mende Hoard*, 62.

[64] M. Thompson, O. Mørkholm, and C. M. Kraay, *An Inventory of Coin Hoards* (N.Y., 1973), 57-58, 157, 159, 202, 228-231, 274. Three hoards were found near Mende and the others abroad, no. 358 (Kaliandra), no. 360 (Nea Cassandra), no. 361 (Kaliandra); no. 1173 (Cos), no. 1185 (Rhodes); no. 1480 (Seleucis, Syria); no. 1638 (Delta), no. 1640 (Benha el Asl), no. 1644 (Asyut), no. 1645 (Zagazig), no. 1646 (Fayum, all in Egypt); no. 1874 (Taranto, Italy). Based on the dispersal of her coinage abroad, Regling asserted that the prosperity of the city "was not the result of producing wine alone," but rather it "was an export depot for grain and wood from the peninsula...," in "Mende," *ZfN* 34 (1923): 8.

more suitable for foreign 'large scale transactions' rather than for retail in the local market.[65]

The earlier issues of Mende were followed from ca. 460 to 423 by a new series of artistically stamped coins (tetradrachms of Attic weight)[66] revealing the high importance placed by the city on the Dionysian cult and viticulture: on the reverse appears the figure of either a bearded Dionysos or Hephaistos reclining upon the back of the ass holding a kantharos, and on the reverse the new form of the ethnic MENΔAION encircling an incuse square containing a vine with clusters of grapes.[67] On the other hand, the symbolic nature of the ass and the fame it brought for Mende cannot be understated. The "Mendaian Ass"

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[65] Taking into account the comparative numbers of coins found abroad, Kraay deduced that the concept of dispersing silver coinage originated in Northern Greece. For his opinion about the original function of coinage and the special needs arising from the Greek colonization and a city's accumulation of wealth, see "Hoards, Small Change and the Origin of Coinage," *JHS* 84 (1964): 83-85, 87-91. See also, M. Jessop Price, "The Coinages of the Northern Aegean," in *Coinage and Administration in the Athenian and Persian Empires*, ed. by I. Carradice (Oxford, 1987), 43-44 on the importance of silver mining and the purpose of large denomination coinage and its role in trade.

[66] Kraay, *Archaic and Classical Greek Coins*, 137, notes that there was a time gap between the first series of tetradrachms and the new series with the reclining Dionysos, and he dates the introduction of the new type ca. 460 (based on an overstruck coin of Gela on Mende) and not later, dispensing thus with the association of the introduction of the new Dionysian type with the much-debated Coinage Decree.

[67] Knoblauch challenges the common view that the reclining figure is Dionysos. She proposes that the figure is Hephaistos, and that the theme represents the myth of his return to Olympos 'imbibed' with the help of Dionysos, "Myth and Message in Northern Greece: Interpreting the Classical Coins of Mende," in *Στέφανος, Studies in Honor of Brunhilde Sismondo Ridgway*, ed. By K. J. Hartswick and M. C. Sturgeon (Philadelphia, 1998), 157-159. The new form of the ethnic 'Mende' was interpreted as an influence from the Attic dialect (the 'ι', γιώτα, in the Ionian dialect changes to 'ε', έψιλον, in the Attic) possibly around the time when Mende became a subject to Athens, see W. Helbig, "Μίνδη-Μένδη," *AZ* 20 (1862): 309-310; cf. Oikonomos, "Minde-Mende the Birthplace of Paionios," *AE* (1924): 29, 32. Besides that, Noe in studying the engraving style of the new series of coins (dated from ca. 450 and to the date of the hoard burial), proposed that at least two artists worked for the mint of Mende; one of them, who produced some of the most artistically rendered pieces, might have been a skilled artist from Athens, *The Mende Hoard*, 50-51; cf. G. F. Hill, "Greek Coins Acquired by the British Museum in 1923," *NC* 4 (1924): 6-7. Kraay, on the basis of a coin of Gela overstruck with the reclining Dionysos, dates the new series close to 460, *Archaic and Classical Greek Coins*, 137. If we combine the epigraphic evidence with the name of Mende appearing in the assessment list of 454/3 (ATL III, 25, 272) and Kraay's earlier date for the new series of Mendaian coins, we can suppose that Mende must have entered the Delian League close to its inception, if not from the very beginning.

(Μενδαίος Ονος) must have been widely known as its name found a way into the modern Greek language. Today, the word Μένδιος (Μένδης, Μέντης: Mendes) is used to mean the ass.[68]

Thucydides, writing at a time that coincided with the minting of the new coinage, narrates the events of the revolt of Mende, probably instigated by a pro-oligarchic faction of Mendaian citizens in 423. The city was detached from Athens, joined the general Brasidas who campaigned to bring other cities, such as Potidaia, Skione, Torone, and Amphipolis under the protection of Sparta. However, the revolt of Mende was short-lived; it was besieged, plundered, and taken back by Nikias and Nikostatos for the Athenians.[69]

Consequently, the city seemed to have stopped issuing silver tetradrachms, probably a repercussion of her revolt from Athens that restricted her coinage, a gap that lasted from 423 to ca. 405. However, as Noe believes, Mende was already issuing smaller denominations (tetrobols) since before these events and continued to do so to ca. 400. Initially they conformed to the Attic standard, but they appeared later in reduced weight, signaling a change in standard.[70] Contrary to the evidence of the earlier Mendaian coinage found

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[68] Vokotopoulou, "Cities and Sanctuaries of the Archaic Period in Chalkidike," *BSA* 91 (1996), 321.

[69] Thuc.IV.121.2; IV.123.1; IV.124.4; IV.129.1-5; IV.130.7; cf. Diodorus, XII.72.7-9; and Plutarch, *Lives*, 14.4 (Nicias and Crassus). For the earliest attempt to identify the topography of ancient Mende (in relation to the events described by Thucydides), see Benjamin D. Meritt, "Scione, Mende, and Torone," *AJA* 27 (1923): 447-450. It has been assumed that the events of that period were the cause for the burial of the Kaliandra hoard, and judging from the approximate dating probably of the 'Scione' one too.

[70] Noe, *The Mende Hoard*, 56-57, proposes a change from the Attic to the Aiginetic standard. On the Attic standard: tetradrachm 17.20 g (Stater), drachma 4.30 g, obol 0.72 g. On the Aiginetic standard: didrachm 12.40 g (Stater), drachma 6.20 g. See, Regling, "Mende," *ZfN* 34 (1923): 28-31. For the Mendaian tetrobols (style and sequence), see Françoise Michaux, "Les Tétroboles de Mendé," *RBN* 127 (1981): 5-18. Note the mention of tetrobols with the legend KA on the reverse interpreted as coins produced jointly by Mende and

dispersed abroad, the new series—from ca. 460 to the end of the 5th century—stayed close to home; all known pieces come from hoards discovered locally.[71] Tetradrachms re-appear, but in reduced weight an altogether different style, dated "after 400". Inter-city political frictions probably continued, such as those that caused the earlier rebellion, causing 'fluctuations' in several aspects of the city's 'domestic' and 'foreign' policies. There is much evidence that friendship and trade relations did not stop with Athens. The find of a tetradrachm re-issued in the Attic standard, which is stylistically similar to the earlier (reclining) Dionysian coins, is used as an indication that Mende tried to retain a close commercial relationship with Athens.[72] The same has been inferred from a reference to the surprise attack against Mende by the Spartan King Agesilaos (394), and the city's reluctance to join the Chalkidian League (390).[73]

During the remainder of the 4th century, few texts affirm Mende's prominence in the wine.[74] But, there is not much information about the fate of the city. It remains unknown

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Kapsa (a neighboring town where Mende might had established a mint).

[71] Kraay, "Hoards, Small Change and the Origin of Coinage," *JHS* 84 (1964): 83, note 55. M. Thompson, O. Mørkholm, and C. M. Kraay, *An Inventory of Coin Hoards*, no. 358 (Kaliandra; 400 pieces, mostly large denominations), no. 360 (Nea Cassandra: 37 pieces of small denominations), no. 361 (Kaliandra; 2 pieces), and the most recent, *Coin Hoards VIII* (London, 1994), 8, no. 63 (Scione, Greece, 1991).

[72] On the tetrobols of reduced weight, the two tetradrachms featuring a Dionysos head (also of reduced weight) and the unique tetradrachm (Boston Museum) of Attic weight dated later than 400, see Noe, *The Mende Hoard*, 53-60 (Pl. X). Also see, Regling, "Mende," *ZfN* 34 (1923): 32 (Pl. III, no. 33).

[73] Polyaenus, *Stratagems of War*, 2.1.31; [Aristotle], *Oeconomica*, II.2.21.

[74] Demosthenes, *Against Lacritus*, XXXV.10, 20, and 35, for the litigation about the insurance of a Mendaian amphora cargo. Athenaeus, *The Deipnoshophists*, I.29d-f, I.31a, IV.129d, IV.146e, XI.784c: ancient authors praising the 'smooth' Mendaian wine. The last citation, in reference to Lysippos' invention of a new 'special' kind of wine vessel for king Kassander, has been interpreted to suggest the introduction of a new style of Mendaian amphora; so far no one has identified such a vessel dated to the end of the 4th

when Mende came under Macedonian rule, as there is no mention of it by the ancient authors and it uncertain if it was not destroyed. It may have become marginalized and dependent, especially after the foundation of the city of Kassandreia in 315 by enforcing the synoicism of the cities of Pallene.[75]

Finally, the archaeological excavations conducted at the site of the ancient city of Mende brought to light new information, which corroborated the validity of past sources, negated others, and generally filled gaps and fragmentary information presented so far by the aforementioned sources. The invaluable work of Ioulia Vokotopoulou on the topography of Pallene (and the broader region of the Chalkidian peninsula) as well as the excavation of Mende and the surveys on numerous neighboring ancient settlements and towns has finally pushed the historical and archaeological studies of this area beyond the borders of ancient texts, chance discoveries, speculation, and assumptions. So far the archaeologists have identified with certainty the ancient sites of Potidaia, Aphytis, Skione, and Mende on Pallene (Fig. 4). During systematic surveys in search of ancient habitation, a number of sites were discovered that were linked in a preliminary way to known cities or locations known from

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century among extant amphoras. Flensted-Jensen seems to disagree with the usual interpretation, and she calls it rather a 'drinking-cup', "Mende, a City-State in Northern Greece." *Classica et Mediaevalia* 50 (1999): 222. For a more comprehensive opinion on what kind of 'vessel' Kassander's 'keramos' might have been, see Mark Lawall, "Nothing to Do with Mendaian Amphoras? Athenaeus 11.784c," in *Daimonopylai: Essays in Classics and the Classical Tradition Presented to Edmund G. Berry*, ed. by Rory B. Egan, and Mark Joyal, 241-249 (Manitoba, 2004). I should like to thank the author for being so kind as to send me a copy of his article.

[75] Ioulia Vokotopoulou, "Ο Κάσσανδρος, η Κασσάνδρεια και η Θεσσαλονίκη (Kassander, Kassandreia, and Thessalonike)," in *Μνήμη Μανόλη Ανδρόνικου (In Memory of Manolis Andronikos)*, 39-50 (Thessalonike, 1997); "Τοπογραφικά Κασσάνδρας (Topography of Kassandra)," in *Αφιέρωμα στον N.G.L. Hammond*, 77 (Thessalonike, 1997) raises the possibility that the occupation by the Macedonians brought the destruction of the cities since no Hellenistic layers have been found during the majority of the surveys and excavations.

the literary texts: Chytropolis, Neapolis, Aige, Theramvos, the sanctuary of Apollo of Kanastro, and Sane.[76]

In brief, the excavation at Mende which has been identified with the site south of the modern village of Kalandra included work at four different locations: the acropolis of the city itself (or Vigla), "the suburb" (or Proasteion) located by the shore below the acropolis, the cemetery of the suburb near the coast (partly submerged in water), and the temple of Poseidon on the promontory located west of Mende. Based on the remains of pottery sherds found in pits, the earliest phase of habitation on the acropolis is dated from the late Mycenaean and continues to the Geometric period (from the late 12th to 7th centuries).[77]

Excavations of the residences, northeast of "the suburb", revealed a continuous habitation from the mid-9th to the 4th centuries. The earliest pottery, dated to the 8th and 7th centuries, is fragmentary pieces of imports from Euboia, sherds bearing stylistic similarities to the Cyclades and locally made pottery with Geometric decoration. Other finds included copper coins of small denominations which were found inside "Residence A", dated to the second quarter of the 4th century. Also important is the discovery of the remains of what seems to be a ceramic workshop and a kiln on top of a destruction layer dated to the end of

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[76] For the excavation reports at Mende (Vigla, Proasteion, Cemetery and Poseidion) see *AEMTh* I (1987), 279-293; *AEMTh* II (1988), 331-345; *AEMTh* III (1989), 409-423; *AEMTh* IV (1990), 399-415; *AEMTh* V (1991), 303-318 ; *AEMTh* VI (1992), 443-450; *AEMTh* VII (1993), 401-412. For an overiew of Vokotopoulou's work on Pallene and Mende, see "Topography of Kassandra," in *Αφιέρωμα στον N.G.L. Hammond*, 65-77; "Nouvelles Donnes sur l'Architecture Archaique en Macedoine Centrale et en Chalcidique," in *Les Grands Ateliers d'Architecture dans le Monde Egeen du VIe siecle av. J. - C.*, ed. by Jacques des Courtils et Jean-Charles Moretti (Istanbul, 1993), 92-95.

[77] *AEMTh* I (1987), 280-1; *AEMTh* IV (1990), 401; Hammond, "Eretria's Colonies in the Area of the Thermaic Gulf," *BSA* 93 (1998): 397, notes that these early dates point to the establishment of the inhabitants during the Aeolian and Ionian migrations.

the 5th century. No less interesting is the discovery of a roof tile stamped with the representation of the "Mendaian Ass" during a trial survey in Delegiannides' hill (Fig. 9).[78]

The cemetery of Mende, found along the coast northeast of "the suburb", included a total of 241 graves, the majority of which were burials of babies and children inside pots (εγχυτρισμοί). A great variety of vessels, mainly amphoras and pithoi, were used for the burials. The style of a number of pots bears similarities to motives from Eretria, Cyclades and Attica dated from the end of the 8th to the 6th centuries. A great number were locally made, featuring geometric designs influenced stylistically from Central Macedonia.[79]

On the promontory west of Mende, the remains of a sanctuary were excavated revealing four structures with different building phases. The earlier dates to the 11th century, based on the local sub-Mycenaean and Geometric pottery found at the site. The date of two of the structures shows that they were used continuously through Hellenistic and Roman period. The foundations of the main temple, probably built in the fifth century, yielded numerous sherds of Attic and local pottery with a few examples from Corinth and Ionia. The most important discovery came in the form of inscriptions, albeit fragmentary, which identify the patron of the site: "[Ποσειδ]έωνι" (to Poseidon). The name of the god has survived in the

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[78] *AEMTh* I (1987), 280-1; *AEMTh* II (1988), 332-335, 418, note 6, and Figs. 1-2 (drawings of the Residences A and B); *AEMTh* III (1989), 409-411. The coins feature the youthful head of Dionysos on the obverse and one or two amphoras on the reverse; and Fig. 3: the stamped roof tile was discovered on the site of two adjacent rooms (possibly the basements of houses) located mid-way between the Vigla and 'the suburb'. Based on the pottery sherds and the few coins found on the floor of the rooms, the buildings were dated to the second quarter of the 4th century.

[79] *AEMTh* III (1989), 414-415, 418; *AEMTh* IV (1990), 415.

local toponym of the site which is called Poseidi.[80]

The finds from the terrestrial excavations at Mende and the surveys conducted in search of the ancient cities of Pallene have given us invaluable insights for the history of the region, which has been otherwise fragmentary and sketchy. While the archaeological spade continues to bring new and exciting discoveries to light for the city of Mende we are gradually introduced through the extant material remains to the people who actually made this city famous. There seems no reason to doubt the general belief that Mende was a vibrant and prosperous city. But, what we are discovering now are the very details of the complex ways in which Mendaians lived and interacted with their neighbors, how they might have exploited the natural resources of the region, and the geographical position of their city, making Mende's name resound during its peak and down to our times.

Historically, from the ancient sources and archaeological excavations, it has been shown that separately the Northern Sporades and Mende in Pallene were key areas in the sea-borne traffic running on the east-west and north-south axis of the east coast of Greece and northern Aegean Sea. But, there is no direct evidence linking any of the islands to the city. One place to look for answers is the material remains of the ships that served as the bridges of communication and interaction between these regions.

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[80] *AEMTh* III (1989), 416-418; *AEMTh* IV (1990), 401-3. This is the site where "Setting out with the fleet from Potidaia and putting in at the temple of Poseidon, they [Athenians] advanced into the country of the Mendaians," as Thucydides wrote during the events of the Mendaian revolt, IV.129.3.

CHAPTER 2: MENDAIAN AND SOLOKHA II TRANSPORT AMPHORAS

Two types of amphoras recovered from the Alonnesos shipwreck were identified by V. Grace as belonging to the Mendaian and Solokha II types, and E. Hadjidaki dates them, based on the Athenian black glazed ware, between 420 and 400.[81] The total number of complete and fragmentary amphoras recovered numbers more than 175. For the present study, 51 Mendaian (Pls. 1-12, 36-37) and 91 Solokha II (Pls. 13-34, 38-39) amphoras were selected and recorded, based on their state of preservation. In addition, 7 other amphoras, grouped under miscellaneous, have been studied and used as a cross-reference material (Pls. 35, 39-40).[82]

A marked increase has been noted in the appearance of Mendaian transport amphoras among the cargoes of shipwrecks in the last decade, a phenomenon probably caused by the increase in the number of underwater surveys and the systematic cataloguing of underwater sites. These archaeological discoveries support the ancient writings proclaiming the fame of Mendaian wine and there seems to be no doubt that Mende was a major wine exporter not only during the 5th, but well into the 4th century. The current archaeological record concurs

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[81] Before I begin this overview, I would like to express my deepest gratitude to Nandya Khodchenko, Natasha Koshkarova, Alla Krutynskaia, Maria Malby, Natasha Lyandres and Ivan Medvedev, who so kindly took the time to translate for me sections or entire articles of the Russian works, cited herein, to the English language.

[82] The amphoras were recovered in 1992 and 1993 and included fragmentary ones as well as individual broken parts bundled in plastic bags. I do not know the exact number of all the vessels recovered during the excavation, because the amphoras were in the process of being catalogued by the Department at the time I examined them. So, for the purpose of this study I selected 171 vessels for photography (not all photographs are included in the Plates) and 142 vessels for dimension measurements. In addition, I took linear dimensions and examined 7 miscellaneous amphoras (a Chian straight-sided neck, a Thasian biconical, a Corinthian B/ Corcyraean, and four unidentified). See description in 'Amphora Description and Catalogue' (Chapter 4).

with primary literary sources such as the well known Demosthenes' case involving three thousand Mendaian wine jars, which were to be shipped to the Black Sea.[83] Centuries later, Mendaian wine still had a good reputation. Athenaeus, ca. A.D. 200, praised Mendaian wine on more than one occasion in *The Deipnosophists*.[84]

Two shipwrecks have been found in the Aegean Sea, which carried as part of their cargo Mendaian transport amphoras predating the ones from the Alonnesos shipwreck. The Phagrou or Kyra Panagia shipwreck dated to the middle of the 5th century with an estimated number of 1,500 Mendaian vessels.[85] The other is the Tektaş Burnu shipwreck, which was discovered on the Aegean coast of Turkey to the east of the island of Chios, and excavated between 1999 and 2001. Interestingly, the ten Mendaian amphoras found among its cargo carried anything but wine; nine of them contained resinous black pitch and the last one, butchered beef bones. They are dated to 450-425 and in the illustrations look very similar to the Phagrou shipwreck amphoras.[86]

The 'Voula' shipwreck dated c. 400, the Porticello shipwreck dated to the early 4th century, and the El Sec shipwreck dated to the middle of the 4th century are the closest (but later chronologically) comparable discoveries to the Alonnesos shipwreck. The wrecks differ

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[83] The prosperity of the city is attested in the numismatic record, the finds (residences, artifacts, etc.) from the excavations at Mende, and the numerous transport amphoras discovered on land and underwater. Demosthenes, *Against Lacritus*, XXXV.10, 20, and 35. From the deposition we are informed that only 450 amphoras were actually loaded aboard the ship. Although the speech dates to 341, there is much evidence for such a volume of trade in the second half of the 5th century.

[84] Athenaeus, *The Deipnosophists*, I.29-31; IV.129, 146; XI.784.

[85] Kazianes, "Nomos Magnesias: Phagrou Vorion Sporadon," *ArchDelt-Chronika B'*2 51 (1996): 724-5.

[86] Carlson, "The Classical Greek Shipwreck," *AJA* 107 (2003): 581, 587-590.

considerably in size, but we are very fortunate to have found on all four the same types of amphoras as part of their cargo. The discovery of these amphoras serves as evidence for their lengthy and geographically broad use, but most significantly it serves as a guide for their morphological development over the years from the late 5th to the early 4th centuries. In 1961, the Voula wreck was surveyed and a number of amphoras were recovered by divers of the Greek Federation of Underwater Activities (ΕΟΥΔΑ) and American divers from the ship *Sea Diver* of Edwin A. Link, under the auspices of the Greek Archaeological Service. V. Grace identified the amphoras as Mendaian and dated them to c. 400, suggesting that an earlier date might be possible. A stamp bearing the head of a man looking to the right appears on one of the handles from a vessel.[87] To my knowledge, this was the first shipwreck carrying Mendaian amphoras that was discovered after Grace identified the Mendaian type and linked it to the ancient Greek city.[88]

On the shipwreck at Porticello, Eiseman identified thirteen Mendaian amphoras and

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[87] Reported by M. Paraskevaides in the Greek press (including Grace's opinion on the date), "The Shipwreck Surveyed at Voula dating to 400 B.C.- Came from Mende," *Kathimerini* (9 July1961): 4. The wreck is located near the lighthouse of the 'Mermigia' reefs, and southwest of the Katramonisi (or Prasonisi) islet, in the Saronic Gulf off Attica. Its main amphora cargo spreads 40 feet in length at a depth of 17 feet. The amphoras were recovered from a deeper point at 24 feet. Other artifacts found were a round clay 'frying pan' one meter in diameter, and copper nails 13 cm long. Mr. Edwin A. Link, the famous engineer, oceanographer and pilot, participated in this and a number of other surveys in the Greek waters during "a three-year underwater archaeological expedition in the Mediterranean Sea [which started in 1960]....Ed Link [during that time] tested his submersible decompression chamber (SDC) that he designed to allow divers to work and live underwater for extended periods of time," (February 2004: http://www.lib.fit.edu/pubs/linkbib/sketch.html). M. S. F. Hood, "Archaeology in Greece, 1961-62 – 'Attica'" *AR* (1962-63): 5, reports on the visit of E. Link in the Aegean and cites the Greek press about two other wrecks: "The wreck of a Classical ship with a cargo of Laconian tiles is reported by the rock 'Petrokaravo' in the Saronic Gulf. The wreck by the south edge of 'Prasonisi', near Voula, thought to be Roman, was found to contain a cargo of wine jars of about 350-25 B.C. from Chios and Lesbos."

[88] See below Grace's identification of the Mendaian type amphora.

two "Solokha II (Byzantine)" type.[89] Eiseman dated the Mendaian amphoras to the end of the 5th - or beginning of the 4th century, and the Solokha II to the 4th, century based on Brashinsky's study on the shape of Mendaian jars found in northern Aegean and around the Black Sea.[90] Later, Lawall adjusted the date of the shipwreck to the early 4th century by comparing the shape and the fabric of the Mendaian vessels to the finds from datable excavated deposits in the Athenian Agora.[91]

One Mendaian amphora is reported from the Punic El Sec shipwreck at El Sec located off Majorca, Spain. It resembles the Porticello examples, but bears distinct differences: the handles have a less pronounced curve on the top, are taller and the shaft is placed closer to the neck. The shoulder is angular, but the shape of the body is slimmer and more elongated. Probably this amphora is a later variation and dates to the first half of the 4th century, somewhat later than those from the Porticello.[92]

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[89] Doulgeri-Intzessiloglou and Garlan, "Vin et Amphores de Peparethos et d'Ikos," *BCH* 114, I (1990): 368-369, where the authors associate this type to the fragmentary amphoras found on Peparethos and Ikos.

[90] Eiseman, "Amphoras from the Porticello," *IJNA* 2 (1973): 15, 21; Eiseman and Ridgway, *The Porticello Shipwreck*, 39, note 2: Eiseman summarizes I. B. Brashinsky's article, "Amphoras from Mende: on the origin of the group of amphoras so-called 'with feet in the form of a glass'," in *Artistic Culture and Archaeology of the Ancient World* (Moscow, 1976), 67-74. On page 40, the author provides a detailed list of previous publications on Mendaian amphoras in chronological order from the mid-fifth to the second half of the fourh century.

[91] M. L. Lawall, "Bolsals, Mendean Amphoras, and the date of the Porticello shipwreck," *IJNA* 27, no. 1 (1998): 19-20. V. Grace had reached the same (unpublished) conclusion.

[92] I would like to thank Sara Zurita-Martinez and Mr. Adolfo J. Dominguez for their help with the Spanish translations. For the El Sec shipwreck and the amphoras recovered from the site, see: Arribas, A., et al., *El Barco de El Sec* (Mallorca, 1987), 469, Fig. 126, type 'Q', and Damian Cerdá, "El Sec: La Ceramica Atica de Barniz Negro y Las Anforas," in *Grecs et Iberes au Vie Siecle avant Jesus-Christ: Commerce et Iconographie*, ed. by Pierre Rouillard et Marie-Christine Villanueva-Puig (Paris, 1989), 65-66, 89, Fig. 18: Sec 'Q'. See also, Lawall, "Bolsals, Mendean Amphoras, and the date of the Porticello shipwreck," *IJNA* 27, no. 1 (1998): 19-20 on comparing the amphoras and bolsals to the Porticello artifacts.

Besides the discoveries of Mendaian amphoras from underwater sites surveyed or excavated properly, we know of two cases, in 1977 and 1981, when amphoras were illegally recovered underwater off the south-east corner of Sithonia sub-peninsula in Chalkidike. In the first case, a reference is made to fragments of Mendaian amphoras dated to the late 5th century. In the second case, a German tourist was caught after having recovered 52 amphoras, from various spots along the same coastal area, which were dated to the 4th and 3rd centuries.[93] These finds are not at all surprising when we are reminded that the Chalkidian peninsula was a primary wine producing area by numerous indications that its towns, such as Skione, Aphytis, Torone, or Akanthos, grew and traded their wines beyond their region.[94] One can only imagine how many shipwrecks must lie beneath the waters of Chalkidike.[95]

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[93] Parker, *Ancient Shipwrecks of the Mediterranean,* 406-407 makes a reference to 'unpublished' photos of Mendaian amphoras, but he does not cite the source for the 1977 recovery of the alleged late 5th century amphoras. T. W. Hillard and J. L. Beness, "Postclassical Effects on Classical Shoreline Sites: Straton's Tower/Caesarea Maritima, Israel and Torone, Chalkidike, Greece," in *Res Maritimae: Cyprus and the Eastern Mediterranean from Prehistory to Late Antiquity*, ed. by Stuart Swiny, Robert L. Hohlfelder, and Helena Wylde Swiny (Atlanta, 1997), 142-3: the authors use these recoveries as examples to emphasize the importance of the ancient city of Torone, which was located on Sithonia, in the seaborne commerce of northern Greece. For the second case see Touchais, "Chronique des Fouilles et Découvertes Archéologiques en Grèce en 1981," *BCH* 106, II (1982): 578 and in the Greek press clipping, "German 'fished' 52 amphoras from Sithonia," *Eleftherotypia* (Athens, Greece), 27 August 1981: "the 27-year-old German tourist stayed at the local camping grounds at Stavrou in Sithonia for approximately twenty days, where he dove illegally in numerous locations and recovered 52 amphoras. The local people informed the authorities of his suspicious activities and the police confiscated the amphoras which were hidden in his car and in his camping bags. Following his arrest he was tried by the Greek court." This report provides a general information on the dating 'from the end of the third to the beginning of the fourth centuries' and no other indication as to the type of amphoras or whether the type was identified and by whom. I do not know whether these amphoras have been published, and it will be interesting to know more details on them that pertain to their form and dating.

[94] J. K. Papadopoulos and S. A. Paspalas, "Mendaian as Chalkidian Wine," *Hesperia* 68, no. 2 (1999): 178-183 cite as a modern analogy the long tradition of wine-making in Chalkidike the Monasteries of Mount Athos in Akte sub-peninsula, where the monks still use traditional techniques in production. Also the famous Porto Carras resort and winery that uses grapes from central and southern Sithonia (where ancient Torone was located).

[95] I would like to make a reference to one very interesting intact amphora, which looks quite similar in form, although it is difficult to tell from an illustration, to the early Mendaian amphoras of the mid-5th

All other examples of Mendaian amphoras come from terrestrial sites; and it was from amphoras found on land that one of the most well developed typological databases was built and continues to develop in chronological sequence with each new discovery of this prominent type of transport amphoras.[96] In 1949, V. Grace made the first identification of a Mendaian amphora by the association with an impressed stamp bearing the city's official coin type dated to the third quarter of the 5th century. The stamp of Dionysos, holding a drinking cup while riding backwards on a donkey, appears on the handle of a wine amphora.[97] The same year, Corbett published two other similar stamped handles, one featuring Dionysos and

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century with a globular body and a short stem toe. This one has a distinctive contracted neck, steeply sloping shoulder, and highly curved but short—almost looped shaped—handles. The amphora was recovered during a survey for ancient shipwrecks in the Bay of Marathon in 1950, and was dated to the end of the 5th or the beginning of the 4th centuries. It was found close to a possible shipwreck site, north of the Kynosoura Point, see F. Braemer and J. Marcadé, "Céramique Antique et Pièces d'Ancres Trouvées en Mer a la Pointe de la Kynosoura (Baie de Marathon)," *BCH* 77 (1953): 139-142, Fig. 3a. It should be interesting to examine closely the amphora and if possible identify the type in prospect of renewing interest in future surveys around the waters of Attica, particularly in the Bay of Marathon. A number of other amphoras were recovered at the same site are believed to be characteristic of the Chian production ca. 425. Parker, *Ancient Shipwrecks of the Mediterranean*, 231 makes a reference to Peter Throckmorton who dived the same area and spotted a cargo of mid-4th century amphoras, some of which resemble type N2 (Samian?) from the El Sec shipwreck. Marathon Bay must be strewn with shipwrecks of a rather early date judging from yet another report by V. Grace who makes a reference to an amphora (top and bottom) recovered from a wreck off Marathon. She believes that it compares to a very characteristic one in her Samian series dated to the last quarter of the 5th century, "Samian Amphoras," *Hesperia* 40 (1971): 77-78.

[96] For previous publications on late fifth century Mendaian jars, see Peter Corbett, "Attic Pottery of the Later Fifth Century from the Athenian Agora," *Hesperia* 18 (1949): 336-37, no. 106, Fig. 7, Pl. 98 (SS 7,614), and 345, no. 166, Pl. 98 (SS 10,231); V. Grace, "Standard Pottery Containers of the Ancient World," *Hesperia Supplement* VIII (1949): 175-189; Brashinsky, "Amphoras from Mende," in *Artistic Culture and Archaeology of the Ancient World*, 72-3, Fig. 1 nos. 3 and 4; on the "late variant" see Lawall, "Transport Amphoras and Trademarks: Imports to Athens and Economic Diversity in the Fifth Century B.C." (Ph.D. diss, University of Michigan, Ann Arbor, 1995), 122-3, Figs. 40 and 41; for a detailed list on Mendaian publications see Eiseman and Ridgway, *The Porticello Shipwreck*, 40-41.

[97] Virginia R. Grace, "Standard Pottery Containers," *Hesperia Supplement.* VIII (1949): 182, 186, Pl. 20, no. 1 (SS 6917), where she emphasizes that the fabric of the handle resembles the Thasian; Lawall, "Transport Amphoras and Trademarks," 117 adds the information that this stamped handle was found on deposit R13:1 closed c. 400 in the Athenian Agora.

the other a satyr-head dated from the same period. Thus, these handles were linked, on the basis of the stamps, the fabric of the sherds and with the help of numismatics, to the particular transport amphora endorsed by the ancient city of Mende.[98] On Dr. Talcott's suggestion, Grace proceeded on a trail of successive comparisons and identifications between earlier unstamped, intact and fragmentary amphoras, with the later stamped handles. Observations of the characteristics of the form, fabric texture, and decoration revealed certain distinctive features about the Mendaian amphora that make it readily identifiable with "the flaring beveled rim, broad band handles with a thumb impression on their lower attachment, flaring foot with a depression on the underside, and micaceous reddish buff clay."[99]

Working independently, in 1951, Zeest separated the amphora with the "wineglass–shaped stem", one of the most widespread containers imported during the 4th to 3rd centuries in the cities along the shores of the Black Sea. She asserted that the vessel with the peculiar foot probably originated in the northern Aegean Sea, most likely one under the influence of the island of Thasos. In 1960, she wrote describing the 'graceful' shape of a vessel:

> "The neck is not very high (18-20 cm); it is flaring downwards, and smoothly connected to the upper part of the body. The shoulders are very wide up to 40 cm, and rounded. The whole height of the vessel is no more than 68 cm. The body is conical. The lower, narrow part ends at a high cylindrical foot, with a very wide toe, which makes it look similar to a wineglass. The diameter of the lower part of the foot is from 7 to 9-10 cm."

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[98] Peter Corbett, "Attic Pottery of the Later Fifth Century from the Athenian Agora," *Hesperia* 18 (1949): 345, no. 166 (SS 10,231), Pl. 98, Fig. 7: both this and Grace's stamped handle were found in contemporary deposits.

[99] Grace, "Wine Jars," in "Pottery of the Mid-Fifth Century from a Well in the Athenian Agora," authored by Cedric Boulter, *Hesperia* 22, no. 2 (1953): 106-107, Pl. 40, no. 161 gives due credit to Talcott who suggested the possibly Mendaian provenance of the amphora. See, Lucy Talcott, "Attic Black-Glazed Stamped Ware and Other Pottery from a Fifth Century Well," *Hesperia* 4 (1935): 496, no. 88, Fig. 17, and 514, no. 88 (P 2375).

In describing the fabric, she noted that the light brown clay contained mica, and insertions of small pieces of white quartz sand, which rendered coarse its surface. The examples studied, according to Zeest, date from the 5th to the 3rd centuries and were found in the Aegean and around the Black Sea. On the basis of shape development, she proposed a chronological sequence where the body becomes slender, "the neck and the foot longer and accordingly the body narrowed."[100]

Other researchers, such as Shelov, supported the hypothesis of the Thasian provenance of the "wine-glass shaped stem" vessel. He singled out a number of stamped handles into "Group A", appearing party in intaglio and party in relief, from amphoras recovered in excavations at Panticapaeum and Phanagoria. He then concluded that, based on similarities of the fabric of the clay between the stamped handles and the clay (fabric) from Thasian vessels, that the former were most likely belonged to amphoras produced on Thasos or in a city along the coast of Thrace. Zeest made another association between the "wineglass–shaped stem" amphora and a group of stamps from Hermonassa, which were believed to bear similar characteristics to those presented by Shelov.

At the same time, A.-M. Bon and A. Bon published a Thasian stamp corpus including those attributed by Shelov to "Group A", but let open the question of

[100] I. B. Zeest, "Keramicheskaia tara Elisavetovskogo Gorodishcha i ego Kurganogo Nekropolya (Ceramic Containers from the Elisavetovskaya Site on the Ancient Town and Its Necropolis)," *MIA* 19 (1951): 122-123; "K Voprosu o Vnutrenne Torgovle Prikuban' ya s Fanagorie (On the Question of Internal Trade between the Kuban Area and Phanagoria)," *MIA* 19 (1951): 116; "Keramicheskaia tara Bospora (Ceramic Containers from Bosporos)," *MIA* 83 (1960): 88-89 (Pls. X, 23 and X-XII, 24), the amphoras were dated in the context of other finds from excavations in Maritsyn, Phanagoria, Myrmecium, Melitopol, and based on markings such as those appearing on the vessel at the Severiano Museum in Bucharest.

provenance.[101] In his discussion of pottery stamps, Brashinsky initially supported the probable Thasian provenance, but later he revised his position in light of the discoveries of Mendaian stamps found on intact amphoras from the Elizavetovskaya necropolis on the Lower Don river. Both epigraphic and the anepigraphic stamps bear the Mendaian coin device and are similar in style to the ones reported by Grace and Corbett from the Athenian Agora.[102]

In the late 1960s and 1970s, Brashinsky studied the amphoras from the burial grounds in Elisavetovksaya, Maritsyn and Niconium (dated to the third and fourth quarters of the 5th century). Focusing on common morphological features, such as the shape of the foot, the shape of the rim, and the fabric of the clay, he suggested that they are predecessors to Zeest's "wineglass-shaped stem" vessels dated to the 4th century. He proposed a successive shape development from the squat and rounded form to the longer and more angular ones, illustrating five characteristic examples. In particular, the Elisavetovkaya burial mounds

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[101] D. B. Shelov, "Stamps on Amphoras and Tiles found at Panticapaeum Excavations 1945-1949," *MIA* 56 (1957): 217-219, 221, and Pl. 4, nos. 4 and 5; and "Pottery Stamps from the Excavations at Phanagoria," *MIA* No. 57 (1956): 151 includes the stamps under "Group A" after having examined closely the fabric as a means to determine provenance; and Zeest, "Raskopki Germonassy (Excavations at Hermonassa)," *KSIIMK* 74 (1959): 62-63 (article was published in 1959 and not in 1954 as stated twice in Eiseman and Ridgway, *The Porticello Shipwreck*, 1987, 39 footnote 2). Anne-Marie Bon and Antoine Bon, *Les Timbres Amphoriques de Thasos* (Paris, 1957), 11, 498-504 (No. 2184-2210).

[102] On the association of the 'wine glass stem' amphoras and Mende, see Brashinsky, "Uspekhi Keramicheskoi Epigrafiki (The Successes of Ceramic Epigraphy)," *SA* 2 (1961): 295-296, and "The Progress of Greek Ceramic Epigraphy in the USSR," *Eirene* 11 (1973): 121-122, and 144 (Addendum to page 122). For the stamps, see Brashinsky, "Iz Istorii Torgovli Severnogo Prichernomorya s Mendoi v V-IV vv. do. n. e. (On the History of the Trade between the Northern Black Sea Region and Mende in the 5th and the 4th centuries B.C.)," *NE* 3 (1962): 46-47 where he reports three stamps: the first was found at Olbia and is stored at the Hermitage Museum, the second of unknown origin is at the Kerch Museum, and the third found in the Olbian Agora is at the Leningrad Division of the Institute of Archaeology. I would like to thank Dr. Koehler who provided me with a translation of this article in English done by P. Broneer.

yielded examples of all the successive stages of development of the Mendaian amphora. Among them, the amphora recovered from Burial 2 Mound 28 in Elisavetovskaya was dated from the last quarter of the 5th century and the amphoras from mound 9 in Elisavetovskaya, mound 1N in Adzhigola, and Niconium were dated from the end of the 5th to the beginning of the 4th centuries.[103] Brashinsky's examples (under his Figs. 3 and 4) are present among the Mendaian amphoras from the Alonnesos shipwreck (Fig. 10).

In his study of amphoras imported to Athens, Lawall elaborated on the variants proposed by Brashinsky, using examples of fragmentary and intact amphoras that were recovered from datable deposits in the Athenian Agora. Based on their fabric and form he distinguished three Mendaian 'variants' and dated them as follows: the "early variant" from the second quarter of the 5th century to 440; the "middle variant" from 440 to 425; and the "late variant" from the end of the third quarter of the 5th to the end of the century; and the shape continued developing into a slimmer and more elongated form into the 4th century.[104] His "middle variant" corresponds to Brashinsky's Figs. 1 and 2, and the "late variant" to Figs. 3, 4, and 5.[105] Here, we are most interested in the "late variant." Lawall noted, after

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[103] Brashinsky, "Amphoras from Mende," in *Artistic Culture and Archaeology of the Ancient World*, 67-8, 72, Figs. 1-5. Figures 1 and 2 are almost the same, globular body with a short stem toe and date the same time, but Figs. 3, 4, and 5 show distinct differences and the evolution of the shape towards the elongated form. (The amphora in Fig. 3 is dated to the last quarter of the 5th century, and the amphora in Fig. 4 is dated from the end of the 5th to the beginning of the 4th century). For the Adzhigola (or Adshigol) Mound, see M. Ebert, "Ausgrabungen auf dem Gute Maritzyn, Gouv. Cherson (Sud-Russland)," *PZ* 5 (1913): 26-27, Fig. 28 (1N). The illustration shows what looks like a Mendaian type amphora with the description: "Height: 0.63; largest width: 0.40. Tone light brown reddish. Below the broken handle there is a painted red sign in between the handles, and on the shoulder there is a flower in red and brown color. The upper part of the neck and one handle is missing."

[104] Lawall, "Transport Amphoras and Trademarks," 120-124.

[105] Brashinsky, "Amphoras from Mende," in *Artistic Culture and Archaeology of the Ancient World*, 67-8,

examining the Mendaian jars from the Athenian Agora deposits R11:3, closed at 425, S16:1 closed at 410, and Q15:2 closed at 390, there appears to be a continuous development in form, which he distinguishes as "an early and a late example" of the "late variant": "the earlier examples have shorter necks and more sloping shoulders than the later jars of c. 400. In addition, the later jars often have taller stem-toes with a greater proportion of the toe appearing as a solid shaft...the body of the amphora is compressed, resulting in a more angular appearance."[106]

Based on their form and fabric, there is no doubt that one of the main types of the cargo of the shipwreck at Alonnesos are Mendaian amphoras, thought so far we have not found any revealing stamps on them. They bear all the traits described by Grace and represent the "early and the late example" of the "late variant", ranging in date from after 425 to the very end of the 5th century. The close similarity is evident when we compare them to the Mendaian amphoras from the Porticello shipwreck, which makes much more interesting their dating and raises questions of variant succession or contemporaneousness.[107]

All investigations to identify the Mendaian type amphora, have raised more important issues that take the study of transport amphoras to the politico-economic level. Many questions are raised that relate to the issues of provenance and production, some of which

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72, Figs. 1-5.

[106] Lawall, "Transport Amphoras and Trademarks," 123-4: Fig. 39 (P23683, R11:3, closed ca. 425) represents an "early example" of the "late variant"; Fig. 41 (P27524, S16:1, closed to 410, and P23809, Q15:2, closed to 390) represent "late examples" of the "late variant".

[107] For a description of the Mendaian amphoras from the wreck, see 'Amphora Description and Catalogue' (Chapter 4).

are: a) did a city-state produce consistently a characteristic type of amphora, and why was attention paid to a distinctive shape, b) did a city produce amphoras locally only, within the boundaries of its *chora*, or had them produced in another city by 'outsourcing' production for a number of reasons, c) if so, to what degree did a city influence subordinates, neighbors or other cities in the production of amphora of similar form, and finally d) what were the relations between cities producing similar amphoras, what determined parallel production, and how long did production last in each city? Some answers are suggested in this thesis. But, this is a limited in scope study and far from a comprehensive treatment of all the issues raised from the examination of the present material. Nevertheless, many questions are put forth as food for thought for future research on the structural and economic organization of amphora production.

The question of provenance (place of origin, production, and distribution) of the Mendaian amphoras is not settled. The issues surrounding the place of production, the network of distribution and sale of a 'packaged product' (e.g. the transport amphora with its contents) are numerous and the details more complex than merely correlating a 'vessel shape' as the official trademark of a particular city, and inquiring whether it served as a form of guarantee for the quality of its contents. In the case of the origin of the Mendaian amphora, recent archaeological evidence from land excavations provides us with new information that demands attention and further research. In 1991, during a rescue excavation in the main city of Kos (ancient classical city of Kos-Meropis), archaeologists discovered the remains of a pottery workshop specializing in amphoras dated to the first half of the 4th century, spanning

the period from sometime before 412 to 366.[108] Among the debris of the workshop they recovered three different types of fragmentary and intact amphoras: a) Kos I, the 'classic' Koan type with the double-barreled or twin handles,[109] b) Kos II, with the a triangular rim in section forming the so-called mushroom shaped lip, strap shaped handles oval in cross-section, heavy ovoid body, and knob toe,[110] and c) Kos III, with a small wedge shaped rim, strap shaped handles forming a slight S-curve that bear the familiar thumb impression. The latter has a neck that tapers downwards to meet a flat and angular shoulder, and the body forms a conical shape standing on a tall flaring stem toe. The base of the toe is circular with a beveled outer edge and a shallow round impression on the underside.

The finds from this workshop show a great variety in the size of the vessels. Kantzia

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[108] C. Kantzia, "Ενα Κεραμικό Εργαστήριο Αμφορέων του Πρώτου Μισού του 4ου αι. π.χ. στην Κώ (A Ceramic Amphora Workshop of the First Half of the 4th c. B.C. on Kos)," in *Third Scientific Meeting on Hellenistic Ceramics, 24-27 September 1991, Thessalonike*, Vol. I (Athens, 1994), 323-354 reports that two more contemporary amphora workshops were found in the city of Kos, located in the northeast side of the city, an indication that the area was probably the pottery quarters during the classical times. It should be noted that Koan III type amphoras (similar to Mendaian) were recovered from those workshops too.

[109] On the Koan wine and twin handle amphoras, see V. Grace, *Amphoras and the Ancient Wine Trade* (Athens, 1979), Figs. 56-59 with accompanying text; on the Koan amphoras from excavations on Delos, see Grace and M. Savvatianou-Petropoulakou, "Les Timbres Amphoriques Grecs," in *L'Ilot de la Maison des Comédiens* (Paris, 1970), 363-365.

[110] Kantzia, "A Ceramic Amphora Workshop," in *Third Scientific Meeting on Hellenistic Ceramics*, 336-7 discusses the parallels of Kos II type, which was also found in Athens, the introduction of the vessel to Samos in 365, and its close similarity to the Solokha I type, the latter being discussed by Zeest and Doulgeri-Intzessiloglou and Garlan. The mushroom shaped rim amphora has been found in several centers of production from Rhodes to Paros and widely on Kos in strata dated to the end of the 5th and 4th century. It is a shape characterized as a 'regional style', or *koine*. Known examples from underwater are those found on the Kyrenia shipwreck, and one vessel recovered offshore in 1951, currently displayed at the Museum in the Castle of Kos. Others are in display at the Kalymnos Museum. Compare the description and illustrations in Kantzia and Lawall's study of Solokha I form in, "Transport Amphoras and Trademarks," 218-230. Kantzia suggests that the type was introduced to Athens from Kos based on literary evidence of their close relations during the second half of the 5th century and the alleged establishment by Alcibiades of an Athenian clerouchy on the island of Kos in 410.

reports that the Kos III type was produced in two sizes, and she suggests that the smaller one could be a 'hemikadion' (half-jar).[111] Only fragmentary amphoras represent the larger size. Their form resembles the shape of an intact amphora recovered from the sea off the island of Kos. The smaller size is represented by two, almost intact, examples. To judge from Kantzia's illustrations, the angular shoulder and the tall flaring stem toe of the Kos III type closely resemble the Mendaian amphoras of the early 4th century.[112] A revealing discovery among the debris was another Koan amphora of a large size, A 282, which resembles the Mendaian amphoras from the Porticello shipwreck.[113] In comparison, however, the latter appear to have a broader upper body (shoulder and belly), a shorter neck, a less pronounced upper curve on the handle, and are somewhat shorter in height and some of them larger in diameter than the Koan. What will eventually determine a definite origin is a fabric examination using petrographic analysis. For now, we are informed that from visual examination the Koan amphora A 282 is reddish with a pink hue (10R 5/6) with inclusions of

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[111] Ibid, 337, note 58. The discovery of different sizes of the same amphora type in the deposit of a single workshop is important as it could shed light on the actual capacity unit and its derivatives for that particular type. On the *hemikadia* (half-jars), see Grace, "Samian Amphoras," *Hesperia* 40 (1971): 82, with bibliographic references to the origin and use of the word *kados* (container-jar).

[112] Kantzia, "A Ceramic Amphora Workshop," in *Third Scientific Meeting on Hellenistic Ceramics*, 337-340, Fig. 9 shows variants of the toes and one cannot but notice their similarity to the Mendaian toes from the Alonnesos shipwreck.

[113] Ibid., 341. Amphora number A 282, was found almost intact. The author dates it tentatively to before 411, but it seems to be a much early date if we are to trust the existing chronological typology for the Mendaian vessels. According to the author, the pottery workshop was dated to the first half of the 4th century, and she believes that the stamp on the neck of the amphora—a rectangular stamp on the neck with the letters MPPOΩ—can be compared to another epigraphic stamp which was dated to 350 by Grace. I suspect that Kantzia suggests this early date on the basis of the information that the amphoras were found on the 'deepest layer'. She believes that the older layers must date before 412, before the earthquake causing the collapse of Kos-Meropis (Thuc.VIII.41.2). However, we should keep in mind that the sections excavated were identified as the deposit of 'debris' from the workshop, and not the workshop itself, which

gold mica, and traces of white slip on the surface.[114] Kantzia believes that the characteristic traits of this amphora are reproduced on the Koan III. Indeed, the close similarity raises many questions in regards to the (re)production of the style of the 'Mendaian type' amphora, a topic discussed by Lawall in his study of North Greek amphoras from eastern Macedonia to western Thrace, and particularly the cities of Thasos, Akanthos and Mende. He points out numerous similarities in the form and marking system shared among the different production centers in northern Greece, proposing a 'regional style', a *koine*; a concept already proposed in the past for the "mushroom shaped rim" amphora (Solokha I?) for the region of coastal Asia Minor and the Greek islands across from it. And if we are to focus on the shared amphora production within the northern Aegean Sea region, it is only natural that this line of inquiry would generate, as Lawall proposes, discussion of "northern Greece as one economic unit".[115] But then, what does the discovery of the Koan amphora A 282 (and the Koan III) from the southeastern Aegean Sea tells us about the extent of the 'borders' of such a unit (Fig. 11)? After all, each new discovery of a Mendaian type amphora, if it is an imported ware, may broaden the range of geographical 'influence'. But, what are we to make of it, if 'a Mendaian type' was produced locally in a different region? To those examples mentioned

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raises questions on the validity of the proposed dates in this case.

[114] The Porticello amphoras C1-C13 are less than 67 cm in height (only one, C4 is reported at 70 cm), and their body diameter ranges between 37.5 to 40 cm. The Koan (A 282) is reported at 70 cm height and 37 cm in diameter. Kantzia reports that its fabric differs slightly from the others found at the workshop. The ones from Porticello have a surface of: light brown (7.5YR 6/4), reddish yellow (5YR 7/6 and 7.5YR 6/6), and pink (7.5YR 7/4).

[115] On the regional style, see Lawall, "Transport Amphoras and Trademarks," 116-7; for the mushroom shaped rim, see also J.-Y. Empereur and M. Picon, "A la Recherche des fours d'Amphores," in *Recherches sur les Amphores Grecques*, ed. by J.-Y. Empereur and Y. Garlan, *BCH Supplement* 13 (1986), 112.

before two more Mendaian amphoras from Southern Aegean; one is currently displayed at the Archaeological Museum of Seteia in Crete, and the other in the Hadjistavris collection on the island of Kalymnos (Fig. 12).[116]

For the time being, our primary focus should concentrate on the origin of the Mendaian type amphora and in search of much-needed archaeological evidence that will provide us with answers about the economic level of viticulture in Chalkidike. That need has been expounded in a more recent study on Mendaian wine, where Papadopoulos and Paspalas emphasize the importance of survey in locating the ancient farms and studying the organization of the agricultural land. Using literary and archaeological evidence, they suggest that the term "Mendaian" did not refer to the wine produced strictly in the city of Mende, but rather to a product coming from the entire Chalkidian peninsula. During the excavations in the ancient city of Torone, they discovered examples of the Mendaian type, a find which make the authors suspect that the type was used at the regional level as a trademark and

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[116] I saw the Mendaian amphora by chance, hiding inconspicuously in a corner of the main room, when I visited the Museum in Seteia in September of 1994. I was surprised as soon as I saw the 'white powdered' figure of a vessel, and blinking my eyes I recognized the familiar "conical belly with the tall tapering neck and tall stem toe," a form the linear dimensions which I had taken multiple times the days before my arrival on the island. Before I realized it, I blurted loudly: "What are you doing here?! Have you been following me?!" I had no knowledge of any Mendaian amphoras found on Crete. I would like to thank the superintendent archaeologist for granting me permission to take photographs of the amphora. I was informed that the police had recovered it from someone who was digging illegally in an area close to the town of Seteia. The very well-preserved surface of the amphora, with remnants of soil surrounding the body, suggests that it was buried in earth. Of course, until such time that substantial information is made available about the area where it was recovered, we cannot tell if it was produced locally, imported during ancient times, or taken from another place and buried there during modern times. The amphora is the same as the ones from the Alonnesos shipwreck (it matches No. 36) and the clay from a break at the handle appeared to me to be a light reddish brown, but I did not have my Munsell Soil Color Charts with me. For an illustration of the Mendaian from the private collection on Kalymnos, see I. K. Whitbread, *Greek Transport Amphorae: A Petrological and Archaeological Study* (Athens, 1995), 198. A third example, a Mendaian handle with a graffito with the Greek letter Σ (three-bar sigma for Stater) was found at Kommos on Crete, is reported by Alan W. Johnston, "Fifth Century Prices," in *I Vasi Attici ed Altre Ceramiche Coeve in Sicilia* (Catania, 1996), 82.

guarantee of its much-praised contents. Is it possible that a kind of 'viticulture co-operative' existed, which capitalized on the name of this highly valued and quite expensive wine?[117] The authors, in examining the case of Torone, believe that the city might have used the label "Mendaian" in the production and sale of its own wine. The two fragmentary examples found at Torone can be compared to the Mendaian amphoras from the shipwreck.[118] Nevertheless, the discovery of Mendaian type amphoras in other city, even within the same region of Chalkidike, does not constitute proof that they were actually produced there. And that is exactly where we come to a standstill because of lack of detailed information on the production sites found on the sub-peninsulas of Chalkidike.

In an effort to advance our knowledge, the newly emerging field of ceramic petrography supports research on any artifact made of clay or stone. The strengths of petrographic analysis have been proven by Whitbread's meticulous work. In the case of the Mendaian amphoras, preliminary data suggest that clay from the neighboring cities of ancient Skione and Aphytis was used in the manufacture of Mendaian amphoras.[119] With the

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[117] As rare as price graffiti seem to be, a couple of them appear on Mendaian type amphoras. One graffito appearing on the neck of a vessel, dated ca. 440-425, has been interpreted as the price of 10 staters for 10 choes of wine that was the equivalent of 2 drachmas per chous (the same price was inscribed on a Chian amphora too), see M. Lang, "Numerical Notation on Greek Vases," *Hesperia* 25, no. 1 (1956): 10, no. 44 (P11382); also M. L. Lawall, "Graffiti, Wine Selling, and the Reuse of Amphoras in the Athenian Agora, ca. 430 to 400 B.C.," *Hesperia* 69, no. 1 (2000): 15-16, 34, and Fig. 17, no. 26, and 81 discusses the meaning and scarcity of price mark graffiti.

[118] J. K. Papadopoulos, and S. A. Paspalas, "Mendaian as Chalkidian Wine," *Hesperia* 68, no. 2 (1999): 165, 172-3, 178-181, and Figs. 5 and 6. Torone, based on literary and numismatic evidence, was a wine-producing center, but there is lack of evidence of any amphora production during the Hellenistic time that would link the city to the production of the Parmeniskos Group of amphoras. Inv. 81.729, and inv. 82.1359 can be compared to Cat. Nos. 10 and 48 respectively from the Alonnesos shipwreck.

[119] Whitbread, *Greek Transport Amphorae,* 198-209.

increased finds of Mendaian type jars (different variants, form and fabrics) in the Chalkidian peninsula, on land and underwater from the underwater site of Alonnesos to the workshops of Kos, it is imperative that any further study should be directed towards the prospection for ceramic workshops in Chalkidike. The analysis of the kilns and clays from each site in comparison to the clay from the vessels will enable researchers to determine the origin of the Mendaian transport amphoras, with and without stamps.

The second type of amphoras recovered from the shipwreck can be matched to some of the examples grouped under the Solokha II type. In general, this type is characterized by a tall, cylindrical neck, an outward-rounded rim and a long, mostly narrow, conical body.[120] It should be noted that the ongoing difficulties and controversies associated with attributing an amphora to this particular type arise from its very label. The name Solokha II is not based not upon the amphora's place of manufacture, but named after the place they were first noted and retrieved, a Scythian tumulus in south Russia, in 1912 and 1913. The name represents amphoras of the form described above with common morphological details, but not necessarily of the same fabric. The examples presented in the following publications are of different sizes and fabrics. Potentially, this can create confusion for anyone who would like to compare an amphora to the existing Solokha II database.[121]

Zeest studied the form of examples found in two groups of burial tumuli at Solokha,

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[120] For a full description of the form of the amphoras from the Alonnesos shipwreck, see 'Amphora Description and Catalogue' (Chapter 4), and the Plates 13-34.

[121] For a discussion on labeling the Solokha types (I and II) and a reference to B. Pharmakovsky's early report on the Solokha Burial Mound excavation, "Archäologische Funde im Jahre 1913," *AA* (1914): 260-290, see Lawall, "Transport Amphoras and Trademarks," 218. (*AA* has no volume numbers, just the year)

and Elisavetovskaya on the Don River and dated to the 4th and 3rd centuries:

"At Bosporus in IV-III c. B.C. another type of red-clay amphoras was very popular. They have high straight neck and conical body. The rather long foot resembles in its graceful shape that of Thasos from the 5th - to the beginning of the 4th c. B.C. It is cylindrical, the lower part is very wide, and the edges of the toe are slanted and have a slightly protuberant or concave protuberant surface. There is an impression on the underside. There are a lot of feet with their most wide part vertically cut, making in this way a round "belt". There are feet bigger in size and of a more round shape. But the aforementioned type was most widely spread. The quality is very high. The clay belongs to the red group. It resembles the Bosporus clay but with less sand and lots of mica. At the break the fragment has a slightly pink color.

The five vessels were in the Solokha burial mound with the amphoras with the hanging rims of the first Solokha type (see XVI, 32)... The Solokha amphoras are kept in the Museum of Chersonessos. They are all of the standard form and are different only in size (see XVIII, 35, a,b,v,g,d.)...Four amphoras of this type are kept in the Hermitage. They come from the burial mound of the Elisavetovskaia necropolis, the most part of the burials belong to the IV-III c. B.C."

Zeest and Grakov–the first on the basis of the reddish fabric, bearing similarities to the local clays of Bosporos and Byzantion, and the second on the basis of a Megaro-Corinthian letter *beta* in dipinti found on the handles –suggested that the Solokha II type was a product of a Megarian colony, possibly Byzantion, in the Black Sea. Brashinsky accepted Zeest's identification and supported Grakov's interpretation of the *beta*, adding another example, a monogram that he interpreted as BY, a possible abbreviation for Byzantion.[122] Eiseman reports two amphoras of the Solokha II type recovered from the Porticello shipwreck, and followed the interpretation given by Brashinsky and Grakov. The fabric in

[122] Zeest, "Ceramic Containers from Bosporos," *MIA* 83 (1960): 96, 154-156, Pls. 18-20.35a-l; B. N. Grakov, "The Settlement of Kamenskoe on the Dnieper," *MIA* 36 (1954): 81-87, Pl. 7.14-15; I. B. Brashinsky, *Metody Issledovaniia Antichnoy Torgovli (Methods for the Study of Ancient Trade)*, (Leningrad, 1984), 45-48. The colony of Byzantion (Byzantium) was founded in 660. For its history with references, see N. G. L. Hammond, *A History of Greece to 322 B.C.*, (Oxford, 1959), 114-117 (Fig. 11), 123, 179, 315, 413, and 655: Appendix 3, Colonies of the Black Sea.

one of these is described as "reddish yellow (5YR 6/8) with small gray streaks."[123] Vasilenko and Mantsevich, however, question this view. Vasilenko points out that "except for a few indications that trace the origin of the amphoras to the Doric cities, we do not have any direct evidences that trace the origin of the amphoras to Byzantion." He believes that the Solokha II amphoras, with a "high and straight neck, almost horizontal shoulders and V-shaped body," which were found at the town of Roxolan (ancient Nikonion) and described by Mantsevich, bear significant morphological similarities to Chian amphoras. Using the examples of eleven stamps appearing on sherds, which were found on the same site and identified as belonging to the Solokha II type, he proposes that the placement and appearance of the stamps are similar to the ones on Chian amphoras dated to the end of the 5th and beginning of the 4th century. However, differences in the shape of the foot and in the color and content of the fabric, and the presence of the signs of the Doric alphabet on some of them, lead him to the believe that these Solokha II were copied ("imitated the form and method of stamping") in centers under Chian influence in the northern Aegean Sea or in the Black Sea region.[124] Mantsevich disputes the place of production, suggesting a common origin for both the Solokha I (mushroom-shaped rim, ovoid body, knob toe) and II types, which were found together on the east side of the Solokha burial mound. She proposes that the first type, based on its similarity to amphora representations on coins from Torone, was produced in

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[123] Alpha-numeric designation from the Munsell Soil Color Chart; Eiseman and Ridgway, *The Porticello Shipwreck*, 50-51. Only one of the two is complete.

[124] B. A. Vasilenko, "Stamps on the Solokha II Type Amphora," *SA* 2 (1971): 243-5 states, however, that the stamps were incised on sherds—(necks of amphoras) that were identified as identical to the Solokha II—and not on intact amphoras. The intact Solokha II amphoras found at Niconion did not have any stamps on them. So, the attribution of the stamped sherds to this type was made on the basis of the fabric.

Chalkidike, which was famous for its wines and silver mines. She also links the Solokha II type to the same area, based on the eight impressed circular markings and painted letters on them that are similar to ones found in Olynthos, another prosperous city in the same region.[125]

The first archaeological evidence linking (some amphoras grouped under) the Solokha II type to a region was presented by Doulgeri-Intzessiloglou and Garlan (from now on cited as Doulgeri-Garlan). They conducted a survey of four workshop sites, Staphylos, Agnondas and Panermos on the island of Skopelos, and Tsoukalia on Alonnesos, where large areas are strewn with innumerable fragments of amphoras. They identified four different types of amphoras among the fragments at the production sites, one of which, the Peparethian I appears widely with a range of variation in the shape of the toes. They proposed that the Peparethian I closely resembles the Solokha II type, based on the illustrations of five published examples by Zeest and four other examples from different sites (Figs. 13, 14, 16).[126] Arguing against Grakov's hypothesis on the use of the Megaro-Corinthian *beta* in dipinti, they explain that: a) there is a difference in writing between what Grakov identified

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[125] A. Mantsevich, "Ceramic Vessels in the Solokha Burial Mound," *Arkheologiia* (Kiev) 17 (1975): 84-86; also in *Solokha Burial Mound* (Leningrad, 1987), 55 and 106. I would like to thank Dr. Mark Lawall and Dr. Lyudmil Vagalinski for providing me with a copy of the first article . Here, I would like to mention an earlier statement by Mantsevich, "Amphoras from the Solokha Burial Mound," *SGE* 4 (1947): 4-5 who "indicated the similarities of the Solokha II amphora to the amphoras from Chios (on the basis of the similarities of the images of the amphoras on the coins of Chios dated to the end of the 5th - beginnings of the 4th century)..." cited in Vasilenko, "Stamps on the Solokha II Type Amphora," *SA* 2 (1971): 244. I was unable to acquire Mantsevich's 1947 article to elaborate on her opinion. For a discussion on the wide use of circular marks, see Lawall, "Transport Amphoras and Trademarks," 80-84, 104-109, 239-243.

[126]

as a *beta* and how it is actually represented in the coins of Byzantion; b) the form of the *beta* on the coins is an archaic form and there is no reason to assume that it was used in the late 5th century; and c) the rest of the dipinti found on amphoras of the same group do not resemble the Megaro-Corinthian alphabet. Further, the authors propose that the supposedly Megaro-Corinthian *beta* may simply represent the initial Greek letter *Π* for 'of the Perarethian', but no such stamp was found during their survey of the workshops.[127] M. Picon also concluded that Northern Sporades most probably would have been producers of the Solokha II type based on an independent X-ray fluorescence analysis of the fabric of clay samples taken from the Peparethos and Alonessos workshop sites, and from clay samples from amphoras found in Phanagoria, Russia. The results showed that the samples clustered together.[128]

M. Lawall offers a thorough report on the history of the Solokha I and II types and discusses the meaning of their markings based upon the economic structures that supported them. He analyzes the similarities and differences between the Solokha II type and the straight-necked Chian type, as well as evidence for their chronological coexistence in production and distribution, using as evidence amphoras dated to second quarter of the 5th century from deposits in the Athenian Agora and Corinth. He welcomes the publication of

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[127] Ibid., 385.

[128] M. Picon, "Annexe: Origine d'Amphores du Groupe dit Solocha II, Trouvées en Russie," *BCH* 114, I (1990): 390-393. The X-ray fluorescence (XRF) method is measuring the abundances of trace and major elements in a pottery fragment and comparing them with the same parameters in the soil and artifacts at known pottery workshops, see D. Adan-Bayewitz, et al., "Determining Pottery Provenance," *Archaeometry* 41 (1999): 1-24. Note Lawall's remark in "Transport Amphoras and Trademarks," 237, that Picon's samples from Phanagoria are not the original Solokha II amphoras, which were misplaced during World War II, but vessels that were labeled as Solokha II based on their characteristics, comparable to the original vessels found in the Scythian tumulus. I was informed that a number of the original amphoras from the Solokha tumulus were rediscovered in a storeroom and have been studied by S. Monakhov, but time

Doulgeri-Garlan, while stressing that the existence of the Solokha II form in various fabrics could be an indication of multiple centers of production, among them the ones discovered on Skopelos and Alonnesos. Based on the similarities, he classifies the Solokha II as an "'extra-regional' form", meaning that "production of similar forms (the Solokha II and the Chian straight-neck)" took place "at geographically and politically unrelated sites (Peparethos and Ikos, and Chios)."[129] He notes that initially Grace had labeled the form "para-Chian".[130]

In identifying an amphora as belonging to the so-called Solokha II type, one must be very cautious for many reasons. The first, as mentioned earlier, arises from the 'label' given to them which relates to the excavation site (the Scythian tumulus) and not the actual production site. Second, in reading the publications on the original amphoras becomes obvious that vessels similar in 'form', but of different sizes and fabrics, were included in the same group. For a long time, and during the previous studies, they could not have been re-examined, because the original amphoras had disappeared (but they were found recently).[131] A third reason is that the visual comparison of an amphora to the originals is based only on illustrations of the finds from the tumulus, and interestingly enough, also depends on which examples one uses for comparison. In other words, we might perpetuate the addition of

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constraints prevented me from accessing the material.

[129] I do not see why "Peparethos and Ikos, and Chios" are unrelated geographically and politically. They were located within the same geographic area of the Aegean Sea, and were members of the Athenian Empire. Although, a historical and archaeological comparative research of these islands will be beyond the scope of this study, I would like to guess that they must have interacted not only on an individual basis with Athens, but among themselves within the Empire.

[130] Lawall, "Transport Amphoras and Trademarks," 219, 234-244.

[131] Doulgeri-Intzessiloglou and Garlan, "Vin et Amphores de Peparethos et d'Ikos," *BCH* 114, I (1990):

similar amphoras, but with important variations and quite possibly different origins, to a group that seems to have included various ones from the beginning.

Here, I would like to retain the label Solokha II for the amphoras for the following reasons. First, the jars from the shipwreck resemble closely certain examples from Zeest's publication from the Solokha II burial mound. Second, a definite place for their provenance has yet to be determined with absolute certainty. The provisional assignment of the amphoras to a region (i.e., Peparethian) will only confuse matters. Third, the amphoras studied here do not match the only two complete amphoras labelled Peparethian I by Doulgeri-Garlan as shown on the published illustrations.[132] That is not to say that the amphoras were not produced, as has been proposed by many, in a center or centers in the northern Aegean Sea. But additional systematic scientific analysis and direct archaeological evidence is needed before the Solokha II amphoras from the shipwreck can be linked to a production site.

The variety in size and forms of the amphoras grouped as Solokha II can be clearly seen in Zeest's eleven illustrations.[133] Doulgeri-Garlan reproduce the first five examples from Zeest's publication in their study (Fig. 13).[134] Although neck and toe fragments from the workshop debris compare to Zeest's illustrations, the only two complete amphoras in

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[132] However, I cannot exclude the possibility that the amphoras from the shipwreck might represent a stylistic development of a given shape (form) produced in one of workshops in Northern Sporades, but this has not been confirmed with certainty. It should be proven with the discovery of complete jars from the debris of the workshops, which then will be compared with those from the shipwreck.

[133] Zeest, "Ceramic Containers from Bosporos," *MIA* 83 (1960): 154-156, Pls. XVIII-XX, examples 35 a-l.

[134] Figure 13 represents two of the five examples, Ibid., Pl. XVIII.35.g,d.

Doulgeri-Garlan (BE 6834 and BE 6843) do not match the form of the amphoras in Zeest's illustrations (Fig. 16). What Doulgeri-Garlan label as Peparethian I, by looking at the illustrated complete examples, can be described as a narrow conical vesssel, with a distinct angular shoulder, tall neck, and a tall and slender stem toe.[135] Actually, they match closer to those presented by Vasilenko who gives a similar description for the Solokha II amphoras found at Nikonion: vessels with "almost horizontal shoulders and V-shaped body which end up in a straight toe."[136] In addition, all illustrations in Mantsevich are identical to Doulgeri-Garlan's complete examples and their height is comparable: the eight examples (from the tumulus) range from 82.5 to 88.5 cm and the complete Peparethian I is 88 cm. Doulgeri-Garlan include in their study four other unpublished amphoras from sites in Russia, which certainly match the Peparethian I more closely, than the Peparethian I match Zeest's five illustrations.[137] Because a number of amphoras with distinct differences have been included

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[135] Doulgeri-Intzessiloglou and Garlan, "Vin et Amphores de Peparethos et d'Ikos," *BCH* 114, I (1990): 373-4, Fig. 8: BE 6834 and Fig. 10: BE 6843 two complete amphoras; Fig. 32 five examples from Zeest's publication, and Fig. 33 four other unpublished amphoras from Russia. These two complete Peparethian I examples are illustrated in larger scale in J.-Y. Empereur and Y. Garlan, "Grecheskie Amfornye Masterskie (The Greek Amphora Workshops)," in *Grecheskiye Amphory: Problemy Razvitiya Remesla i Torgovli v Antichnom Mire (The Greek Amphorae: The Evolution Problem of the Trade and of the Commerce in Antiquity)*, ed. by V. I. Kats and C. Yu. Monakhov (Saratov, 1992), 8-31, Figs. 10 and 11.

[136] Vasilenko, "Stamps on the Solokha II Type Amphora," *SA* 2 (1971): 242, but he does not offer an illustration of a complete Solokha II amphora.

[137] Now, compare Mantsevich's illustrations of Solokha II on pages 74-75, 77-79, in "Ceramic Vessels in the Solokha Burial Mound," *Arkheologiia* (Kiev) 17 (1975), and on pages 51-53, 105, in *Solokha Burial Mound*, (Leningrad, 1987) to Doulgeri-Intzessiloglou and Garlan's Peparethian I type amphoras, Figs. 8 and 10 on page 374 and 382, "Vin et Amphores de Peparethos," *BCH* 114, I (1990) for their close similarity in shape and height. Also, see Zeest, "Ceramic Containers from Bosporos," *MIA* 83 (1960): 96, 153-156 for the heights of the five amphoras (Pl. XVIII.35 a-d) which range from 83 to 90 cm. They are comparable to Doulgeri-Garlan's, but looking more closely they do not seem to have the same body shape. Perhaps Zeest's illustrations are not so precise. So, unless we actually see the vessels we can never agree on what is similar and the degree of similarity.

in the so-called Solokha II type, one has to be cautious in comparing an amphora to any of these publications (Fig. 13 and 14).[138]

The shape of the Solokha II amphoras from the shipwreck is elongated, with a pear-shaped body, a pronounced long neck, rounded sloping shoulder and a tall and somewhat stocky stem toe. The form differs from the tall, slim, conical body with the angular shoulder of the Peparethian I type. The amphoras look similar to Zeest's examples (35g: No. 1000, and 35d: No. 2873), especially the upper body; the toe in Zeest is rather taller than ours (Fig. 13).[139]

There is a striking similarity between the Solokha II from the shipwreck (Nos. 77, 80, and 90) and the two amphoras from the Porticello shipwreck, C32 and C33 (Fig. 15).[140] The average height of the shipwreck vessels is 74.18 cm, with more than half of the measurements below 75 cm (Table 2). Eiseman reports the complete Solokha II (C32) at 73 cm in height, and Doulgeri-Garlan's complete Peparethian I (BE 6834) is 88 cm. These are only two examples and probably not a representative sample for each case. Nevertheless, our measurements are closer to Eiseman's and none of the 91 Solokha II amphoras reported here exceeds 79.9 cm in height.[141]

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[138] Figures 13 and 14 include four of the eleven amphoras grouped under the Solokha II type, which are presented by Zeest (Pl. XVIII.35.g,d and Pl.XIX.35.z,i)

[139] Zeest, "Ceramic Containers from Bosporos," *MIA* 83 (1960): 154, Pl. XVIII.35.g,d. For a detailed description of the Solokha II amphoras from the shipwreck, see 'Amphora Description and Catalogue' (Chapter 4).

[140] Eiseman and Ridgway, *The Porticello Shipwreck*, 50, Figs. 4-5, C32 and C33.

[141] The height of Solokha II, Cat. No. 100 (A743), is reported at 81 cm by Hadjidaki, "Underwater Excavations," *BCH* 120, II (1996): 577, but we measured it at 74.10 cm. This measurement needs to be

Besides differences in the shape between the two complete examples of Peparethian I and the Solokha II from the shipwreck, there are some similarities among the fragments of toes (particularly the base of the toe) and the rim profiles from Panermos and Agnondas. But the Peparethian I examples, based again on the illustrations, seem to have a much higher stem toe.[142] One might raise the question whether the rounded shoulder and broader conical body of the amphoras from the shipwreck represent an earlier variation of the angular and narrower, 'V-shaped' Peparethian I and Solokha II from the Scythian tumulus.

Two Solokha II examples reported by Lawall and dated from Athenian deposits to c. 400 are very similar to the Alonnesos vessels, especially the base of the toe. This toe is short and quite different from the complete Peparethian I example, but he includes both of them under the label Solokha II, indicating a later fourth century date for the latter.[143] At this point any typological variation (or co-existence) between the amphoras from the Alonnesos shipwreck, the Peparethian I, and the Solokha II (the narrow conical type) can only be proven with petrological or XRF analysis.

The date of the Solokha II amphoras from the shipwreck can be inferred from the relative chronology provided by three sources. The first is the Mendaian amphoras in the same cargo, which represent the "late variant" and date to the very end of the 5th century. The

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checked.

[142] Doulgeri-Intzessiloglou and Garlan, "Vin et Amphores de Peparethos et d'Ikos," *BCH* 114, I (1991): 374-375 and Figs. 11, 12, 17, 18.

[143] Lawall, "Transport Amphoras and Trademarks," 236, 377 and Figs. 94-96. Toe of the Peparethian I (Fig. 94), and toe of the Solokha II (Fig. 96) from deposit B 13:5.

second is the dating of the examples from the Athenian Agora deposits to c. 400.[144] And the third is the two Solokha II examples reported by Eiseman (compare her C32 to No. 100). Lawall suggests an early 4th century date for the amphoras from the Porticello based on their form.[145] Consequently, the Solokha II from the Alonnesos wreck must predate the Solokha II from the Porticello; it should not be surprising if later we verify that their production or circulation overlapped. In this case, and possibly in many other amphora studies, it is difficult to determine for how long a workshop produced an amphora of a certain form. Nor do we know for how long each individual vessel may have been in circulation.

Both the Alonnesos and the Porticello shipwrecks share the same two types of amphoras and the dates of their later and earlier material respectively seem not to be much apart.

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[144] Ibid.

[145] Lawall, "Bolsals, Mendean Amphoras, and the date of the Porticello Shipwreck," *IJNA* 27, no. 1 (1998): 20-21.

CHAPTER 3: METHODS AND PROCEDURES

In the following chapters, the author describes the methods followed during this study, discusses the results, and presents the analysis of a selected group of 142 Mendaian and Solokha II amphoras. The examination and recording of the amphoras was completed during the period of three summer months with limited hours of access that prevented subsequent cross-referencing and confirmation of the data. Thus, possible mistakes on the data presented here cannot be corrected until the material is re-examined.

Four steps were followed during the examination of the amphoras as material remains: a) the recording of linear dimensions, b) the recording and archiving of the amphoras using professional photographic procedures and standards, c) the recording of the color of the clay using a widely accepted tool, the Munsell Soil Color Charts, and d) the recording of the capacity of each vessel using a procedure tested to produce optimal and consistent results. At the end of the 1992 and 1993 summer excavation seasons, all the artifacts, including the amphoras, recovered from the shipwreck (from the grid column Θ) were transferred to the conservation laboratory, subsequently treated and stored away for further study. The author studied the amphoras from June through September of 1995 after a number of preliminary arrangements had taken place. An unknown number of amphoras were placed at her disposition, stacked in a small room with pieces of plastic bubble material for protection. As a consequence, the author requested the permission of the Director, Mr. Kazianis, to have a large number of metal mounting shelves installed in the storage room. This arrangement facilitated their safe, albeit temporary, accommodation, accessibility, and

examination. Over the several days that this project materialized, the author organized and set up an improvised 'photographic studio' with the photographer of the Department, Mr. Petro Vezirtzi. Each amphora was photographed following standards explained in detail below. Mr. Vezirtzis commenced a daily photographic 'marathon' shooting each of the 171 amphoras, kindly assisted by Ms. Roula Maninou, conservator at the Department.

The author recorded the dimensions of each amphora. The 'Linear Measurements and Equipment' section includes the thirteen linear dimensions selected by the author in accordance with similar archaeological studies, along with a description of the equipment that was used to take the measurements. The 'Amphora Description and Catalogue' (Chapter 4) includes the description of each of the 142 amphoras belonging to the Mendaian and Solokha II types, and the 7 Miscellaneous amphoras.

With the help of Mr. Elias Spondilis 'the Captain', archaeologist at the Department, the author took readings on 21 amphoras using the Munsell Soil Color Charts. Two readings were taken per amphora on two different surfaces: the first on a clean, preserved surface and the other on a fresh break. They are listed in detail in the 'Munsell Soil Color Chart Readings' section. Concurrently, C. G. Koehler organized the recording of capacity measurements and advised the author on the necessary equipment, methods and procedures. Ms. Alexandra Zavou offered invaluable help in taking the measurements at the conservation laboratory. She worked closely with the author in selecting the best-preserved Mendaian amphoras for measuring capacities. The results are included in the 'Capacity Measurements and Catalogue of Mendaian Amphoras'. At the same time, the author advised Mr. Kostas Phaphoutis and Mr. Vasilios Skouphis, who completed the drawings of thirteen selected

amphoras (seven Mendaian and six Solokha II). They produced pencil drawings at 1:1 scale and ink drawings at 1:2. These drawings are included in the Plates.[146]

Linear Measurements and Equipment

During the first step the author recorded the linear measurements using thirteen selected 'fields' for the different parts of an amphora and took general notes, describing the state of preservation and any peculiarities. Planning for such a number of fields was done preventively in case more figures were needed and proved useful during the comparative linear analysis of the vessels. The fields are: Maximum Preserved Height, Body Diameter, Rim Diameter (external), Rim Height, Rim Thickness, Neck Height, Neck Minimum Diameter, Handle Height, Handle Width on top, Handle Width on side, Handle Thickness, Toe Diameter, and Toe Height (Tables 1 and 2).

The equipment used for the recording of the dimensions are: a) a pair of large calipers for the diameter of the body, b) a pair of small calipers for the diameter of the rim, neck, and toe, c) small calipers marked off in metric units for the height and thickness of the rim, and the width and thickness of the handles, d) an L-shaped metal ruler marked off in metric units for the preserved height of each amphora, e) a metal tape measure marked off in metric units for the height of the neck, handles, and toe, and f) a level, which was placed on top of a straight piece of wood, and used in combination with the tape measure, at a right angle, for

[146] All the original notes, photographs, and drawings are in the possession of the author. The expenses for the services of the photographer and draughtsmen, as well as the purchase of all equipment (negative films, slides, backdrops, plexi-glass rods, scales, callipers, measures, levels, etc.) were paid by the author as had been stipulated and according to the permission to access the material granted by the Department. The seven rolls of black-and-white film shot during the study that contained the 171 amphoras were returned to E. Hadjidaki per her request.

the measurement of the height of the neck, handles, and toe. The latter was also used in combination with the L-shaped ruler to measure the height of each amphora.

Although taking the measurements can be an arduous and time-consuming process, it ensures, however, a complete record for each amphora that can be used in various ways to generate different analytical tables once entered into a database. For example, the linear measurements are useful in comparative studies to establish the range of sizes for a particular type of amphora. In addition, linear dimensions are indispensable in volumetric capacity studies. The following data from the Mendaian and Solokha II amphoras are added to the extant *corpus* with the purpose of providing new information on the stylistic variations and chronology of these types.

Photographic Procedures and Standards

Mr. Vezirtzis, under the guidance of the author, photographed the amphoras in a consistent and professional manner (Pls. 1-34). The 'photographic studio' was set up as follows: First, a long piece of white and semi-glossy construction paper was attached on a wall as background for the amphoras. A black bipod was set in front of it, where each amphora was placed securely. The black tag with the excavation number was attached on the right leg of the bipod.[147] The photographer used a Nikkor (70-210 mm) camera on a tripod at about 4.80 m. distance from the subject and he fixed the focal length at 135 mm. Two light

[147] Descriptions such as 'left' and 'right' side in the text signify the side that the photographer faces towards the amphora, as he looks through the camera (the same the way we are looking at the photographs in the Plates). The stand was a tripod, but the author decided to have one of the legs cut off for the sake of photographic composition and aesthetics. So, it became a 'bipod'.

sources were placed on each side of the subject, evenly lighting constantly the white background to eliminate any shadow from the jar. Two synchronized flash-heads were placed in front of and diagonally from the object, to illuminate the foreground of the amphora.[148] A final element was the introduction of a ten-centimeter scale in each photograph, placed at mid-point on the left side of the amphora. It was attached vertically at the end of a rod made of plexi-glass, which was tied to a standing pole placed outside the frame of the photograph. The use of the transparent plexi-glass rod allowed us to 'place' the scale close to the shoulder of each amphora. In the photographs the scale appears suspended magically in mid-air.[149]

The author took the precaution of requesting that photographs be taken of as many amphoras in storage as possible during the limited time that her stay permitted. In the end, all but a small number of fragments of amphoras were photographed, including a number recovered from sections Θ3 and Θ4. At the time, the Department had scheduled the movement of the material to a remote location where it might have been difficult to find them in the same condition and together as a group. So, besides identification and archiving, professionally taken photographs to scale can provide essential information if the material is temporarily inaccessible.

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[148] The light sources and the flash-heads were placed at such a distance as to be outside from the frame of the photograph. But, a number of slides were taken, for archival purposes, showing the complete photographic set-up and studio.

[149] In the beginning, the placement of the scale posed a problem for us because the position of the amphora in the bipod provided no support around it for the scale. Gluing the scale on the white background behind the amphora was dismissed, as it would have rendered the measurements useless because of the difference in distance, and would have looked awkward in perspective. I am indebted to Mr. Craig Mauzy, the photographer of the American School of Classical Studies at Athens, for all the invaluable advice and tricks of the trade he taught me in my pursuit of a series of professional quality pictures of the amphoras. The photographic equipment, camera and flash heads were provided by Mr. Vezirtzis. The remainder of the

The photographer used a Kodak 5052 TMX black-and-white negative film and used the same 10 cm scale to print the photographs to scale. He also took a series of shots using a Kodak 5045 EB 100 color slides (positive film) that present: a) the complete setting of the photographic studio, b) the author demonstrating how each linear measurement was taken, and c) a number of representative examples of Mendaian and Solokha II amphoras. These photographs document the 1995 working space and the people at work during the study.

Munsell Soil Color Chart Readings

We examined ten Mendaian and eleven Solokha II amphoras, using the Munsell Soil Color Charts in an effort to describe the fabric of the vessels. Mr. Elias Spondilis kindly helped the author in taking the readings at the premises of the Department of Marine Antiquities in Athens (Tables 5 and 6).[150] Two readings, at least, were taken per amphora: a) on a preserved and fairly well cleaned exterior surface, and b) on a freshly broken edge. The readings indicate the range of the clay color of the vessels, which can be used for comparative studies within the same group or between amphoras of the same type from different sites. Knowing that ancient firing techniques and conditions, such as oxidizing and reducing environments, produce variations in color even on the same vessel, it is advisable, where possible, to take careful readings on both a clean break and on the exterior surface, and

material was purchased by the author at the industrial supply market in Athenas Street.

[150] *Munsell Soil Color Charts* (N.Y., 1994, revised edition). Reading explanation: The order of the Munsell notation is hue number and letter, followed by a space. Following is the value number, separated by a diagonal slash from the chroma number, then a comma and the name of the color (e.g. 10R 5/6, red). Long submersion of jars tends to change the color of the clay towards a darker tone; Carolyn G. Koehler and M. B. Wallace, "Appendix. The Transport Amphoras: Description and Capacities," in Cemal Pulak and Rhys F. Townsend, "The Hellenistic Shipwreck at Serce Limani, Turkey," *AJA* 91, no. 1 (1987): 50.

identify where the readings were taken (e.g. handle, neck, body). Color variations can also result from the treatment of the outer surface of a ceramic vessel with a slip of different color, or from the various thicknesses of the parts of a vessel.[151]

The color of the clay is one of many variables employed to match an amphora to a certain type and link it to a group, that is, if prior data have been collected for that type. It does not identify, however, the provenance, the city or geographical region where the product was manufactured. A secure identification of the place of origin can only be ascertained from an inscription, or a stamp impression bearing an ethnic name or insignia of the state on the vessel itself.[152] Nevertheless, even with the stamped examples and more so with the thousand amphora fragments that do not bear any impression, one can reach a definite answer as to the origin only with the discovery of kilns at the workshop sites.[153] Further, chemical and petrographic analysis of specimens from production sites and amphoras securely linked to a region can provide solid data, which may answer a plethora of questions.[154] Besides the organization of a record for production sites in connection to amphora types, scientific analyses may provide a variety of information about the ceramic technology methods and techniques used locally and regionally.

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[151] Whitbread, *Greek Transport Amphorae*, 390-391, discusses the effects of ancient firing and refiring on the color of the clay and ceramics. Interestingly, he notes that "the color of a fired clay [sample] may not match that of the ancient ceramics, which can be an indicator of the ancient firing conditions (temperature, duration, and atmosphere) or of the differences in the compositions of the clay and ceramic samples."

[152] Grace, "Standard Pottery Containers," *Hesperia Supplement* VIII (1949): 176-177.

[153] D. P. S. Peacock and D. F. Williams, *Amphorae and the Roman Economy* (London, 1986): 9-16.

[154] For an overview of studies on chemical analyses of Greek transport amphoras using X-ray fluorescence spectrometry and neutron activation methods, see Whitbread, *Greek Transport Amphorae*, 44-50.

The Mendaian amphoras from the shipwreck have not been examined using either chemical or petrographic methods. Whitbread did a petrographic analysis of twelve Mendaian amphoras which were found at Corinth and compared them with clay samples from the Kassandra (Pallene) peninsula. The amphora samples fell into two fabric types. The results show close similarities between the clay samples and the amphoras, with a clear indication that more than one type of clay was used to make the Mendaian amphoras.[155] The amphoras from the shipwreck should be examined by petrographic analysis and then compared with Whitbread's data; particularly with the clay samples from the surrounding geological deposits in Kassandra. In addition, information should be collected and analyzed about the actual production sites found in that region or the other two sub-peninsulas of Chalkidike.[156]

No chemical or petrographic analysis been conducted on the Solokha II amphoras from the shipwreck. This type has been found in abundance in the Black Sea and their provenance is still in question.[157] It has been proposed that they may originated from the island of Skopelos (Peparethos) on the basis of morphological traits between the fragments found at the four sites and the ones described in Zeest from the Solokha tumulus.[158] An

[155] Ibid., 198-209.

[156] To my knowledge, the remains of a possible site of a ceramic workshop and a kiln were unearthed in the 'suburb' of Mende on top of a destruction layer dated to the end of the 5th century, *AEMTh* III (1989), 409-411.

[157] For an extensive discussion on the 'Solokha II' type, see Chapter 2. Zeest, "Ceramic Containers from Bosporos," *MIA* 83 (1960): 96; Vasilenko, "Stamps on the Solokha II Type Amphora," *SA* 2 (1971): 243; Lawall, "Transport Amphoras and Trademarks," 237-240.

[158] Doulgeri-Intzessiloglou and Garlan, "Vin et Amphores de Peparethos et d'Ikos," *BCH* 114, I (1990):

independent XRF analysis of fragments found on Skopelos and Alonnesos (Ikos) in comparison with fragments of amphoras identified as Solokha II from Phanagoria in the Black Sea provide results that cluster into the same group. This is used as an indication that Northern Sporades were at least one of the producers of this type.[159]

The fabric of the Mendaian samples is micaceous with grain-size inclusions.[160] The surface is reddish buff and many examples have a grey core. The color of the preserved surface ranges between a very pale brown (10YR 7/3) to a reddish brown (2.5YR 5/4) but it is predominantly a light reddish brown (5YR 6/4). The color of the fresh break ranges between a very pale brown (10YR 7/3) to a reddish yellow (5YR 6/6); it is predominantly reddish yellow with few examples of light reddish brown and one very pale brown (Table 5). These samples have the same values as the ones presented in Whitbread.[161]

No. 2. BE 91/16-6
a1. 2.5YR 5/4, reddish brown (belly)
a2. 5YR 6/4, light reddish brown (belly)
b. 7.5YR 7/6, reddish yellow (rim)

No. 5. ΠΕ 20
a. 7.5YR 6/4, light brown (shoulder)
b. No break

No. 6. ΠΕ 32
a. 10YR 6/4, light yellowish brown, after scraping the concretion
b. 10YR 7/4, very pale brown

368-369, 375; Zeest, "Ceramic Containers from Bosporos," *MIA* 83 (1960): 96, 154-155.

[159] Picon, "Annexe: Origine d'Amphores du Groupe dit Solocha II," *BCH* 114, I (1990): 390-3.

[160] Abbreviations: BE (for 'Biblio Eurematon'): Entry book of artifacts of the Department; ΠΕ (for 'Periphereia'): amphoras recovered from the periphery of the delimited excavation area; Θ: excavation column Θ (Greek letter 'Theta'). Examination was done with the naked eye and a small magnifying glass.

[161] Whitbread, *Greek Transport Amphorae*, 201.

No. 16. A 741 (Θ6/A2)
a. 5YR 6/4, light reddish brown (toe)
b. 5YR 7/6, reddish yellow (shoulder)

No. 19. A 979 (Θ5/A2)
a. 5YR 6/4, light reddish brown
b1. 10YR 7/2, light gray (belly)
b2. 5YR 6/6, reddish yellow (handle)

No. 22. A 983 (Θ5/A2)
a. 5YR 6/4, light reddish brown
b. 5YR 7/6, reddish yellow (rim)

No. 27. A 1001 (Θ5/A3)
a. 5YR 6/6, reddish yellow (base of the neck)
b. 5YR 7/6, reddish yellow (shoulder)

No. 34. B 5 (Θ6/B)
a. 5YR 5/4, reddish brown
b. 7.5YR 6/6, reddish yellow

No. 37. B 29 (Θ6/B)
a. 10YR 7/3, very pale brown
b. 5YR 6/4, light reddish brown (handle)

No. 51. Γ 63 (Θ5/Γ)
a. 10YR 5/2, grayish brown
b. 5YR 6/4, light reddish brown (rim)

The fabric of the Solokha II is fine-grained with some inclusions of mica and has a very distinctive red-brown color. The preserved surface the amphoras is predominately reddish brown (2.5YR 5/4) to red (2.5YR 5/6) with one example in pinkish gray (5YR 6/2). The color on the broken surface is predominately light red (2.5YR 6/6) to red (2.5YR 5/8), (Table 6). Our readings correspond with fabric descriptions of Solokha II type amphoras found in Athens and the Black Sea.[162]

[162] Lawall, "Transport Amphoras and Trademarks," 237-238.

No. 54. ΠΕ 16
a. 2.5YR 4/4, reddish brown
b. 2.5YR 5/6, red

No. 61. A 608 (Θ4/A1)
a. 2.5YR 5/4, reddish brown
b. 2.5YR 6/6, light red (neck)

No. 64. A 617 (Θ3/A1)
a. 2.5YR 5/4, reddish brown (shoulder)
b. 2.5YR 6/6, light red (shoulder)

No. 70. A 641 (Θ5/A1)
a. 10YR 5/6, yellowish brown (shoulder)
b. 2.5YR 6/8, light red (belly)

No. 85. A 664 (Θ6/A1)
a. 2.5YR 5/6, red (shoulder)
b. 2.5YR 5/8, red (toe)

No. 87. A 666 (Θ6/A1)
a. 10R 4/4, a weak red
b. 2.5YR 6/6, a light red

No. 93. A 672 (Θ6/A1)
a. 2.5YR 5/6, red (shoulder)
b. 2.5YR 5/8, red (neck)

No. 98. A 740 (Θ6/A1)
a. 5YR 5/3, reddish brown
b. 10R 6/4, pale red

No. 122. B 4 (Θ6/B)
a. 5YR 6/2, pinkish gray (belly)
b. 2.5YR 6/4, light reddish brown (neck)

No. 126. B 9 (Θ6/B)
a. 5YR 6/4, light reddish brown (shoulder)
b. No fresh break

No. 129. B 12 (Θ5/Γ)
a. 2.5YR 5/6, red
b. 10R 6/6, light red (handle)

Capacity Measurements and Catalogue of Mendaian Amphoras

Ms. Alexandra Zavou and the author measured the capacity of twenty-four Mendaian amphoras under the expert guidance of Carolyn Koehler at the premises of the Department. We decided to measure the capacity of the amphoras by volume with tap water, after having examined the vessels and agreed that they were in a well-preserved condition. The process we followed is considered a precise and safe method for handling the vessels.[163] Conveniently, we used the amphoras already immersed in water while undergoing desalination treatment in the plastic basins at the conservation laboratory.[164]

Water is an acceptable medium for measuring capacity 'by volume' of wine transport amphoras, because it can give accurate and repeatable results.[165] A number of variables can

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[163] I am indebted to Dr. Koehler for guiding us in properly setting up our working space and giving instructions on how to take the capacity measurements. The process and method described herein is based on the unpublished manuscript by B. L. Johnson, C. G. Koehler, P. M. W. Matheson, and M. B. Wallace, "Measuring Amphora Capacities," describing two 'wet' processes using water 'by weight' and water 'by volume', and a dry method using small polystyrene beads.

[164] The removal of soluble salt contaminants (desalting/desalinating) and calcareous concretion from artifacts recovered on land and underwater is one of the main concerns and tasks for their long-term preservation. The bibliography on methods and treatments applied to various materials found in dry and wet environments is extensive. On ceramic objects from land, see Alice Boccia Paterakis, "The Deterioration of Ceramics by Soluble Salts and Methods for Monitoring their Removal," in *Recent Advances in the Conservation and Analysis of Artifacts*, ed. by James Black (London, 1987), 67-72. For salt removal on different artifacts, wood, ivory, glass, tin and others recovered from underwater, see Robert Payton, "The Conservation of Artefacts from One of the World's Oldest Shipwrecks, The Ulu Burun, Kas, Turkey," in *Recent Advances*, 41-49. On the organic concretion deposited and the fouling organisms attached on pottery above and within the sediment underwater, see Lucy E. Weier, "The Deterioration of Inorganic Materials under the Sea," *Bulletin of the Institute of Archaeology* 11 (1973): 144-147. For extensive bibliography on the conservation of organic and inorganic materials, see John S. Illsley, *An Indexed Bibliography of Underwater Archaeology and Related Topics* (Shropshire, 1996), 103-108.

[165] On the history and procedures followed for amphora capacities, see Malcolm B. Wallace, "Progress in Measuring Amphora Capacities," *BCH Supplement* 13 (1986): 87-94. For a large amphora sample measured using both water and polysterene beads, see Koehler and Wallace, "Appendix. The Transport Amphoras: Description and Capacities," in Cemal Pulak and Rhys F. Townsend, "The Hellenistic Shipwreck at Serce

affect the capacity figures taken using water, such as barnacles, the internal lining of the vessel, and the unknown factor of the level to which an amphora was filled in antiquity. Thus, Zavou measured the amount of barnacles or other irremovable foreign matter found inside the amphora. Traces of the remains of possibly resinous lining, covering in most cases the neck and shoulder inside, were calculated to be from 0.001 to 0.002 m thick. Although no stoppers have been found, we decided to compensate for that factor in taking all measurements, unless otherwise indicated in the catalogue, by filling the amphora up to the base of its rim.[166]

The equipment used was: a straight, flat wooden stick ca. 1.0 m. long, a level, a flashlight, a stiff tape measure, small calipers, a clear plastic tube ca. 0.01-0.015 m. in diameter and approximately 2 m. long, a glass demi-john (5.065 l.), a glass graduated cylinder for volumes up to 500-ml, a funnel, a tripod, and printed worksheets with the required fields for collecting the data. From our experience we recommend that two people, who can lift weights more than 25 kg, are needed to handle the amphoras during measurements.

The process began by taking linear measurements of six dimensions—the height, depth, body diameter, height up to the maximum diameter, neck height, maximum neck diameter—using tape measure and calipers, and continued with the capacity measurement

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Limani, Turkey," *AJA* 91, no. 1 (1987): 49-57.

[166] Ibid., 54-55, 57, note 105, Koehler and Wallace took the water measurements up to the brim, so they provide calculations on the hypothetical allowances for lining and stoppering. In this case if we want to make our results comparable with other water measurements taken to the top of the rim (brim), an amount will have to be added, based on the height of the rim and its estimated interior diameter.

using the remainder of the equipment. Zavou took detailed notes on the condition of each jar, examining carefully the exterior and interior with the flashlight for any damage on its body, such as small holes or cracks that would make it unfit for holding water. Next, each vessel was placed upright on a tripod inside a large plastic basin and it was leveled. Using two different taps, the basin and the amphora were filled with water simultaneously, increasing the level externally and internally to prevent cracking due to differential water pressure. When the jar was filled up to the base of the rim, the water was left to settle for five minutes to soak the porous walls. It should be noted here that the selected vessels were already soaking in water during the desalination treatment and they were wet through. If the jars selected for measurement are dry, the procedure calls for an increased amount of time of soaking, at least half an hour and up to an hour. That will ensure that the walls are permeated and will not absorb any more water during the siphoning-out that would result in an unreliable measurement.[167] In our case, after a short waiting time, when the water level dropped below the base of the rim, the amphora was filled up again with water to that level. Once the internal water level stabilized, we dipped the plastic tube into the jar quickly but carefully and the water was siphoned out from the amphora into the demi-john.[168]

The number of demi-johns it took to empty a vessel represents the total water volume capacity for that vessel. The volume of the demi-john was measured accurately with a

[167] Ibid., 57, each jar was soaked roughly half an hour and the amounts of water loss due to evaporation and absorption are recorded.

[168] The plastic tube was tied at its bottom to the wooden stick, so it would stay straight and reach all the way into the bottom of the jar.

volumetric flask at 5.065 l. Any water that could not be siphoned out from the very bottom of the jar was emptied, using the funnel, into the demi-john. From there it was measured into the 500-ml graduated cylinder, and that last amount was added to the result.[169] At the same time, during the siphoning of the water into the demi-john, the water from the basin was drained to prevent a possible implosion of the amphora walls. Initially, the measurement process was very time-consuming. But, when all details are worked out, and provided that an amphora does not present unexpected leaks, a measurement of one amphora can be completed in forty-five minutes to an hour.

In order to verify the accuracy and repeatability of the results, we took double measurements on nine out of the twenty-four vessels (Nos. 2, 4, 5, 10, 14, 16, 17, 22), and a triple measurement on one (No. 37), selecting the vessels randomly and using the same method for all measurements. The range of experimental error for the repeated measurements is 0 to 85 ml for eight amphoras and on the ninth we received the same result (No. 22).[170] Generally, the capacities correlate with the linear measurements of the vessels.[171] The

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[169] Process for measuring the water in the final demi-john (for each vessel): a) if the DJ unit was almost, but not quite full, we topped it off with water using the 500-ml graduated cylinder to measure the water poured in and then we subtracted that amount of water from the result (described as 'minus' in the capacity measurements), and b) if the last demi-john was filled less than half, we poured out the water and measured it with the graduated cylinder and then we added that amount of water to the result (described as 'plus' in the capacity measurements).

[170] The nine amphoras measured twice hold from 18.930 l. to 24.430 l. of water. Johnson, et al., "Measuring Amphora Capacities," express doubt whether amphoras in ancient times were measured with accuracy to the nearest 100 ml. Wallace, "Progress in Measuring Amphora Capacities," *BCH Supplement* 13 (1986): 93, states that "measuring with water our results do not differ by more than 100 ml."

[171] However, No. 8 needs to be re-measured, because its linear dimensions are similar to those of No. 10, but the capacities of the two jars vary by almost two liters. The capacity measurements for Nos. 36 and 42, which were slightly leaking, are including herein as supportive and should be used with caution.

twenty-four Mendaian amphoras measured herein hold from 18.750 l. to 24.740 l. with an average capacity (mean) of 21.420 l., or 5.990 l. which is 28% of the mean.[172] The average of the absolute deviations of the twenty-four measurements from the mean is 1.41 l., ca. 6.58%.[173] This represents a large margin if we are to assume that the average of 21.420 l. intended to be an ideal and accepted standard.

We really do not know what the seller (people of Mende?) or the buyer considered to be an acceptable deviation from their common or reciprocal standards, but supposing they followed the Attic standard (with the volume of an Attic chous at 3.2 l. as the unit) then the difference of the lower and the upper measurements from the mean ranges from 83 to 103% of an Attic chous. One might wonder whether roughly one unit on either side of the mean would have been an acceptable deviation from an 'ideal standard' involving wine trade by either the customer or the seller.[174] But, was there an 'ideal standard' and how precisely it was followed? Recent capacity studies and analyses of 5th century amphoras have shown that

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[172] These figures may be somewhat lower, as the measurements were not adjusted for the internal resinous lining.

[173] 21.420 l. is the average of the 24 measurements arranged in descending order using the Microsoft Office Excel software (Tables 3 and 4). These measurements translate in an approximate weight of water between 19 and 25 kg.

[174] An Attic chous (plural choes) served as a liquid measure of capacity. It is equal to 3.2 l. (1 chous = 12 kotylai). I would like to thank Mr. Malcolm Wallace for reading a draft of my analysis and for making valuable comments on it. In a personal communication, he pointed out that according to his observations the deviation of volume between batches of twenty-five amphoras is only a fifth of the deviation of individual jars. In perspective, the average deviation of 1.41 l. (of the 24 measurements herein) means that the average (mean) capacity between two similar batches of 24 Mendaian amphoras might vary as much as 0.3 l. This for a single amphora translates to about an Attic chous (3.2 l.), but on a batch is about a kotyle. So, it seems reasonable to assume that trading in bulk would have decreased the margin of loss.

during this period amphoras might have been 'less precisely standardized than later ones.'[175] Along the same lines, Wallace has argued that the focus of capacity analyses should shift to looking closely how the volumetric translate for batches of amphoras rather than restricting observations on comparative figures of individual jars, in search of extracting the 'precise' standard of a particular type of amphora. In comparing the results from previous capacity studies of Classical and Hellenistic bathes of jars, he shows that there have been considerable variations in almost all of the cases. Based on his observations, he concludes that the relevant increase in the size of a batch of amphoras would have decreased the risk in trade, and thus the chances of purchasing less of a product in potentially "undersized batch" would have been reduced.[176]

So, let us see how the present results compare to previous studies. The data obtained from the twenty-four Mendaian compare closely with the figures generated from the study of those from the Porticello shipwreck. In measuring nine amphoras (C1-C9), somewhat later in date than the Alonnesos vessels, Eiseman found that their capacity fluctuates between 19,255 and 23,930 ml—a range represented in our sample. And the difference of 4,675 ml is

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[175] Yvon Garlan, *Amphores et Timbres Amphoriques Grecs* (Paris, 2000), 76, 80-82, in his comprehensive work on amphoras and their socio-economic nature, expresses his concern on this point, "Meme si l'on pouvait se fonder sur des données sérielles, il me semble donc pour le moins hasardeux de pousser très loin les spéculations sur la standardisation des amphores—faute de posseder des indications indépendantes sur le nombre et la nature des unités antiques de mesure utilisées dans la production amphorique."

[176] Malcolm Wallace, "Standardization in Greek Amphora Capacities," (paper presented at a conference in the Danish Archaeological Institute, Athens, Greece, 2002; currently in press). Based on these observations, it seems to me that one should differentiate between the ways and practices followed in the bulk shipment of goods over the sea, and the retail trade talking place locally (at the Agora) when discussing a topic about amphoras, capacities and wine trade. The Alonnesos shipwreck falls in the first case.

calculated as 22% of the average; 5% smaller than the Alonnesos sample.[177] In comparing both samples, I also noted that the average (mean) capacity of the nine water equivalents (20,973 ml) is 447 ml lower than our average of 21,420 ml. Quite interestingly the standard deviation of the nine capacities from the mean is 1.41 l. as in our case.[178] Nevertheless, the reliability of these figures is relative, as we are reminded that the eight amphoras from Porticello were measured using polystyrene beads and only one vessel (C9) was tested using both the beads and a double water measurement. Results taken using polystyrene beads might not be as repeatable as water ones, but in this case they might be relatively correct; one measurement (C9) using both methods (beads and water) yielded results that validate the figures (beads: 19,758 ml; double water measurement: 19,647 and 19,797 ml).[179]

So, what can we infer from the comparison between the measurements of the two samples (Alonnesos and Porticello)? Is there a relation between the respective measurements or a correlation between the capacities from the Alonnesos sample to any known capacity standard used during that period? Indeed, the Porticello results are comparable to ours as the

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[177] Eiseman and Ridgway, *The Porticello Shipwreck*, 51-53 report the data avoiding any interpretation due to the fact that the sample measured is small and quite possibly because of the questionable precision of the dry method used to take their measurements. For the sake of simply comparing the figures, I would like to show that in their case the deviation from the 'ideal' mean is almost a chous too: I take the average (mean) between the lower 19,255 ml and the upper 23,930 ml measurements to be at 20,973 ml according to the figures in their Table 7. The deviation of the upper and lower measurements from the mean ranges from 53 to 92% of an Attic chous. This is a smaller range of deviation than in our case.

[178] See note 174 above.

[179] Note that three out of the nine amphoras measured by Eiseman using the beads were incomplete. C. Koehler pointed out to me that measurements using polystyrene beads are not as repeatable as those taken using water, especially for sharp-shouldered amphoras. On the reliability of the 'dry' method using the beads, see Koehler and Wallace, "Appendix. The Transport Amphoras: Description and Capacities," in Cemal Pulak and Rhys F. Townsend, "The Hellenistic Shipwreck at Serce Limani, Turkey," *AJA* 91, no. 1 (1987): 57.

figures cluster within the 19 to 24 l. range. This indicates a certain degree of uniformity and continuity in volumetric numbers in relation to the span of time represented by the Mendaian variants from the two shipwrecks from the late 5th century to the early 4th century. While keeping in mind that the Porticello sample is small, it has been noted that the upper measurements do not exceed 24 l., and that six out of the nine measurements from Porticello are smaller than 21 l. as in our case where almost half of the measurements are smaller than 21 l. and only two are just below 25 l. Any validity in assuming a probable tendency towards smaller volumes remains to be seen with further comparative studies of amphoras dated to the same period. The problem in answering directly the second part of the question is the actual lack of direct evidence on what the 'Mendaian' capacity standard might have been during that period; that is assuming that there was one established by the cities in the same region. Nevertheless, we can still explore the issue based on available information on standards from the numismatic record for this famous coastal and commercial city-state.

In brief, as it has been presented in the previous historical background, we know that Mende was already striking silver coinage in the Euboic (-Attic) weight standard when it became a member of the Delian League. The city continued production of the tetradrachms depicting the reclining Dionysos, almost uninterrupted, until the third quarter of the 5th century.[180] As a consequence of the revolt in 423, numismatists believe that its coinage was

[180] There might have been some irregularities in weight between the staters of the cities using the Euboic-Attic standard against the guaranteed Attic tetradrachms (from ca. 479), but Robinson suggests that "they were tolerated" and Mende was one of the cities that was permitted ('even encouraged') to continue minting her coinage to the second half of the 5th century, "The Athenian Currency Decree and the Coinages of the Allies," *Hesperia Supplement* 8 (1949): 338-9. In the Attic standard: tetradrachm 17.20 g (Stater), drachma 4.30 g, obol 0.72 g, see Kraay, *Archaic and Classical Greek Coins*, 329.

restricted by Athens, because at roughly the same time Mende ceased to issue any more tetradrachms. The city continued minting a series of tetrobols, a number of which seem to have conformed to the Attic standard, but others start appearing in reduced weight. Noe proposed that a change took place from the Euboic-Attic to the Aiginetic standard, sometime after the Sicilian Expedition (415) and before the Athenian blow at Aegospotami (405), possibly influenced by the wartime events and the decline of Athenian power; a standard that the city continued to use until past the end of the century. After 400, tetradrachms also re-appear, but in reduced weight and different style.[181] As volatile as the political scene was at the turn of the century, it is not surprising to detect continuous changes in a city's economic and political decisions. The find of a unique example of a Mendaian tetradrachm re-issued in the Attic standard (and stuck in the older style), a reference to the surprise attach by King

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[181] Noe, *The Mende (Kaliandra) Hoard*, 56, and Pl. X (Dionysos-head tetradrachms of reduced weight): asserts that the Berlin tetrobol of 2.07 g strikes a close agreement, when multiplied by six, with the "reduced weight tetradrachms of 12.32 g", thus being in accordance with the Aiginetic standard. Also, Seltman, *Greek Coins*, 140 mentions that the city issued didrachms of Pheidonian (or Aiginetic) weight of 12.30 g. In the Aiginetic standard: drachma 6.20 g, didrachm 12.40g (so the Aiginetic drachma stood to a ratio of 10:7 to the Attic drachma of 4.34 g), and as Wallace points out the choice of this standard had many implications. The cities which seceded from Athens after 413 may have chosen a 'non-Attic' standard to proclaim their autonomy "without any particular bilateral situation in mind whatsoever." Interestingly however, the ratio of the Attic to Aiginetic standard relates to the Persian standard, the adoption of which was considered in certain cases as evidence of 'medism': 16 Persian drachmas (or 8 Persian sigloi—one siglos 5.42 g) were equal to 10 'Attic' and to 7 'Aiginetic' drachmas, in "Texts, Amphoras, Coins, Standards and Trade," *Ancient World 10* (1984): 12, 14. (Note: Kraay, Ibid., 329, gives the rates of Aiginetic didrachm at 12.20 g, and the Attic drachma at 4.30 g). We should also keep in mind that Mende was a colony of Eretria, which also left the Athenian alliance in 411. Robinson suggests that following her rebellion Eretria might have been influenced to resume her coinage, not on the native Euboic standard, but on the Aeginetic standard, "Athenian Currency Decree and Coinages of the Allies," 336. Most likely Mende knew that by retaining communication with the mother-city and the others cities on Euboia as well as the ones in the Northern Sporades Islands, the trading ground and cross roads for the Mendaian goods. Peter Garnsey, *Famine and Food Supply in the Graeco-Roman World* (Cambridge, 1988), 133, reminds us that the Athenians depended heavily on Euboia, "treating the island as virtually an extension of Attica," to procure staples such as grain, and Eretria's secession "thrust [Athens] back increasingly onto long-distance suppliers," to feed its besieged population. It seems more than a coincidence that Mende would act accordingly and 'rebel' by changing her coin standard too.

Agesilaos of Sparta (394), and Mende's stance to avail participation in the Chalkidian League (390) led experts to the assumption of the city's affinity towards Athens.[182] Or are these simply signals of independence that Mende wished to maintain her political options open and retain control of the trade and high profits enjoyed by the Mendaian people for so long? Probably a combination of both due to the exigencies of the times. The war and post-war events must have affected the socio-economic state of things at home, including Mende's decision on coinage and capacity standards for the trade of its celebrated wine. At this point we can only speculate about these issues during the following discussion given the limited information at hand.

A number of studies have focused on the interrelation of the different coin standards used by the Greek city-states to answer whether and to what degree this reciprocity affected the amphora capacity standards. Such discussions arose in light of the much-debated existence, date of issue, and nature of the Athenian Standards (a.k.a. Coinage) Decree (449?).[183] In examining the numismatic evidence put forth by Regling and Noe, indicating that Mende changed her coinage standard from the Attic to the Aiginetic standard, one is tempted to draw analogies from another case, albeit of a 'reverse' nature: the one between

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[182] Noe, *The Mende (Kaliandra) Hoard*, 58-9, and Pl. X.

[183] For the text of the decree, see Meiggs and Lewis, *A Selection of Greek Historical Inscriptions*, 111-117, no. 45. Early on, Grace suggested that the city states of Chios, Thasos, and probably Mende stamped their amphoras, and thus regulated the capacity in accordance to the Decree, in "Standard Pottery Containers of the Ancient World," *Hesperia Supplement* VIII (1949): 182. For a summary on the debates about the Decree, see D. Lewis, "The Athenian Coinage Decree," in *Coinage and Administration in the Athenian and Persian Empires*, ed. by I. Carradice (Oxford, 1987), 53-63; and for the first overview and re-examination of the subject based on new results from studies of amphoras from the Athenian Agora, see Lawall, "Transport Amphoras and Trademarks," 292-302.

Chios and Athens.

We know from epigraphic and numismatic evidence that the city-states issued their own coin, weight, capacity and length standards, and at times adjusted the ratios commensurably to the predominant standards for a number of reasons, such as political and commercial.[184] According to the Decree, the allied tributary member- subjects could not use other standard measures (including coinage) than the Attic ones. In the case of Chios, it has been advocated that the capacity standard was adjusted to stand in the same ration of 8:7 to the Attic as the Chian and Attic coinage standard did. Archaeologists based this assumption on evidence from material studies of Chian amphoras which showed that there was an overlapping change in the style from the bulging-neck to the straight neck. This in combination with general notations of increased capacity figures, generated the following conclusions: a) the new straight neck style was intended to hold eight Chian choes corresponding to seven Attic, b) the new form was produced to serve as a visual 'statement or confirmation' that it holds the expected new increase in contents, and that c) the underlying reason for these changes was the imposition of the Decree. As M. Wallace put it, in acting this way Chios expressed a "gesture of political solidarity" since it was not a subject, but a major ally, of Athens'.[185] However, recent studies caution

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[184] B. V. Head, *Historia Numorum*, xli-xlix points out that the adoption of a coin weight standard under names, such as Persian, Phoenician, Rhodian, etc, should not lead to rushed conclusions for the creation of such alliances. On coinage issued by Athens and her colonies, see C. Seltman, *Greek Coins* (London, 1965), 108-116. And that issued in Chalkidike, see Kraay, *Archaic and Classical Greek Coins*, 132-141.

[185] Wallace, "Texts, Amphoras, Coins, Standards and Trade," *Ancient World 10* (1984): 13. The ratio of the Attic chous to the Chian was established from the find of the inscribed marble wine measure found in Chios, and for the Attic pottery klepsydra from the Athenian Agora, in Grace and M. Savvatianou-Petropoulakou, "Les Timbres Amphoriques Grecs," in *L'Ilot de la Maison des Comédiens*, 360, note 2 and 4. Here, Grace focuses on

against the validity of these conclusions. Lately, Lawall after examining the style and fabric of, and the commercial graffiti found on Chian amphoras (dated during the 5th century from closed datable deposits in the Athenian Agora) denies the relationship between the Decree and the reciprocal change in Chian amphora style and capacity. The re-examination of the archaeological evidence shows that the 'high-bulge' Chian jars (or C/3) date later ca. 440, a decade later than the proposed date of the alleged imposition of the Decree.[186] On the other hand, we are told that "the decree of Klearchos, ca. 449 B.C., did not affect Acanthus, Mende, Scione, Thasos, Aenus, and Samos, since all six cities were coining pieces which were in conformity with the Attic standard. But it forced Abdera and Maroneia to change from Thracian to Attic, while it drove Chios, Cnidus, Cos, Camirus, Ialysus, and Lindus to abandon the minting of money."[187] So, let us hypothetically assume for the sake of comparison in our case that the Decree was forced upon or willingly accepted by major allies as a diplomatic move; that capacity standards were changed in accordance to the Attic chous as it is believed to have been in the case of Chios; and that later long-term and trustworthy allies such as Mende (Eretria, etc), that used the Attic standard even before the Decree was issued, rebelled and changed their

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the relationship between the changing styles and capacity of amphoras in relation to probable reasons for these changes.

[186] Lawall, "Graffiti, Wine Selling, and the Reuse of Amphoras," *Hesperia* 69, no. 1 (2000): 7, notes 7-9; also in "Transport Amphoras and Trademarks," 292-302.

[187] Seltman, *Greek Coins*, 150 means the Standards Decree. For a brief overview on the debate over whether the Klearchos Decree and the Standards Decree is one and the same, see D. Whitehead, "The Athenian Standards Decree (IG I^3 1453): 'The (?) Preceding Decree which Klearchos Proposed'," *ZPE* 118 (1997): 169-173.

coin standard (after 411?) as an expression of their autonomy and disapproval of the Athenian political and economic pressures. Then, were capacity standards changed to correspond in ratio to the 'newly' adopted coin standard of choice too (e.g. Aiginetic)? Based on the previous numismatic information that Mendaian coins changed from the Attic to the Aiginetic standard after 415[188] and continued to be issued in the reduced weight after 400, and proposing that the Mendaian amphoras from the wreck date during the same period (the last two decades of the 5th century), is it possible for us to detect a reciprocal change in the capacity standard of the Mendaian type amphora? Do the results from the 24 capacity measurements show any uniformity, and what is—if there was one—the intended 'ideal' standard? What other archaeological evidence is available for the Mendaian amphoras that supports or negates our data? Finally, combining all available, but undoubtedly limited information, what can we say about the capacity of Mendaian amphoras? The following discussion touches on these questions, but it is general and anything but comprehensive due to unknown factors inherent in standards and measures and the limited direct evidence in such matters for the 5th century.

Archaeological evidence pertinent to Mendaian volumetric capacities comes to us in the form of commercial graffiti (numerical markings) inscribed on the amphoras, which have been found in dated, closed deposits at the Athenian Agora. Unfortunately, we have not found any graffiti or stamps on the Mendaian amphoras from the wreck that

[188] Among these series of tetrobols (dated from 423 to 405) appeared for the first time the reverse inscription *MENΔAIH* that according to some experts betrays the spread of the Ionic language in the region of Chalkidike and most likely represents the "drachma" of the Mendaians, in Noe, *The Mende (Kaliandra) Hoard*, 54; Regling, "Mende," *ZfN* 34 (1923): 11.

might have offered additional information on the vessels. But, assuming that both belong to the same type, a comparison is attempted between the capacity markings from the Athenian Agora to the twenty-four capacity measurements from the amphoras using the proposed interpretation of these markings. Presented and interpreted by Lawall, the commercial graffiti appear on fragmentary Mendaian amphoras, the second largest amphora group (after the Chian) with such markings appearing in the Agora. They are dated from as early as 440 to 390, according to how their form and fabric fits within the proposed stylistic and chronological development of the Mendaian type.[189] Here, we are interested in ten examples interpreted as volumetric graffiti:

- Dated from 440 to 425:

No. 26 reads 10 choes; and a price mark for 10 staters

No. 27 reads 10 choes

No. 52 reads 8½ choes

- Dated from 430 to 400 (three incomplete and two complete):

No. 35 reads 3 or more choes and 3 kotylai

No. 36 reads 3 or more choes and 3 kotylai

No. 37 reads 4 and more choes, ½ chous, and 3 oxybapha (=3/4 kotyle)

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[189] Graffiti were originally studied by Mabel Lang, "Numerical Notation on Greek Vases," *Hesperia* 25, no. 1 (1956): 1-24; *Graffiti and Dipinti*, The Athenian Agora XXI (Princeton, 1976); *Graffiti in the Athenian Agora*. Excavations of the Athenian Agora, Picture Book No. 14 (Athens, 1974). Lawall re-visited the topic using a much broader material, which includes Lang's samples. For all pertinent details on the graffiti, the deposits in which they were found, dating, corrections and interpretations, see Lawall, "Graffiti, Wine Selling, and the Reuse of Amphoras," *Hesperia* 69, no. 1 (2000): 3-90. The numbers in parentheses correspond to the catalogue numbers in Lawall's article. No. 41 was interpreted by Lang as 10 choes and corrected to 7 choes by Lawall in a persuasive argument. I am not including graffito No. 72 due its incomplete preservation.

No. 41 reads 7 choes

No. 45 reads 6 choes and 7 kotylai (or possibly a weight graffito for mnas)

- Dated no later than 410:

No. 86 reads 5½ choes and more (questionable, possibly Mendaian dated to 390)

No. 96 reads 8 choes, and 1/3 chous, and possibly ¼ chous (dated in the last quarter of 5th century)

First Lang, in interpreting the early graffiti dated from 440 to 425 and in particular No. 26 and No. 96, made the case that the Mendaian amphoras have high capacities ranging from 8 to 10 choes.[190] Thus, if we are to assume that the graffiti reliably represent the average volumetric capacity of a Mendaian type amphora,[191] then the results from our sample show that the capacity might have been reduced from 8 to 10 choes volume to a lower one: from 6 to little more than 8 choes towards the end of the 5th century.

In the case of No. 26 the question posed by Johnston of 'whose choes and whose staters' the price marking of the three-bar sigma refers to (Athenian or Mendaian?) makes matters much more interesting and becomes somewhat difficult to interpret the capacity numbers (alone and) in relation to the ancient market prices.[192] In other words these markings, as Lawall suggests, may have been used by a non-Athenian (Mendaian?)

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[190] Lang, "Numerical Notation on Greek Vases," *Hesperia* 25, no. 1 (1956): 10, 15, nos. 44, 57, and 64; the latter is a price marking interpreted as fifteen drachmas).

[191] At least in the cases that the total volume is preserved on a graffito. Also, it is uncertain whether the incomplete graffiti recorded the full contents, or partial filling or decanting from the jar.

[192] Johnston, "Fifth Century Prices," in *I Vasi Attici ed Altre Ceramiche Coeve in Sicilia*, 82, the three-bar sigmna, Σ, is being interpreted as the first letter for 'stater'.

wholesaler before the cargo reached Athens. The remainder of the graffiti have been interpreted as referring to the Attic chous. Thus, keeping in mind this valid question, 'whose choes?', the twenty-four measurements are examined against the Attic standard (of 3.2 l. per chous) and against the ratio of 10:7 applied (hypothetically) from the Aiginetic and Attic coin standard equivalency.

The Attic chous (3.2 l.) from 5 to 10 choes converted in liters, and the commensurate hypothetical 'Mendaian' values adjusted according to the Aiginetic-Attic ratio of 10:7 are:

Attic:					
5 = 16.000 l.	6 = 19.200 l.	**7 = 22.400 l.**	8 = 25.600 l.	9 = 28.000 l.	10 = 32.000 l.
$5^{1/2}$ = 17.600 l. $6^{1/2}$ = 20.880 l. $7^{1/2}$ = 24.000 l. $8^{1/2}$ = 27.200 l. $9^{1/2}$ = 30.400 l.					
'Mendaian':	(Aiginetic)				
8 = 17.920 l.	9 = 20.160 l.	**10= 22.400 l.**	11= 24.640 l.	12 = 26.880 l.	13= 29.120 l.
$8^{1/2}$ = 19.040 l.					

If Mende used the Attic capacity standard during the late 5th century (regardless whether her coin standard was Attic or Aiginetic), then we should expect to find supportive figures in the measurements. Indeed, we see that the vessels from the shipwreck range in capacity from 18.750 l. to 24.740 l., that is from $5^{7/8}$ to $7^{7/8}$ choes, which is very close to the 6 to 8 chous range suggested by the graffiti studies.

Now, if we accept that the average (mean) of the twenty-four measurements is 21.420 l., and if Attic 7 choes was the 'standard' intended capacity, the average deviates 4.3% from the target (22.400 l.), and the lower and upper measurements (18.750 l. and

24.740 l.) deviate considerably more from the mark. Was that an acceptable deviation? Possibly yes, but we still do not know what the 'intended capacity' might have been.[193]

To test the twenty-four measurements, the data were analyzed using the fuzzy k-means algorithm, assigning the average (21.420 l.) as the target. The results showed that the volumes do not cluster around the average, but appear to be uniformly distributed (Table 7). The present sample of volumetric data is small and not adequate to prove that the average was the intended capacity. Thus, this figure should not be interpreted as reflecting a 'standard' (or precise) capacity unit.[194] Other possibilities have been also explored, such as whether the wide and uniform distribution of data is an indication that each one of the twenty-four measurements represents an acceptable deviation from the volumes of 6, 7, or 8 choes. According to Grace, "between jars of the same shape and fabric, and identical height, a difference in dimensions and outline that is scarcely noticeable to the eye can produce a difference in capacity of about an eighth of the total."[195] Following that line of thinking and based on the observation that the amphoras

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[193] Wallace, "Standardization in Greek Amphora Capacities," (paper presented at a conference in the Danish Archaeological Institute, Athens, Greece, 2002; currently in press) notes that prominent amphora types have been reported to show a fluctuation in mean capacity in the range of +/— 10% throughout time.

[194] I would like to thank Dr. Nikos Pitsianis (The Fitzpatrick Center, Duke University) for taking the time to analyze the raw data of the 24 capacity measurements with the fuzzy k-means algorithm, generate the tables and discuss the results. A definition of the k-means algorithm can be found at: http://mathworld.wolfram.com/K-MeansClusteringAlgorithm.html (April 2004). According to Dr. Pitsianis a simple analogy for understanding the algorithm results is the game of darts: "The players paste a piece of paper with a target on the wall and throw darts that puncture the paper and the wall surface. Then, they remove the paper with the target and only the dart marks appear on the wall. Can we locate the position of the target? If the players were accurate dart throwers and they played the game for some time, then there is going to be a substantial concentration of dart marks where the center was." In this case, assuming that there was an intended capacity, it is difficult to tell from the present sample which the 'target' might have been.

[195] Grace, "Standard Pottery Containers of the Ancient World," *Hesperia Supplement* VIII (1949): 176.

have produced a relatively uniform range of linear measurements, we used again the fuzzy k-means algorithm to test the data (Table 8). Three targets were assigned, the 'centroid' volumes of 19.200 l., 22.400 l., and 25.600 l. The results show that the data did not cluster around the targets, but instead they are distributed uniformly, and are not adequate to support or refute a claim that the amphoras intended to hold precisely 6, 7, or 8 choes. A larger sample may provide different results.

Further, as I mentioned before, it is unknown what the acceptable deviation from a chous might have been, assuming that jars were manufactured with a certain 'nominal volume' (intended capacity) in mind (x), and not from a (y) volume and up to an (x) volume. In other words, in the case of the Chian the (x) volume, as has been advocated, would have been a standard size of 8 Chian choes corresponding to 7 Attic. But, did Chian jars hold that volume with an acceptable deviation, or were they meant to hold from (y) choes up to 8 choes or more? Actually, one large sample of volumetric capacities of Chian amphoras shows values ranging from below 7 to more than 8 choes and not an expected consistent intended volume.[196] And overall, judging from the size of similar Mendaian vessels in circulation during the late 5th century and the relatively uniform linear measurements of the amphoras from the shipwreck, it looks as if the producer made the vessels to hold a minimum and a maximum capacity of choes. So, if the potter was targeting a nominal volume of 6 or 7 choes (Attic?), then the Mendaian amphoras (in this sample) would have held plus or minus one chous (3.2 l.) from this volume. As Lang

[196] Brashinsky, *Methods for the Study of Ancient Trade,* 172-173, nos. 63-76, reports the capacities from 18,000 to 24,000 ml.

wrote, based on the interpretation of graffiti on Chian amphoras, "the jars were manufactured in accordance with minimum specifications of dimensions, they often must have held more than the minimum, so that when they were actually measured,...the total capacity would be something over seven [Attic] choes."[197] If this 'minimum premise' applies here, would that mean that the minimum (and possibly intended capacity) for the Mendaian amphoras from the shipwreck was 6 Attic choes? The results are divided in the middle; roughly half of them range between 6 to 6½ choes (19.390 - 20.820 l.) and half from 6½ to 7 choes (21.140 – 22.480 l.). In comparison, four out of nine amphoras from the Porticello shipwreck range at the lower end from 6 to 6½ choes (19.255 – 19.705 l.). The premise seems applicable, but what about the measurements from 7 to just under 8 choes' volume? A possible answer can be found in the following research.

In a detailed study from the 1980s, fluctuations in capacity were recorded in later Hellenistic Rhodian amphoras (of the 3rd century) and questions were raised about the establishment of official capacity units and standards.[198] Here, Wallace makes an important observation: that a batch of amphoras can be smaller or bigger than the 'official intended capacity' minus or plus two liters. Could it be that the variation of volume of the Mendaian 'batch' from the wreck falls within this estimated and possibly acceptable deviation of two liters? It seems that it does, but more samples and data are needed to support the valid observations of such a 'not very precise standardization.' Eventually,

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[197] Lang, "Numerical Notation on Greek Vases," *Hesperia* 25, no. 1 (1956): 4.

[198] P. M. W. Matheson and M. B. Wallace, "Some Rhodian Amphora Capacities," *Hesperia* 51, no. 3 (1982): 293-301.

additional studies will offer definite answers about the acceptable deviation of capacity (for an amphora or a batch), and whether fluctuations in volume should be interpreted as official changes taking place over time.[199]

But then again, if capacities were not 'so precise', how did the purchaser know how much was in the jar? It has been suggested that possibly the very design of a vessel (in form, color, and average dimensions) stood as a visual recognition of the contents and the volume. Also, the impressed stamps found on Mendaian type and other amphoras might have served as a further guarantee. However, not each one of the amphoras was stamped, so their function has been speculative, although it has been suggested that they might have been used to mark one vessel every so many in a large batch. Also, it is possible that the evidence is missing, because the 'guarantee' indicating the volume was made out of perishable material tied on the jar.[200] But, this is another much debated topic, i.e., the meaning and use of form of amphoras, and the stamps or markings on amphoras, which is currently under discussion and is being re-evaluated with the addition of new data from the archaeological sites.[201]

If such fluctuations were normal, how did they translate in terms of price, profits

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[199] Ibid, 299; Wallace, "Texts, Amphoras, Coins, Standards and Trade," *Ancient World 10* (1984): 13; and "Standardization in Greek Amphora Capacities," (paper presented at a conference in the Danish Archaeological Institute, Athens, Greece, 2002; currently in press).

[200] Wallace, "Progress in Measuring Amphora Capacities," *BCH Supplement* 13 (1986): 92-93.

[201] For an early discussion of form, stamps and the practice of stamping, seeY. Garlan, "Greek Amphorae and Trade," in *Trade in the Ancient Economy*, ed. by P. Garnsey, Keith Hopkins, and C. R. Whittaker (Berkley, 1983), 27-35; and *Amphores et Timbres Amphoriques Grecs*, 68-76, 99-107 for a recent comprehensive evaluation of the matter. For the markings on Mendaian amphoras, see Lawall, "Transport Amphoras and Trademarks," 28-32, 125-129.

or losses? According to the interpretation of graffiti inscribed on Mendaian necks, two examples dated to the late 5th century show price: one with ten staters (for 10 choes) and the other for fifteen drachmas.[202] If the present volumetric data is applied to Lang's suggestion of 'minimum specifications of dimensions', then the Mendaian jars from the wreck were manufactured to hold 6 choes, but on average, each jar contained from half a chous to 2 choes more (i.e., up to 7 and 8 choes). And, if the cost of wine was approximately two drachmas per chous, then the wholesaler would stand to gain a minimum of half a drachma per jar for the 'additional' contents. Multiplied by a cargo of 1500 amphoras in which a merchant usually had one-third stake would amount to a minimum of 500 drachmas 'profit' at purchase. If there was no indication of the 'extra' contents, since the jars were sealed (or unstamped), the purchaser might or might not have benefited from that hidden 'profit', depending on what price the wine sold at the port. Certainly, it does not seem logical to think that the seasoned (Mendaian) sellers, or any other merchant for that matter, would have 'poured' more than the standard and give away extra choes of wine. Unless, of course, this 'extra' quantity was accurately measured (with a precise measuring device) and the quantity was marked on the vessel or vessels containing the same volume were separated in batches. It seems more likely that the vessel was manufactured according to minimum linear dimensions to contain a maximum capacity and acceptable small deviations below that amount passed to the

[202] Lang, "Numerical Notation on Greek Vases," *Hesperia* 25, no. 1 (1956): 3, 10, no. 44, and 12, 14-15, notes that one stater was equal to two drachmas, which would pay for a chous of wine. The second example (no. 64, P6126) is not complete, and does not show the number of choes. She identifies the fragment as belonging to the Mendaian type, and infers that the vessel should hold anywhere from 8 to 10 choes.

purchaser, but differences of more than two liters, as has been suggested by Wallace, were noted on the amphora in some form.

In the case of the Mendaian amphora capacity being hypothetically adjusted to the Aiginetic standard, the previous comparative ratio table shows that roughly 8½ to 11 'Mendaian' choes equal 6 to 8 Attic choes. Only the volume of 22.400 l. is precisely the same (in the 10:7 ratio), and the equivalent of 9 and 11 'Mendaian' choes differ 960 ml from the Attic, which is a large deviation for an individual jar. The adoption of the Aiginetic standard for the Mendaian type amphoras seems unlikely as the 10:7 ratio would require precise measurements to acquire precise equivalences. Besides the numismatic observation that Mende's coinage standard changed to the Aiginetic sometime in the last fifteen years of the 5th century, there is no other direct evidence that can support the claim of a reciprocal change in ratio for the capacity standard.

In sum, it seems more likely (but not proven) that the twenty-four capacity measurements fluctuate around the Attic standard and range from 6 to just below 8 choes (for this batch of Mendaian amphoras dated to the last two decades of the 5th century). A number of graffiti from the Athenian Agora indicate that the Mendaian type held higher capacities (8 and 10 choes), but our examples have a smaller capacity and the figures do not exceed the 24.740 l. The same decrease in capacity can be attested in Brashinsky's sample of fourteen amphoras from the Black Sea ranging from just below 6 to 7 choes (18,700 - 22,200 ml).[203] However, later dated graffiti indicate a decrease in capacity between amphoras dated from

[203] Brashinsky, *Methods for the Study of Ancient Trade,* 178, nos. 6-26.

440 to 425 and those amphoras dated to the end of the 5th century.[204] The present data and results are indicative and not conclusive. In order to obtain more information on the intended capacity standard for this type of northern Greek amphora, a study much larger in scale should be launched using the remainder of the jars in storage and those that will be recovered from the Alonnesos wreck site in the future. It is my opinion that the Alonnesos shipwreck is the best example of an archaeological 'closed deposit' for such an expanded study.

Finally, the capacity figures permit us to make some tentative estimates on the overall cargo load and approximate tonnage of the ship. Taking the average capacity of the Mendaian vessels at 21.420 l. and the tare (weight of the amphora itself) at a minimum of 12 kg, the total average weight of a full Mendaian amphora is estimated close to 34 kg.[205] In addition, one Solokha II amphora weighed 9,380 kg empty, and its volume capacity using water was measured at 17,700 kg, bringing the gross weight to 27,080 kg.[206] Based on these observations, it is assumed that the average gross weight for these two types of amphoras is at about 30 kg.

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[204] See the ten graffiti, note 189 above.

[205] The weight of two amphoras was measured independently at the premises of the Department: "a Mendaian at 12,440 kg and a Solokha II at 9,380 kg." Several factors can influence the result of the weight measurement of a vessel itself, such as the state of its preservation, and the extent and thickness of deposits from calcareous concretions, barnacles, etc., internally and externally. It has been suggested that amphoras recovered from underwater, even after they have been dried completely, are somewhat heavier than the ones coming from terrestrial sites. I believe that the amphoras from the shipwreck should also be used in a study for measuring the tare of the vessels, comparing them to each other within the group, and to similar ones found in other underwater and terrestrial sites.

[206] I do not have the exact details of the procedures followed for the recording of this particular measurement, and whether the amphora was already 'wet' or was let to soak the appropriate amount of time before the measurement. These results should be used with caution.

Hadjidaki, taking in account the figures generated from two excavation seasons, proposes that the tonnage of the ship could be up to 126 metric tons.[207] Although, this is still a premature estimate, it is a fact that the first layer of amphoras numbered close to one thousand, and two more layers are visible below the first, promising an equal number of amphoras. Such a number is possible given the fact that the ship settled on a sandy bottom that enveloped it over the centuries. The image of the Alonnesos shipwreck lying on the bottom of the Aegean Sea reminds us of Katzev's impression of the visible mound on the Kyrenia site: "What had appeared to our first divers as a miniature mound of 80 amphoras expanded day by day until, by the end of the season, more than 300 had been brought to the surface. Perhaps another 200 still lie in place awaiting excavation." That visible mound of 80 jars yielded 404 in total by the end of the excavation.[208] Assuming even a low estimate of three thousand amphoras for the partially visible 'three-layer' mound, the tonnage could be up to ninety or one hundred metric tons. Although this line of thinking is based on simple observations and assumptions, if these estimates prove to be correct, then this find challenges pre-existing beliefs on the tonnage capacity of the late 5th century ships.

It has been advocated, based on a number of shipwrecks excavated from the classical period, and on the literary records, that cargoes higher than 75 tons (or 1500 amphoras)

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[207] Hadjidaki, "Underwater Excavations," *BCH* 120, II (1996): 569, 588, notes that: a) the first layer of the mound contained 976 amphoras alone, and b) that the density of each of approximately 60 (out of 72) excavation squares (2x2 m each) could be up to 70 amphoras.

[208] M. L. Katzev, "The Kyrenia Shipwreck," *Expedition* 11, no. 2 (1969): 55; "The Kyrenia Ship," in *A History of Seafaring Based on Underwater Archaeology*, ed. by George F. Bass (New York, 1972), 50-64.

appear much later in the Hellenistic and Roman times.[209] From the archaeological record examples such as the Kyrenia, the Ma'agan Micha'el, the Porticello, and the Tektaş Burnu shipwrecks show a range from six to thirty metric tons.[210] But, the discovery of the Kyra Panagia wreck with an estimated 1,500 Mendaian amphoras dated to the middle of the 5th century, suggests that average capacities higher than thirty tons might not have been uncommon even earlier in time.[211] Based on the literary record, Wallinga and Casson have argued that ships up to 130 tons were in use and considered of average size in the second half of the 3rd century. The Alonnesos shipwreck is the first example of a classical merchant ship dated to the last two decades of the 5th century supporting Casson's opinion that carriers of up to one hundred fifty tons were in use from the 5th century onwards. [212] Whether the Alonnesos ship was of average tonnage for that period, or a rarity that heralded the beginning of a new era in large-scale trade, remains to be seen from the full-scale excavation of the site.

The following section is the Capacity Catalogue, which includes notes on the condition of the twenty-four Mendaian amphoras, the linear measurements, as well as the single and multiple capacity measurements, marked (a), (b), or (c) accordingly. Where two or three capacity measurements have been taken, the average has been calculated and used in the database (Tables 3 and 4). Capacity figures in milliliters (ml) are rounded off

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[209] Parker, "Cargoes, Containers and Stowage," *IJNA* 21 (1992): 89, 96-98; Torr, *Ancient Ships*, 23-26.

[210] See Introduction.

[211] Kazianes, "Nomos Magnesias: Phagrou Voreion Sporadon," *ArchDelt-Chronika B'*2 51 (1996): 724-5.

[212] On the fragment of the port regulations of Thasos providing information on vessels and their size, see Casson, *Ships and Seamanship in the Ancient World*, 170-172, 183-184; on capacity and cargoes, see H. T. Wallinga, "Nautika I: The Unit of Capacity for Ancient Ships," *Mnemosyne* 17 (1964): 2-9, 19-24.

to the nearest two decimal places in liters (e.g. 24,385 ml becomes 24.38 l.).

Capacity Catalogue

Ht	Height
Depth	Depth
BD	Body Diameter
H./Diam.	Height to Diameter
NHt	Neck Height
max ND	maximum Neck Diameter
cc	cubic centimeter
l.	litre
kg	kilogram
ml	mililitre

1 cc = 1 ml, 1l. = 1,000 ml, 1 kg = 1,000 ml
DJ = "Sicilian" demi-john = 5,065 ml (used in our study as a unit of measurement)
BE: (for 'Biblio Eurematon') Entry book of artifacts of the Department.
ΠΕ: (for 'Periphereia') amphoras recovered from the periphery of the excavation site.
Θ= excavation column Θ (Greek letter 'Theta').

All linear measurements taken in centimeters unless otherwise indicated.
Depth measurement was taken internally, from the top of the rim to the bottom of the jar.
Height to diameter was taken externally, from the point of the maximum circumference of the body to the end of the toe.

No. 2. BE 91/16-6. Mendaian

Ht	65.7
Depth	56.4
BD	40.1
H./ Diam.	40.7
NHt	15.7
max ND	12.1

Complete; ca. 10-15 cc of barnacles around the neck inside the amphora.
Average capacity: 24.43 l.

a. 5 DJ minus 940 ml = 24,385 ml (24.38 l.)
b. 5 DJ minus 855 ml = 24,470 ml (24.47 l.)

No. 4. ΠΕ 12. Mendaian

Ht	66.1
Depth	57.6
BD	39.5
H./ Diam.	41.5
NHt	15.6
max ND	13.3

Complete; ca. 200 cc of barnacles in clumps on the interior of the vessel. Average capacity: 23.70 l.

a. 5 DJ minus 1,640 ml = 23,685 ml (23.68 l.)
b. 5 DJ minus 1,610 ml = 23,715 ml (23,71 l.)

No. 5. ΠΕ 20. Mendaian

Ht	56.8
Depth	54.4
BD	37.0
H./ Diam.	33.5
NHt	16.2
max ND	10.5

Incomplete, broken toe; ca. 50 cc of barnacles inside the amphora. Measurement was taken with no problem. Average capacity: 18.93 l.

a. 4 DJ minus 1,350 ml = 18,910 ml (18.91 l.)
b. 4 DJ minus 1,310 ml = 18,950 ml (18.95 l.)

No. 7. A 607 (Θ4/A1). Mendaian

Ht	66.1
Depth	55.6
BD	37.7
H./ Diam.	34.5
NHt	15.9
max ND	12.5

Complete; ca. 100 cc of barnacles and some resin remains inside the vessel. Average capacity: 20.82 l.

a. 4 DJ plus 560 ml = 20,820 ml (20.82 l.)

No. 8. A 654 (Θ5/A1). Mendaian

Ht	64.3
Depth	54.2
BD	38.0
H./ Diam.	39.0
NHt	16.5
max ND	15.4

Complete; ca. 5 cc of barnacles inside. Nos. 8 and 10 have very close linear measurements, but No. 8 measured less by 1.87 l. Given that No. 10 was measured twice giving close results, it is possible that an error was made with the former and measurements need to be repeated. Average capacity: 21.78 l.

a. 4 DJ plus 1,520 ml = 21,780 ml (21.78 l.)

No. 10. A 658 (Θ5/A1). Mendaian

Ht	63.1
Depth	54.1
BD	38.5
H./ Diam.	38.6
NHt	15.1
max ND	15.7

Complete; ca. 5 cc barnacles inside. Average capacity: 23.65 l.

a. 4 DJ plus 3,380 ml = 23,640 ml (23.64 l.)
b. 4 DJ plus 3,400 ml = 23,660 ml (23.66 l.)

No. 12. A 673 (Θ6/A1). Mendaian

Ht	65.5
Depth	55.4
BD	39.5
H./ Diam.	42.1
NHt	14.7
max ND	12.0

Complete; ca. 5cc barnacles inside; possible traces of circular impression on either handle; small piece of neck chipped. Average capacity: 24.74 l.

a. 5 DJ minus 585 ml = 24,740 ml (24.74 l.)

No. 14. A 675 (Θ6/A1). Mendaian

Ht	63.7
Depth	56.6
BD	39.2
H./ Diam.	39.5
NHt	15.4
max ND	14.6

Complete; ca. 10 cc of barnacles inside; chipped rim ca. 5 cm on both sides. Average capacity: 23.05 l.

a. 5 DJ minus 2,295 ml = 23,030 ml (23.03 l.)
b. 5 DJ minus 2,260 ml = 23,065 ml (23.06 l.)

No. 16. A 741 (Θ6/A2). Mendaian

Ht	62.8
Depth	51.8
BD	38.6
H./ Diam.	37.8
NHt	16.2
max ND	14.9

Complete. Average capacity: 20.08 l.

a. 4 DJ minus 200 ml = 20,060 ml (20.06 l.)
b. 4 DJ minus 160 ml = 20,100 ml (20.10 l.)

No. 17. A 769 (Θ6/A2). Mendaian

Ht	62.6
Depth	53.3
BD	38.4
H./ Diam.	29.3
NHt	15.3
max ND	13.4

Complete. Average capacity: 21.58 l.

a. 4 DJ plus 1,330 ml = 21,590 ml (21.59 l.)
b. 4 DJ plus 1,310 ml = 21,570 ml (21.57 l.)

No. 20. A 981 (Θ5/A2). Mendaian

Ht	63.4
Depth	52.0
BD	39.3
H./ Diam.	38.9
NHt	16.1
max ND	12.2

Complete. Average capacity: 21.88 l.

a. 4 DJ plus 1,625 ml = 21,885 ml (21.88 l.)

No. 22. A 983 (Θ5/A2). Mendaian

Ht	66.1
Depth	55.7
BD	38.6
H./ Diam.	42.4
NHt	16.1
max ND	14.0

Incomplete; ca. 10 cc barnacles inside; half of upper part of rim is missing, ca. 10-15 cm. Average capacity: 22.11 l.

a. 4 DJ plus 1,855 ml = 22,115 ml (22.11 l.)
b. 4 DJ plus 1,855 ml = 22,115 ml (22.11 l.)

No. 25. A 988 (Θ5/A2). Mendaian

Ht	64.9
Depth	54.2
BD	38.8
H./ Diam.	37.8
NHt	16.5
max ND	13.5

Complete; ca. 10-15 cc barnacles and remains of resin lining inside. Average capacity: 20.61 l.

a. 4 DJ plus 350 ml = 20,610 ml (20.61 l.)

No. 28. A 1002 (Θ5/A3). Mendaian

Ht	61.2
Depth	53.2
BD	38.2
H./ Diam.	35.2
NHt	15.3
max ND	14.4

Incomplete; ca. 5cc barnacles on the interior. Side of rim broken ca. 0.125 cm. Average capacity: 19.39 l.

a. 4 DJ minus 865 ml = 19,395 ml (19.39 l.)

No. 30. A 1005 (Θ5/A3). Mendaian

Ht	65.9
Depth	54.9
BD	38.3
H./ Diam.	39.4
NHt	16.7
max ND	13.2

Incomplete; ca. 5 cc barnacles around the neck, broken rim. Resin remains inside. Average capacity: 21.14 l.

a. 4 DJ plus 885 ml = 21,145 ml (21.14 l.)

No. 36. B 26 (Θ6/B). Mendaian

Ht	67.3
Depth	63.7
BD	38.9
H./ Diam.	42.3
NHt	17.0
max ND	12.1

Complete; ca. 15-20 cc of barnacles around the neck. Capacity was taken from the toe to the base of the neck. The vessel was leaking from its body. Assuming that the linear measurements of depth and height are correct and comparing with other vessels yielding similar data, No. 36 should have had a larger capacity than the present result shows. If possible, both the linear measurements and another capacity measurement should be retaken to check the present data. Average capacity: 20.61 l.

a. 4 DJ plus 350 ml = 20, 610 ml (20.61 l.)

No. 37. B 29 (Θ6/B). Mendaian

Ht	62.0
Depth	53.0
BD	37.0
H./ Diam.	38.0
NHt	15.4
max ND	12.4

Complete; ca. 50-100 cc barnacles inside. Average capacity: 20.13 l.

a. 4 DJ minus 120 ml = 20,140 ml (20.14 l.)
b. 4 DJ minus 160 ml = 20,100 ml (20.10 l.)
c. 4 DJ minus 105 ml = 20,155 ml (20.15 l.)

No. 40. B 52 (Θ5/B). Mendaian

Ht	59.7
Depth	49.1
BD	38.1
H./ Diam.	34.8
NHt	16.7
max ND	11.5

Complete; ca. 10 cc barnacles and remains of resin inside.
Average capacity: 18.75 l.

a. 4 DJ minus 1,510 ml = 18,750 ml (18.75 l.)

No. 41. B 53 (Θ5/B). Mendaian

Ht	63.6
Depth	53.7
BD	37.9
H./ Diam.	38.6
NHt	16.4
max ND	15.8

Complete; ca. 40-50 cc barnacles and remains of resin inside.
Average capacity: 19.76 l.

a. It took 4 DJ minus 500 ml = 19,760 ml (19.76 l.)

No. 42. B 55 (Θ5/B). Mendaian

Ht	66.5
Depth	57.2
BD	39.6
H./ Diam.	34.8
NHt	17.2
max ND	13.6

Complete; ca. 20 cm crack runs vertically at the height of the maximum diameter. This measurement is approximate, and can only be used as supportive evidence. The jar was leaking water at a slow rate. Crack was filled with putty to prevent leakage. Average capacity: 23.06 l.

a. 4 DJ plus 2,800 ml = 23,060 ml (23.06 l.)

No. 43. B 57 (Θ5/B). Mendaian

Ht	61.5
Depth	51.7
BD	38.4
H./ Diam.	37.5
NHt	16.2
max ND	13.2

Complete; ca. 5-10 cc barnacles inside, especially around neck.
Average capacity: 19.86 l.

a. 4 DJ minus 400 ml = 9,860 ml (19.86 l.)

No. 44. B 59 (Θ5/B). Mendaian

Ht	64.6
Depth	52.9
BD	37.6
H./ Diam.	41.2
NHt	15.9
max ND	15.4

Incomplete; ca. 5-10 cc barnacles and remains of what it looks like resin inside. Rim broken on top. Average capacity: 21.56 l.

a. 4 DJ plus 1,300 ml = 21,560 ml (21.56 l.)

No. 48. B 66 (Θ5/B). Mendaian

Ht	63.5
Depth	54.1
BD	38.4
H./ Diam.	39.5
NHt	14.9
max ND	15.5

Complete; ca. 30-40 cc barnacles inside. Average capacity: 22.48 l.

a. 4 DJ plus 2,225 ml = 22,485 ml (22.48 l.)

No. 49. B 69 (Θ5/B). Mendaian

Ht	63.7
Depth	54.3
BD	38.0
H./ Diam.	37.1
NHt	17.1
max ND	16.8

Complete; 5 cc barnacles inside and around the rim. Small piece broken from the rim. Average capacity: 20.08 l.

a. 4 DJ minus 180 ml = 20,080 ml (20.08 l.)

CHAPTER 4: AMPHORA DESCRIPTION AND CATALOGUE

Mendaian Amphoras

Fifty-one amphoras share, with few variations, the features that identify them as belonging to the Mendaian type.[213] The flaring, wedge-shaped rim turns outwards and bears an incised groove around its base. The neck is fairly tall and flares toward the base. An incised groove runs around the neck below the attachment of the handles. The form of the body is represented by what Lawall has described as the "early and late example" of the "late variant."[214] In the "early example", the neck smoothly curves out to a sloping shoulder with a rounded curve where it turns downwards to form the conical body on a high stem toe (e.g. Nos. 7, 9, 42). These "early examples" do not have the exact roundness of the jars in Brashinsky's Figure 3, or Lawall's Figure 39, and because of a tendency towards a slightly angular shoulder, they might represent a step towards the "later example" of the "late variant", or they might simply be the product of a different but contemporary workshop.[215] In the "later example", the neck is taller, turns out to a wider, almost flat, and more angular shoulder, and the shaft of the stem toe is taller (e.g.

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[213] In describing the parts of an amphora I use the following terms: rim, handles, neck, shoulder, belly, and toe. Sometimes, I use the word 'body' interchangeably to mean the belly (the area between the shoulder and the toe).

[214] Lawall, "Transport Amphoras and Trademarks," 123-4.

[215] Ibid., Fig. 39 (P23683, R11:3, closed ca. 425) an "early example" of the "late variant"; Brashinsky, "Amphoras from Mende," in *Artistic Culture and Archaeology of the Ancient World*, 67-8, 72, Figs. 1-5.

Nos. 33, 36, 38).[216] Two vertical handles, oval in cross-section, attach just below the rim and curve at the top. Their sides parallel the neck and attach well out on the wide shoulder of the vessel. A soft shallow ridge or 'rib' runs vertically down the center of the outside of the handles.[217] We distinguished two variations of the handles too: the first has an almost flat top, attaching perpendicular to the neck, and a straight side following the line of the neck (e.g. Nos. 7, 37); the second, the so-called S-curved handle, has a pronounced upward arch at the upper attachment and a side shaped into two relaxed counter curves (e.g. Nos. 36, 47). Both types of handles bear a wide thumb impression on the lower attachment.

The shoulder stands out prominently over the body. It is rounded and continues to the point of the maximum diameter of the body, which is above the midpoint of the vessel. From there the belly tapers into a conical shape. Its lower part follows a slight convex curve, which smoothly gives into a concave curve introducing the solid shaft of the flaring toe. The stem toe stands tall and can vary in height. It has a wide, circular bottom with a beveled outer edge and a round, concave impression on the underside. No. 11, which lacks bevel and impression, is an exception. An incised groove encircles the toe above its maximum diameter and another groove, quite deep, encircles the impression on the underside. This type of stem toe might not have been produced exclusively in

[216] These differences between the early and the later example can be clearly seen in side-by-side comparison of the two pairs, e.g. Nos. 35 and 36 or Nos. 24 and 42.

[217] C. G. Koehler informed me that this ridge or rib was most likely created when the handle was pulled to its shape, and took this form from the palm of the potter's hand.

Mende, as recent studies show that the shape seems to have been shared by Thasos on amphoras with wedge-shaped rims dated to the end of the 5th century.[218]

Although all examples studied here have more or less the same linear dimensions, we have found one of smaller size: the lower body with small part from the shoulder, belly and stem toe are preserved in No. 145 (see below, under Miscellaneous Amphoras). What remains bears the traits of the Mendaian type, but since the upper body is missing we cannot classify it with certainty.[219]

Thus far, we have not found any well-preserved stamps, which could give us a firmer indication of origin. On top of both handles of No. 12 there are traces of what seems to be a circular impression. Another such impression might be No. 28, and No. 34 has a circular impression on one of the handles, which is most likely a stamp, but bears no representation.

The amphoras have been cleaned of heavy and thick organic concretion, but there remain patches of concretion of varying thickness or a mixture of remnants of calcareous shells and worm tubes cemented on the walls of the amphoras. Complete removal is impossible and at times unsafe due to the poor condition of the vessel. Some of the vessels, however, have been preserved in an excellent condition, especially those that

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[218] Lawall, "Transport Amphoras and Trademarks," 141-143, and Figs. 50 and 53. It has been made clear from the examples of Thasian (?) stem-toes which cannot be linked with whole jars (found in the Athenian Agora) that, due to the similarity in appearance between them and other types, the only way to distinguish the origin of a such a toe is close examination of the fabric using petrographic analysis.

[219] It resembles closely the illustration of the lower part of a Kos III amphora, which, as here, appears to have a small part of its shoulder preserved, see Kantzia, "A Ceramic Amphora Workshop," in *Third Scientific Meeting on Hellenistic Ceramics*, 338, Fig. 9: middle example in second row. Could that be a *hemi-amphorion*?

were buried within the sediment. Dispersed medium to large black patches of a thin layer (or film) appear on the surface of a number of jars (Nos. 2, 36, 46), which initially look like fire marks. It was noted that the charcoal powder found underneath the black-glazed bowls recovered under the amphoras suggests a fire on board.[220] But, the black patches on the amphoras might be a number of other things such as stains from pitch or the pigment of sea algae growing on the mound of jars during hundreds of years underwater.[221] They might even be an organic compound such as the remains of pine branches and leaves used as a protection between the vessels, manganese (Mn) oxide or hydroxide, or the result of a lead source nearby.[222] There is also an indication that "sulphate-reducing bacteria might blacken lead glazes both in the sediments and under concretions."[223] Undoubtedly, in this case warrants analysis using a scanning x-ray spectrometer in order to establish the exact composition of the black film on the surface of the amphoras.

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[220] Hadjidaki, "Underwater Excavations," *BCH* 120, II (1996): 590.

[221] An interesting source discussing the pigment of sea algae and environmental conditions or human intervention affecting their growth is the company 'bbe MOLDAENKE GmbH'. Accessed February 2004. Available from the gopher: http://www.bbe-moldaenke.de/english/chloro_e.htm. Internet.

[222] In a personal communication, Dr. Michael S. Smith of the Department of Earth Sciences of UNC, Wilmington, NC, suggested to me that "although the black patches might be an organic compound, it might also be a manganese (Mn) oxide or hydroxide. These oxides/hydroxides are easily formed and often are a thin film coating, which is patchy in distribution. One can find them on cliff faces, river and stream pebbles, and as coatings or manganese nodules on the ocean floor. Common mineral names are romanechite or psilomelane (these are often mixtures of a variety of Mn oxides/hydroxides)." Mr. Cosmos Coroneos, consultant archaeologist in Australia, informed me that a number of plates were recovered from the *Pandora* (1792), which had a black patina on them. Later the tests revealed that it came from an unidentified lead source nearby. For the use of pine branches and leaves, see A.Tchernia et al., *L'epave Romaine de la Madrague de Giens, Gallia Supplement 34* (Paris, 1978), 20-21, Pl. VI, 2. and XII.

[223] Weier, "The Deterioration of Inorganic Materials under the Sea," *Bulletin of the Institute of Archaeology* 11 (1973): 146, cites a personal communication with George Bass, in June 1970, who informed her that much of the pottery from the Yassi Ada shipwreck appeared to have had a blackened surface.

Traces of a black substance that looks like pitch have been detected inside most of the amphoras, the presence of which is an indication for excluding olive oil as the contents. The practice of daubing (caulking) the interior of a jar is not unusual during ancient times when pitch, tar, bitumen or wax were used as a sealing material because of the permeability and porosity of the clay. Wine, olive oil, salted fish, fish sauce, and other liquids and foodstuffs were transported in amphoras, and different linings were used to prevent leakage, and in some cases enhanced the flavor of wine.[224] Early on, during her studies of Chian stamped handles, Grace notes that a sample extracted from the broken neck of a jar, was found to be resin.[225] In another study, the lining from a number of amphoras—from various periods found in the western and eastern Mediterranean—analyzed at the British Museum was found to be rosin, and at the laboratory of the Archaeological Institute of the University of Tel Aviv was found to be pine-resin

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[224] The most widely used sealing medium referred to in ancient literature and supported by the archaeological record seems to be resin (the term better used is 'pitch', the prepared version of resin). It was derived from conifers; mainly from the pine tree. On the provenance and use of pitch, see Meiggs, *Trees and Timber*, 467-471: insightful is the citation to Plutarch (*Moralia*, 676a) who informs us that the pitys-pine (coastal pine) was sacred to both Poseidon and Dionysos, and the reason might have been because "...pitch is used to seal wine-vessels, and so to preserve wine,..." For a discussion on the use of lining with references to archaeological and literary evidence and details on different linings intended for different products, see C. G. Koehler, "Handling of Greek Transport Amphoras," *BCH Supplement* 13 (1986): 50-53; it seems that either wax or gum would have been used to line an amphora carrying olive oil or olives. For resin used as flavoring, see Koehler, "Wine Amphoras in Ancient Greek Trade," in *The Origins and Ancient History of Wine*, ed. by Patrick E. McGovern et al. (Philadelphia, 1995), 328-330; also in Zemer, *Storage Jars in Ancient Sea Trade* (Haifa, 1978), 94-97: note Pliny's reference (XIV, 123) to Cypriote resin used to improve the quality of wine. Lawall noted the absence of resin lining in amphoras marked with the M/ME graffito, suggesting that the contents might have been honey (*meli*), in "Graffiti, Wine Selling, and the Reuse of Amphoras," *Hesperia* 69, no. 1 (2000): 18.

[225] Grace, "Stamped Amphora Handles found in 1931-32," *Hesperia* 3 (1934): 297; the handle of the fragmentary piece bears a Chian stamp. The sample was tested by Dr. Crenshaw of the Department of Chemistry of Bryn Mawr College.

(colophonium).[226] In the case of the Mendaian amphoras found off Tektaş Burnu, it was found that nine amphoras were not only lined, but contained pine tar, and one of them butchered beef bones. The use and identification of linings has been under discussion for many years, but there is still much debate about whether a particular lining was used with a certain kind of contents, such as resin, tar or bitumen for wine, or whether its absence is evidence for storage of dry goods, honey, olive oil, or possibly the use of clay and techniques which made the jars impermeable. [227]

The only possible stopper, found so far is a clay object (B 58), which has a round and almost flat surface with protrusions on either side, with a diameter of 9.2 cm and thickness of 2.8 cm. It looks like a stopper, or possibly a sherd reused for stoppering, and most likely is the base of the foot of an amphora. The round impression on one side of the artifact and its diameter, which is comparable to the diameter of the toes of the Mendaian amphoras, suggest that this piece is most likely a severed toe base, which could have been used as a stopper.

For the purpose of this study each amphora has been assigned a consecutive Catalogue Number, starting with the Mendaian (1-51), followed by the Solokha II (52-

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[226] Rosin is the solid residue obtained from the distillation of the resin from pine trees. The dates of the amphoras analyzed range from the 7th c. B.C. to the 1st c. A.D. For the tests performed at the British Museum, see Parker, "The Evidence Provided by Underwater Archaeology for Roman Trade," in *Marine Archaeology*, ed. by D. J. Blackman (London, 1973), 371, 380-1; for the tests that took place at the University of Tel Aviv and additional information on storing wine and olive oil, see Zemer, *Storage Jars,* 95-96, 106-108, 109-111.

[227] Carlson, "The Classical Greek Shipwreck," *AJA* 107 (2003): 588-589; six vessels were analyzed, at the Amber Research Laboratory at Vassar College, using mass spectrometry and were found to contain pine tar probably from pines in northern Greece or the Black Sea.

142), and last the Miscellaneous (143-149). Next follows the identification of the amphora by excavation number, e.g. ΠΕ, BE, or A675, which was the tag number tied on each vessel *in situ* at the wreck site. The excavation square by column letter and row number, e.g. Θ5, and the level, e.g. A1, from which the amphora was recovered during the excavation, are included in parentheses. The absence of an excavation square in the catalogue signifies either that, a) the amphora was recovered during the initial survey and the information was entered by the date of its recovery in the Entry Book (BE) of artifacts, or b) that it was recovered from the periphery of the site, or c) that the author does not have the information to assign it with certainty to an excavation square.[228]

The amphoras are designated as 'complete' or 'incomplete'. Complete amphora is one with all parts of its body preserved in fair to excellent condition. The type of vessel can be clearly identified and all dimensions taken with accuracy. The amphora may have small to medium pieces chipped off or cracks on its body and still be classified as complete, provided that does not affect the accuracy of the measurements. An incomplete amphora is one that is poorly preserved and is missing parts such as neck, handles, or larger pieces that prevent taking anyone of the linear measurements. All measurements were taken using the metric system. The measured position of an incised groove on the body of an amphora was taken from the top of the rim (or from the highest preserved height if the rim is missing); the position of a groove around the toe is taken from the

[228] Hadjidaki, "Underwater Excavations," (1996): 565 and 569 reports that the wreck site was divided into 2x2 m sections by a rope grid. These sections were identified by the Greek letters A through N lengthwise and the numbers 1 through 6 vertically. A plastic tag starting with the letter A and a number was attached on each visible amphora, identifying the first layer of the amphora mound. After the collection of a layer of

base of the toe.

The date of these vessels, based on the typology and chronology established from previous research, ranges within a twenty-year time span at the end of the 5th century. The "early example" of the "late variant" dates certainly later than 425. The "early examples" represented in the wreck, although they are somewhat rounded in the transition from the shoulder to the belly, start to show 'angularity', a feature more pronounced in the later examples; they also have a fairly long neck and a tall stem toe. The "late example" of the "late variant" from the wreck appears to have all the characteristics described by Lawall and compare to his Figure 40 and 41 and Brashinsky's Figure 4, and thus they should be dated to the last fifteen years (415-400) of the 5th century. In addition, they have much in common with the Mendaian recovered from the Porticello shipwreck. This similarity becomes obvious when comparing Eiseman's C1-C11 with examples from the Alonnesos site, e.g. compare C1 with No. 6, C2 with No. 27, C3 with No. 19, C4 with No. 36, C5 with No. 38, C6 with No. 27, C7 with No. 43, C8 with No. 6, C9 with No. 36, and C11 with No. 33. One more detail which might be important as we study this type further is the S-curved handles, which appear on the Mendaian jars from the Porticello wreck. Eiseman questions "whether or not they characterize amphoras of a certain date." In our case this feature seems to have developed earlier, but only detailed analysis would show whether it is a feature relating to 'form in development' over time, or to a preference from a local pottery workshop during a certain span of time. The latest accepted date for the

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amphoras, new tags were tied on the ones beneath them.

transport amphoras from Porticello is early 4th century, which does not contradict the date for the Mendaian from the Alonnesos shipwreck.[229] We cannot answer with certainty whether these variations overlapped or were successive—meaning the transition between the "late example" of the "late variant" from the Alonessos site and the Mendaian amphoras from Porticello—because of two imponderable factors: a) so far we do not know for how long a certain variation of an amphora might have been in production, nor its useful lifetime and circulation, and b) no detailed information is available on the 5th century production sites on Pallene, where we could easily and more accurately be able to trace the development from the smallest variations to drastic changes in form for that type. Nevertheless, the appearance of two examples of the "late variant" within the same cargo could indicate a number of things. In the absence of petrographic analysis, the results of which would give us some indications, the presence of variants could mean that they represent a stylistic development and their production time overlaps, or that they are possibly co-existent variants produced by different workshops within the same city or region. If indeed, we are dealing with two variants and the later one dates right before the turn of the century, this might be an indication that the earlier variant dated after 425 was in use for a long period of time, possibly close to a quarter of a century. As we continue to explore the shipwreck and recover more amphoras from underwater, we may discover more variants, or more of other types represented in the same cargo that will supplement the present observations with additional evidence. It is important to keep in mind,

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[229] Eiseman and Ridgway, *The Porticello Shipwreck*, 30, 41, Fig. 4-1; Lawall, "Bolsals, Mendean Amphoras, and the date of the Porticello Shipwreck," *IJNA* 27, no. 1 (1998): 21.

however, that chronological classifications of stylistic changes in amphoras are relative and at times misleading especially when we are dealing with such a utilitarian and time enduring product. Most of the times there are no absolute dates in change of form and style, and at the present time we know very little about the length of time during which an amphora was in use.

Amphora Catalogue

MaxPrHt	Maximum Preserved Height
BD	Body Diameter
RD	Rim Diameter (external)
RHt	Rim Height
RTh	Rim Thickness
NHt	Neck Height
NMmD	Neck Minimum Diameter
HHt	Handle Height
HWthT	Handle Width on top
HWthS	Handle Width on side
HTh	Handle Thickness
TD	Toe Diameter
THt	Toe Height

BE: (for 'Biblio Eurematon'): Entry book of artifacts of the Department.
ΠΕ: (for 'Periphereia'): amphoras recovered from the periphery of the excavation area.
Θ= excavation column Θ (Greek letter 'Theta'). The number next to Θ corresponds to the row and the A, B, and Γ indicates an excavated layer within a 2x2 m square.
Pl.: Plate

All linear measurements taken in centimeters.
Measurement of the incised groove(s) on the upper body is taken from the top of the rim, and that on the toe is taken from the base of the toe.

1. (Peristera Island sea-well, 28-7-1993). Mendaian

MaxPrHt	64.8	HHt	16.7
BD	38.6	HWthT	04.6
RD	13.4	HWthS	04.3
RHt	01.5	HTh	02.3
RTh	02.0	TD	08.6
NHt	17.0	THt	10.4
NMmD	09.3		

Complete amphora. This amphora was found accidentally near the excavation area in an underwater sea-well. It is quite possible that it belongs to this shipwreck. The body is fairly well cleaned of concretion, and has a few long cracks on it. One of the cracks reveals the area where the toe attaches to the lower body. Two parallel incised grooves encircle the lower part of the toe right above its maximum diameter. Straight handles with a slight curve at the lower attachment. (Pl. 1)

2. BE 91/16-6 (14-10-91). Mendaian

MaxPrHt	65.7	HHt	17.9
BD	40.1	HthT	04.7
RD	13.5	HWthS	04.3
RHt	01.7	HTh	02.3
RTh	01.6	TD	08.5
NHt	15.7	THt	09.3
NMmD	10.0		

Complete amphora. Well-preserved. Black marks appear on the shoulder. Incised groove around the neck at 9.4 cm, and below the shoulder at 34.9 cm. Straight handles with a slight curve at the lower attachment. Munsell: 2.5YR 5/4, reddish brown taken from the surface on the belly. A second reading taken from a different area on the belly gave 5YR 6/4, light reddish brown. 7YR 7/6, reddish yellow from a break on the rim. Capacity: a) 24.38 l. and b) 24.47 l. (Pl. 1)

3. ΠΕ 11. Mendaian

MaxPrHt	64.4	HHt	17.9
BD	38.1	HthT	04.6
RD	13.6	HWthS	04.6
RHt	01.5	HTh	02.1
RTh	01.5	TD	08.9
NHt	15.1	THt	15.4
NMmD	09.9		

Incomplete amphora. This amphora was recovered from the north side of the periphery of the wreck. Part of its body is covered with concretion. There is a piece missing from the rim and the neck, but this does not affect the measurements or profile. Straight handles. Black marks on the neck and lower belly. (Pl. 1)

4. ΠΕ 12. Mendaian

MaxPrHt	66.1	HHt	16.1
BD	39.5	HWthT	04.4
RD	14.2	HWthS	04.7
RHt	01.6	HTh	02.4
RTh	01.5	TD	08.4
NHt	15.6	THt	12.4
NMmD	10.0		

Complete amphora. It was recovered from the east side of the periphery of the wreck. The vessel, although intact, has a number of cracks and slits. Small piece missing from the lower toe. Straight handles. Capacity: a) 23.68 l. and b) 23.71 l. (Pls. 1 and 36)

5. ΠΕ 20. Mendaian

MaxPrHt	56.8	HHt	16.6
BD	37.0	HWthT	04.8
RD	12.7	HWthS	04.6
RHt	01.4	HTh	02.5
RTh	02.0		
NHt	16.2		
NMmD	09.0		

Incomplete amphora. It was recovered from the north side of the periphery of the wreck. The toe is missing. Black marks on the shoulder and belly. Straight handles with a slight curve at the lower attachment. Munsell: 7.5YR 6/4 light brown from the surface on the shoulder. Capacity: a) 18.91 l. and b) 18.95 l. (Pls. 2 and 36)

6. ΠΕ 32. Mendaian

MaxPrHt	57.2	HHt	19.3
BD	38.7	HWthT	04.3
RD	13.2	HWthS	04.3
RHt	01.8	HTh	02.1
RTh	01.9		
NHt	18.6		
NMmD	09.3		

Incomplete amphora. It was recovered from the south side of the wreck periphery. Missing toe and large hole on the shoulder and upper belly. Unusually tall neck. Long and straight handles. Munsell: 10YR 6/4, light yellowish brown from the surface, and 10YR 7/4 very pale brown from a break. (Pls. 2 and 36)

7. A 607 (Θ4/A1). Mendaian

MaxPrHt	66.1	HHt	17.5
BD	37.7	HWthT	04.9
RD	13.7	HWthS	04.7
RHt	01.8	HTh	02.3
RTh	01.9	TD	09.3
NHt	15.9	THt	11.2
NMmD	09.7		

Complete amphora. Well-preserved. Straight handles. Distinctive rounded sloping shoulder. Incised groove around the toe at 4.0 cm. Tall stem toe. Capacity: 20.82 l. (Pls. 2 and 36)

8. A 654 (Θ5/A1). Mendaian

MaxPrHt	64.3	HHt	17.6
BD	38.0	HWthT	04.8
RD	13.1	HWthS	04.5
RHt	01.5	HTh	02.4
RTh	01.7	TD	08.6
NHt	16.5	THt	10.4
NMmD	09.8		

Complete amphora. Thin layer of concretion covers the body. Straight handles. Two parallel running incised grooves encircle the lower part of the toe right above its maximum diameter. Capacity: 21.78 l. (Pl. 2)

9. A 656 (Θ5/A1). Mendaian

MaxPrHt	59.7
BD	38.6
TD	08.8
THt	10.9

Incomplete amphora. Preserves the lower part of the neck, the lower attachment of the handles, full body, and the toe. Thin concretion surrounds the body and a large chunk of it is attached on the stump of the handle. The upper part of the neck and both handles are missing. Fairly tall stem toe. (Pl. 3)

10. A 658 (Θ5/A1). Mendaian

MaxPrHt	63.1	HHt	15.9
BD	38.5	HWthT	04.3
RD	12.4	HWthS	04.2
RHt	01.8	HTh	02.2
RTh	01.8	TD	08.9
NHt	15.1	THt	08.5
NMmD	09.7		

Complete amphora. Well-preserved. Straight handles. There are spots of concretion on the neck and on one of the handles. The toe is shorter than usual and appears stockier. Capacity: a) 23.64 l. and b) 23.66 l. (Pl. 3)

11. A659 (Θ5/A1). Mendaian

MaxPrHt	44.2
THt	11.0

Incomplete amphora. Preserves part of the body and the stem toe. Neck, both handles, and part of the upper body are missing. The lower part of the body has a pronounced convex curve, to which is joined an unusually tall stem toe with a wide base. This toe has a flat bottom and does not have the usual beveled edge. This is the only example of such a toe found so far. (Pl. 3)

12. A 673 (Θ6/A1). Mendaian

MaxPrHt	65.5	HHt	14.5
BD	39.5	HWthT	04.4
RD	13.0	HWthS	04.3
RHt	02.0	HTh	02.3
RTh	01.8	TD	08.4
NHt	14.7	THt	10.0
NMmD	09.9		

Complete amphora. There is a small piece broken from the rim and from the base of the toe. Straight handles with a slight curve at the lower attachment. Incised groove runs around the base of the rim, right above the point where handles attach to the neck. On top of both handles there is what seems to be a circular impression, maybe a dipinto. Capacity: 24.74 l. (Pl. 3)

13. A 674 (Θ6/A1). Mendaian

MaxPrHt	65.5	HHt	17.2
BD	37.4	HWthT	04.4
RHt	01.9	HWthS	04.4
RTh	01.6	HTh	02.1
NHt	17.4	TD	09.2
NMmD	09.4	THt	11.2

Incomplete amphora. A large piece of the shoulder and part of the belly is missing. Half of the rim is also missing, as well as a piece from the neck. The rim diameter could not be taken. A fresh break and small hole appears on the shoulder. Straight handles. (Pl. 4)

14. A 675 (Θ6/A1). Mendaian

MaxPrHt	63.7	HHt	17.2
BD	39.5	HWthT	04.2
RD	12.8	HWthS	04.1
RHt	01.5	HTh	02.3
RTh	01.9	TD	08.4
NHt	15.4	THt	15.2
NMmD	09.6		

Complete amphora. Other than a small piece missing from the rim, the container is well-preserved. Straight handles with a curve at the lower attachment. Two faint incised grooves run parallel to each other around the body just below the maximum diameter. The first groove is found at 28.4 cm. from the top of the rim, and the second at 36.4 cm. The usual round impression appears on the underside of the toe.
Capacity: a) 23.03 l. and b) 23.06 l. (Pl. 4)

15. A 680 (Θ6/A1). Mendaian

MaxPrHt	65.8	HHt	17.3
BD	37.5	HWthT	05.1
NHt	16.5	HWthS	04.4
NMmD	09.6	HTh	02.1
		TD	09.0
		THt	10.5

Incomplete amphora. A piece from the neck and rim is missing as well as a large piece from the belly and shoulder. The amphora is heavily concreted; chucks of concretion still remain on the shoulder and toe. The handles have a somewhat curved shaft. (Pl. 4)

16. A 741 (Θ6/A2). Mendaian

MaxPrHt	62.8	HHt	18.0
BD	38.6	HWthT	04.5
RD	12.6	HWthS	04.2
RHt	01.7	HTh	02.3
RTh	01.7	TD	08.8
NHt	16.2	THt	10.1
NMmD	09.4		

Complete amphora. The rim is slightly chipped off, but otherwise the container is very well-preserved. Straight handles. An incised groove runs around the body just below the shoulder at 33.6 cm. Munsell: 5YR 6/4, light reddish brown from the surface on the foot, and 5YR 7/6, reddish yellow from a break on the shoulder.
Capacity: a) 20.06 l. and b) 20.10 l. (Pl. 4)

17. A 769 (Θ6/A2). Mendaian

MaxPrHt	62.6	HHt	19.1
BD	38.4	HWthT	04.4
RD	12.7	HWthS	04.3
RHt	01.8	HTh	02.3
RTh	02.0	TD	08.8
NHt	15.3	THt	10.2
NMmD	09.5		

Complete amphora.Very well-preserved. Small pieces are chipped off from the rim. Part of the vessel is covered with a thin film of concretion. S-curved handles.
Capacity: a) 21.59 l. and b) 21.57 l. (Pl. 5)

18. A 770/A 657 (Θ6/A2). Mendaian

MaxPrHt	63.9	TD	07.6
BD	37.4	THt	09.2
RD	12.9		
RHt	02.3		
RTh	01.9		
NHt	15.9		
NMmD	09.5		

Incomplete amphora. The rim is chipped off. Both handles are broken; only the stumps remain at the neck and the shoulder of the vessel. The neck was restored during conservation. There are patches of concretion around the body. The toe appears to be slimmer, but that is because it has been chipped off around its maximum diameter. (Pl. 5)

19. A 979 (Θ5/A2). Mendaian

MaxPrHt	62.5	HHt	17.9
BD	36.9	HWthT	04.5
RD	13.1	HWthS	04.4
RHt	01.7	HTh	02.2
RTh	02.0	TD	08.4
NHt	15.7	THt	08.9
NMmD	09.5		

Incomplete amphora. The jar was assembled from several pieces. There is still a large piece missing from the belly. Straight handles. Two distinct incised grooves run parallel around the lower part of the toe above its maximum diameter. Munsell: 5YR 6/4, light reddish brown from the surface, and 10YR 7/2, light gray from a break on the belly, and 5YR 6/6 reddish yellow from a break on the handle. (Pl. 5)

20. A 981 (Θ5/A2). Mendaian

MaxPrHt	63.4	HHt	16.9
BD	39.3	HWthT	04.7
RD	13.2	HWthS	04.3
RHt	01.8	HTh	02.5
RTh	02.0	TD	08.8
NHt	16.1	THt	10.7
NMmD	09.2		

Complete amphora. The vessel has a fair amount of concretion on it. There is a small piece chipped off the toe. Capacity: 21.88 l. (no photograph)

21. A 982 (Θ5/A2). Mendaian

MaxPrHt	59.8	HHt	17.0
BD	39.4	HWthT	04.8
RD	13.1	HWthS	04.6
RHt	02.1	HTh	02.3
RTh	01.4		
NHt	17.2		
NMmD	09.0		

Incomplete amphora. Poorly preserved fabric. The body of the vessel is covered with concretion. A crack runs perpendicular to the shoulder. A third of the rim and the whole toe are missing. Straight handles. (Pl. 5)

22. A 983 (Θ5/A2). Mendaian

MaxPrHt	66.1	HHt	18.1
BD	38.6	HWthT	05.1
RD	13.4	HWthS	04.6
RHt	01.5	HTh	02.2
RTh	01.6	TD	09.2
NHt	16.1	THt	10.0
NMmD	09.9		

Incomplete amphora. The body is covered with a fair amount of concretion. There is a large piece missing from the rim and the toe base is chipped off. Straight handles with slight curve at lower attachment. Munsell: 5YR 6/4, light reddish brown from the surface, and 5YR 7/6, reddish yellow from a break on the rim.
Capacity: a) 22.11 l. and b) 22.11 l. (Pl. 6)

23. A 984 (Θ5/A2). Mendaian

MaxPrHt	59.5	HHt	17.4
BD	38.8	HWthT	05.0
RHt	01.6	HWthS	04.7
RTh	01.6	HTh	02.4
NHt	17.0		

Incomplete amphora. Half of the rim and one third of the neck are missing, as well as one handle and the toe. A layer of concretion covers the body. Straight handle. A small piece from another amphora was found inside this one, which had traces of pitch on one of its sides. (Pl. 6)

24. A 985 (Θ5/A2). Mendaian

MaxPrHt	62.3	HHt	15.9
BD	39.3	HWthT	04.3
RD	12.3	HWthS	04.3
RHt	01.6	HTh	02.4
RTh	01.9	TD	08.5
NHt	14.5	THt	08.0
NMmD	09.3		

Complete amphora. Body covered with concretion and several cracks appear on the shoulder. The toe has a shorter shaft than usual. Straight handles. (Pl. 6)

25. A 988 (Θ5/A2). Mendaian

MaxPrHt	64.9	HHt	18.1
BD	38.8	HWthT	04.7
RD	12.4	HWthS	04.3
RHt	01.7	HTh	02.4
RTh	02.2	TD	09.1
NHt	16.5	THt	10.6
NMmD	08.5		

Complete amphora. A thin layer of concretion covers the body, but the jar is very well-preserved. Straight handles with a slight curve at the lower attachment. Capacity: 20.61 l. (Pl. 6)

26. A 1000 (Θ5/A3). Mendaian

MaxPrHt	65.5	HHt	17.2
BD	39.6	HWthT	04.3
RD	13.0	HWthS	04.2
RHt	02.0	HTh	02.1
RTh	02.1	TD	08.4
NHt	16.6	THt	09.7
NMmD	09.5		

Incomplete amphora. A large piece is missing from the belly. Through this opening one can clearly see the joint between the neck and the shoulder. The body is covered with concretion. Straight handles. (Pl. 7)

27. A 1001 (Θ5/A3). Mendaian

MaxPrHt	58.8	HHt	19.0
BD	37.4	HWthT	04.7
RD	13.1	HWthS	04.4
RHt	01.7	HTh	02.6
RTh	01.9		
NHt	19.0		
NMmD	09.3		

Incomplete amphora. Patches of concretion around the body. The stem toe is missing. Incised groove runs around the neck at 11.2 cm. S-curved handles. Munsell: 5YR 6/6, reddish yellow from the surface on the base of the neck, and 5YR 7/6, reddish yellow from a break on the shoulder. (Pl. 7)

31. A 1006 (Θ5/A3). Mendaian

MaxPrHt	60.7	HHt	16.2
BD	37.2	HWthT	04.0
NHt	15.9	HWthS	04.1
NMmD	09.0	HTh	02.6
		TD	08.2
		THt	09.9

Incomplete amphora. The vessel is covered with concretion. The rim and part of the upper neck is missing. There is also a large piece missing from the shoulder and upper belly. The base of the toe is chipped off. Inside the vessel visible are the remains of pitch or resin. Straight handles. (Pl. 8)

32. A 1007 (Θ5/A3). Mendaian

MaxPrHt	63.3	HHt	16.3
BD	38.5	HWthT	04.1
RD	12.4	HWthS	03.8
RHt	01.7	HTh	02.2
RTh	01.9	TD	08.2
NHt	16.5	THt	10.9
NMmD	09.2		

Complete amphora. Assembled from several pieces. Cracks are visible around the neck and the belly. The body is covered with concretion. S-curved handles. (Pl. 8)

33. A 1008 (Θ5/A3). Mendaian

MaxPrHt	64.4	HHt	16.8
BD	37.9	HWthT	04.5
RD	12.6	HWthS	04.2
RHt	02.2	HTh	02.3
RTh	02.1	TD	08.5
NHt	17.3	THt	10.2
NMmD	09.2		

Complete amphora. The jar is covered with concretion. A chunk still covers the top attachment of one handle and the rim. Straight handles. (Pl. 8)

34. B 5 (Θ6/B). Mendaian

MaxPrHt	54.8	HHt	18.2
BD	39.2	HWthT	04.4
RD	12.4	HWthS	04.1
RHt	01.9	HTh	02.3
RTh	01.9		
NHt	17.9		
NMmD	09.0		

Incomplete amphora. The jar is clean of concretion. The toe is missing and a hole appears in the extremity. There is a crack on the shoulder and the rim is chipped. A circular impression on one of the handles is most likely a stamp, but no representation is visible. Munsell: 5YR 5/4, reddish brown from the surface, and 7.5YR 6/6, reddish yellow from a break. (no photograph; Pl. 37, drawing)

35. B 22 (Θ6/A2). Mendaian

Complete. The vessel has been preserved in an exceptional state. No measurements are available. It has characteristically deep incised grooves, which appear running below and around the rim and around the upper belly. (Pl. 8)

36. B 26 (Θ6/B). Mendaian

MaxPrHt	67.3	HHt	18.8
BD	38.9	HWthT	04.7
RD	14.0	HWthS	04.5
RHt	02.1	HTh	02.6
RTh	02.2	TD	09.7
NHt	17.0	THt	11.5
NMmD	09.1		

Complete amphora. Well-preserved. There is still some concretion around the body. The toe is chipped at the base. It has a tall toe and S-curved handles. Capacity: 20.61l., but note that the vessel was leaking slightly. (Pls. 9 and 37)

37. B 29 (Θ6/B). Mendaian

MaxPrHt	62.0	HHt	17.8
BD	37.0	HWthT	04.9
RD	13.2	HWthS	05.0
RHt	01.7	HTh	02.5
RTh	02.0	TD	09.2
NHt	15.4	THt	11.3
NMmD	09.9		

Complete amphora. Very well-preserved. Small pieces chipped from the rim and the toe. Straight handles. Munsell: 10YR 7/3, very pale brown from the surface, and 5YR 6/4, light reddish brown from a break on the handle.
Capacity measurements: a) 20.14 l., b) 20.10 l. and c) 20.15 l. (Pl. 9)

38. B 30 (Θ6/B or Θ5). Mendaian

MaxPrHt	65.3	HHt	17.2
BD	38.1	HWthT	04.5
RD	12.7	HWthS	04.1
RHt	02.2	HTh	02.2
RTh	02.0	TD	08.6
NHt	17.6	THt	11.1
NMmD	09.0		

Complete amphora. The body is covered with thick concretion. There is a crack at the lower part of the belly and the toe has been mended. S-curved handles. (Pl. 9)

39. B 50 (Θ5/B). Mendaian

MaxPrHt	57.0	HHt	19.5
BD	37.9	HWthT	04.4
RD	13.2	HWthS	04.2
RHt	02.0	HTh	02.5
RTh	02.1		
NHt	15.5		
NMmD	08.6		

Incomplete amphora. The vessel is covered with concretion. There is a small hole on the belly. The toe is missing. Straight handles. An incised groove runs around the base of the rim. (Pl. 9)

40. B 52 (Θ5/B). Mendaian

MaxPrHt	59.7	HHt	17.5
BD	38.1	HWthT	04.4
RD	13.0	HWthS	04.3
RHt	01.8	HTh	02.9
RTh	01.7	TD	08.9
NHt	16.7	THt	09.4
NMmD	10.0		

Complete amphora. The jar has a fair amount of concretion around its body. Lining, possibly pitch, is visible inside the vessel. S-curved handles. Capacity: 18.75 l. (Pl. 10)

41. B 53 (Θ5/B). Mendaian

MaxPrHt	63.6	HHt	17.5
BD	37.9	HWthT	05.0
RD	13.2	HWthS	05.0
RHt	01.7	HTh	02.5
RTh	02.0	TD	09.1
NHt	16.4	THt	09.5
NMmD	09.5		

Complete amphora. Vessel is covered with concretion. Incised groove around the neck at 8.5 cm. S-curved handles. Capacity: 19.76 l. (Pl. 10)

42. B 55 (Θ5/B). Mendaian

MaxPrHt	66.5	HHt	18.5
BD	39.6	HWthT	04.6
RD	13.1	HWthS	04.3
RHt	02.0	HTh	02.6
RTh	02.0	TD	09.2
NHt	17.2	THt	11.7
NMmD	09.4		

Complete amphora. Thin layer of concretion around the body and on the handles. Fairly tall vessel. S-curved handles. Capacity: 23.06 l., but note that this measurement might not be accurate, because the jar was loosing water at a slow rate. (Pl. 10)

43. B 57 (Θ5/B). Mendaian

MaxPrHt	61.5	HHt	17.5
BD	38.4	HWthT	04.3
RD	13.0	HWthS	04.0
RHt	01.7	HTh	02.1
RTh	02.2	TD	08.8
NHt	16.2	THt	08.9
NMmD	09.6		

Complete amphora. The body is covered with concretion. Rim is slightly chipped. S-curved handles. Capacity: 19.86 l. (Pl. 10)

44. B 59 (Θ5/B). Mendaian

MaxPrHt	64.6	HHt	17.1
BD	37.6	HWthT	05.0
NHt	15.2	HWthS	04.6
NMmD	10.6	HTh	02.5
		TD	09.4
		THt	11.0

Incomplete amphora. Patches of concretion cover the body. Top of the rim is broken. Shallow groove around the neck at approximately 17 cm. Deep incised groove runs around the underside of the toe. Straight handles. Capacity: 21.56 l. (Pl. 11)

45. B 60/A 768 (Θ5/B). Mendaian

MaxPrHt	63.2	HHt	17.6
BD	38.2	HWthT	05.0
RD	13.0	HWthS	04.3
RHt	01.7	HTh	02.6
RTh	01.6	TD	09.0
NHt	16.8	THt	11.6
NMmD	09.4		

Complete amphora. Assembled from several pieces. It was tagged twice: tag B60 was attached to the toe, and A768 to the handle. There is a piece missing from the belly. (no photograph)

46. B 61 (Θ5/B). Mendaian

MaxPrHt	56.8	HHt	16.8
BD	38.5	HWthT	04.5
RD	13.0	HWthS	04.2
RHt	01.9	HTh	02.4
RTh	02.1		
NHt	16.1		
NMmD	09.1		

Incomplete amphora. Body covered with concretion. Toe is missing, leaving an open hole at the base of the belly. A black mark on the belly looks like fire burning. S-curved handles. Pronouncedly flared rim. (Pl. 11)

47. B 62 (Θ5/B). Mendaian

MaxPrHt	63.5	HHt	16.3
BD	38.5	HWthT	04.4
RD	11.4	HWthS	04.2
RHt	01.7	HTh	02.5
RTh	02.0	TD	08.5
NHt	15.0	THt	10.4
NMmD	09.2		

Complete amphora. Body covered with concretion. There are cracks and openings on the rim and on one of the handles. The toe is chipped off. S-curved handles. (Pls. 11 and 37)

48. B 66 (Θ5/B). Mendaian

MaxPrHt	63.5	HHt	15.2
BD	38.4	HWthT	04.5
RD	13.5	HWthS	04.5
RHt	01.6	HTh	02.0
RTh	01.9	TD	08.8
NHt	14.9	THt	10.5
NMmD	09.3		

Complete amphora. The vessel is covered with concretion. Straight handles with slight curve at the lower attachment. Capacity: 20.48 l. (Pl. 11)

49. B 69 (Θ5/B). Mendaian

MaxPrHt	63.7	HHt	18.3
BD	38.0	HWthT	04.5
RD	12.7	HWthS	04.1
RHt	01.6	HTh	02.3
RTh	01.9	TD	08.4
NHt	17.1	THt	09.6
NMmD	09.0		

Complete amphora. The jar is covered with concretion. Small piece is missing from the rim. Black marks cover the neck and the handles. Straight handles with a slight curve at the lower attachment. Capacity: 20.08 l. (Pl. 12)

50. B 71 (Θ5/B). Mendaian

MaxPrHt	58.5	TD	08.8
BD	37.5	THt	09.3

Incomplete amphora. Body covered with concretion. Two-thirds of neck and both handles are missing. A large piece is broken from the shoulder and upper belly. Possibly a lining of pitch or resin is visible inside the vessel. (Pl. 12)

51. Γ 63 (Θ5/Γ). Mendaian

MaxPrHt	64.9	HHt	17.1
BD	38.7	HWthT	04.5
RD	12.8	HWthS	04.1
RHt	01.7	HTh	02.2
RTh	01.9	TD	08.7
NHt	16.1	THt	09.0
NMmD	08.8		

Incomplete amphora. The body is covered with concretion. A small piece is missing from the rim, but this does not affect the measurements. Also, there is a broken area creating a hole on the belly. Black marks cover the lower belly and the toe. Straight handles. Besides the usual incised groove at the base of the rim there is a second one on the neck just above the attachment of the handles at 3.1 cm. Munsell: 10YR 5/2, grayish brown from the surface, and 5YR 6/4, light reddish brown from the break on the rim. (Pl. 12)

Solokha II Amphoras

The second type of amphora, appearing in large numbers in the cargo, and represented by 91 jars in this study, closely resembles examples of the so-called Solokha II type. The vessel has an elongated, pear-shaped body with a long pronounced neck and straight-sided, vertical handles, somewhat curved on top and sometimes slightly arched. The mouth is almost round in plain view. Often, it is pressed to an oval shape where the handles attach to the neck (e.g. Nos. 71, 80, 126, 130); the long axis of the rim is opposite the handles. There are distinct differences in the profile of the rim in many jars. One profile is thin (short) and rolled outward with a convex upper and outer surface (e.g. Nos. 122, 126); and the other is thicker (taller), somewhat squared in profile, and set off from the neck by a distinct narrow ridge (e.g. Nos. 86, 100). Further examination of the rim profiles is needed to determine whether the differences represent stylistic variations, production 'errors', or wear through use or by currents underwater. In this study a distinction is made between the 'thin' or short (up to 1.3 cm) and the 'thick' or tall (from 1.4 cm and up) rim profiles in the catalogue.

The neck, tall and cylindrical, flares at the base to a shoulder that is sloping and slightly concave in profile. The shoulder is well defined and forms a solid, somewhat narrow base for the handles. Small differences appear in some vessels where the neck joins the shoulder: on one variant, the neck is wider in diameter (e.g. Nos. 58, 59, 73, 86). Flaring starts at a higher point, the neck is wider at the base and the shoulder is narrow and sloping. On another variant (e.g. Nos. 74, 100, 119, 121, 122) the neck base flares

just above the lower handle attachment, giving a narrower neck base and a wider and somewhat flatter shoulder. The handles, tall and oval in cross-section, attach below the rim, arching upward at the top. The side (shaft) of the handles is straight and runs parallel to the neck. The base of the handle usually rests on the middle of the shoulder (No. 100), but sometimes it spreads out to the edge of the shoulder (Nos. 52, 126). Both handles are marked with a thumb impression at the lower attachment. The finger marking is a constant feature on both handles; so far only one vessel (No. 104) has been found to have a single impression.

The shoulder turns downwards into a broad conical body with a flaring toe. The stem toe ends in a circular base, which flares outwards and is beveled on the underside. Occasionally, the underside is flat and not beveled (No. 84). A narrow ridge runs around the base. The middle of the base underneath is marked by a round impression. There are several amphoras with a broken, missing toe. What remains is a pointed or pegged-shaped extremity that possibly betrays the "capping" technique of forming the toe. The flared circular bottom, very practical for handling the jar, was added after the body had been formed, with lower walls converging to a point (e.g. Nos. 64, 68, 80). Besides serving as a 'handle' to carry an amphora, the long, solid toe offers protection against possible knocks. It might have been added to protect the contents inside the walls of the body, lest they spill out from a broken toe. The added toe of No. 64 has deteriorated and 'peeled open', revealing the walls of the body and how it "capped" the pointed extremity.

Incised grooves appear around the body of many vessels. An incised groove encircles the neck just below the rim at the point of the upper handle attachment (e.g. No.

100). Perhaps this groove, serving more than a decorative purpose, marks the maximum level of wine in the jar or the place where possibly a cord was tied to hold the stopper in place. Two shallow grooves run around the neck, either below the upper attachment of the handles (e.g. No. 133) or further below, closer to the base of the neck (e.g. Nos. 65, 110). From two to five incised horizontal grooves have been noticed on the body. Frequently a deep incised groove encircles the round impression on the underside of the toe (e.g. No. 125). So far, no stamps or other markings have been noticed on these Solokha II amphoras.

I have already explained in detail (Chapter 2) the reasons for keeping the 'label' Solokha II in this study. Dating of the vessels has also been discussed in the same section. In sum, the date of the Solokha II is based on the relative chronology provided by the appearance of the "late variant" of the Mendaian type in the same cargo; the similarity to dated examples ca. 400 from the Athenian Agora; and the close similarity to the Solokha II found in the Porticello shipwreck. Thus, the Solokha II amphoras from the Alonnesos shipwreck should date in the last two decades or somewhat closer to the end of the 5th century, ca. 415-400.

Catalogue (continued):

52. BE 91/16-2 (13-10-91). Solokha II

MaxPrHt	78.4	HHt	24.4
BD	32.1	HWthT	05.0
RD	11.8	HWthS	04.5
RHt	01.5	HTh	02.8
RTh	01.4	TD	06.5
NHt	23.0	THt	06.0
NMmD	10.4		

Complete amphora. Well-preserved. Chipped on the rim and on the shoulder next to the base of the handle. Small crack appears on the belly. Thick rim. Groove runs around neck at 15.3 cm. Numerous grooves run around the body in different directions, which look like impressions of lashings from ropes. (Pl. 13)

53. ПЕ 2. Solokha II

MaxPrHt	74.9	HHt	23.0
BD	32.5	HWthT	04.9
RD	11.6	HWthS	04.4
RHt	01.9	HTh	02.8
RTh	01.4	TD	06.5
NHt	22.9	THt	06.1
NMmD	09.8		

Complete amphora. Well-preserved. Small piece are missing from the rim and the toe. Thick rim. (Pl. 13)

54. ПЕ 16. Solokha II

MaxPrHt	73.9	HHt	24.1
BD	31.9	HWthT	04.3
RD	11.8	HWthS	04.2
RHt	01.5	HTh	02.7
RTh	01.4	TD	06.8
NHt	22.8	THt	07.4
NMmD	10.5		

Complete amphora. Large patches of a thin layer of concretion alternate with large black patches on the surface of the vessel. Thick rim. Incised groove runs around the neck at 17.2 cm. Three grooves run around the belly: from the top at 41.80, 54.80, and 61.60 cm. Munsell: 2.5YR 4/4 reddish brown on the surface, and 2.5YR 5/6 red on a break. (Pl. 13)

55. A 498. Solokha II

MaxPrHt	70.5	HHt	23.1
BD	32.0	HWthT	03.9
NHt	19.4	HWthS	03.9
NMmD	10.1	HTh	02.4
		TD	06.8
		THt	06.0

Incomplete amphora. Body covered with concretion. Rim and a small piece from the neck are missing. A medium sized hole appears below the maximum diameter on the belly. (Pl. 13)

56. A 520 (Θ4/A1). Solokha II

MaxPrHt	73.6	HHt	24.0
BD	32.8	HWthT	04.1
RD	11.3	HWthS	04.0
RHt	01.4	HTh	02.6
RTh	01.1	TD	06.1
NHt	22.0	THt	06.2
NMmD	10.5		

Complete amphora. Well-preserved. Body covered with patches of concretion. Violet-colored marks appear on the neck and the body. Thick rim. (Pl. 14)

57. A 591 (Θ3/A1). Solokha II

MaxPrHt	76.7	HHt	23.9
BD	31.8	HWthT	04.7
RD	11.2	HWthS	04.3
RHt	01.6	HTh	02.6
RTh	01.1	TD	06.5
NHt	22.4	THt	06.7
NMmD	09.4		

Complete amphora. Body covered with concretion. There is a small hole on the shoulder and a chipped piece from the toe. Thick rim. Groove around the neck just below the rim. (Pl. 14)

58. A 603 (Θ4/A1). Solokha II

MaxPrHt	75.1	HHt	23.7
BD	31.8	HWthT	04.8
NHt	22.0	HWthS	04.3
NMmD	10.1	HTh	02.7
		TD	06.2
		THt	06.1

Incomplete amphora. Patches of concretion around the body. Rim is missing. Distinct beveled toe. (Pl. 14)

59. A 604 (Θ4/A1). Solokha II

MaxPrHt	76.0	HHt	24.2
BD	31.8	HWthT	04.4
RD	12.0	HWthS	04.3
RHt	01.7	HTh	02.8
RTh	01.2	TD	06.8
NHt	22.2	THt	07.4
NMmD	10.5		

Complete amphora. Vessel covered with concretion. A small piece is chipped from one of the handles. Thick rim. Incised groove runs around neck at 16.0 cm. (Pls. 14 and 38)

60. A 606 (Θ4/A1). Solokha II

MaxPrHt	74.9	HHt	23.7
BD	30.2	HWthT	04.4
RHt	01.2	HWthS	04.3
RTh	01.3	HTh	02.5
NHt	23.2	TD	06.5
		THt	06.6

Incomplete amphora. Part of rim and neck are broken. One handle is missing. Incised groove runs around neck at 19.0 cm. (no photograph)

61. A 608 (Θ4/A1). Solokha II

MaxPrHt	69.8	TD	07.0
BD	33.6	THt	07.6

Incomplete amphora. Body covered with concretion. Rim and part of the neck are broken. Both handles are broken, only small part of the lower attachment remains on the shoulder. Munsell: 2.5YR 5/4 reddish brown on the surface, and 2.5YR 6/6 light red from a break on the neck. (Pl. 15)

62. A 609 (Θ4/A1). Solokha II

MaxPrHt	75.8	HHt	24.7
BD	33.1	HWthT	04.5
RD	11.6	HWthS	04.2
RHt	01.5	HTh	02.6
RTh	01.3	TD	06.6
NHt	21.8	THt	08.1
NMmD	10.2		

Complete amphora. Upper part of the body of the vessel covered with concretion. Black patches on the neck and on the shoulder. Thick rim. (Pl. 15)

63. A 610 (Θ4/A1). Solokha II

No dimension measurements were taken for this piece. It has been included here for its distinct features: a tall, cylindrical and narrow neck and a tall handle of what remains of this fragmented amphora. (Pl. 15)

64. A 617 (Θ3/A1). Solokha II

MaxPrHt	73.2	HHt	23.1
BD	32.3	HWthT	04.2
RHt	01.4	HWthS	03.7
RTh	01.3	HTh	02.2
NHt	21.0	TD	06.6
NMmD	10.4	THt	06.1

Incomplete amphora: Overall poorly preserved. The vessel has been assembled from several broken pieces. Body covered with concretion and black patches. Part of the rim and a small piece from the neck are broken. One handle is broken, only the stumps remain of its upper and lower attachments. The clay on the toe has cracked open and chipped off revealing the joint between the lower body and the toe; it was added as a cap at the bottom of a pegged body (see also No. 68). Thick rim. Munsell: 2.5YR 5/4 reddish brown on the surface at the shoulder, and 2.5YR 6/6 light red from a break on the shoulder. (Pl. 15)

65. A 626 (Θ3/A1). Solokha II

MaxPrHt	76.2	HHt	23.4
BD	30.5	HWthT	04.5
RD	11.6	HWthS	04.4
RHt	01.2	HTh	02.5
RTh	01.4	TD	06.8
NHt	21.9	THt	07.3
NMmD	09.9		

Complete amphora. Lower body covered with concretion. Small hole (fresh break) on the shoulder below the base of one of the handles. Thin rim. Incised groove runs around neck at 18.2 cm.. The neck flares to a 'flatter' shoulder. (Pl. 16)

66. A 628 (Θ3/A1). Solokha II

MaxPrHt	75.8	HHt	24.3
BD	31.2	HWthT	04.7
RD	10.6	HWthS	04.5
RHt	01.2	HTh	02.5
RTh	01.2	TD	06.2
NHt	24.0	THt	07.3
NMmD	09.4		

Complete amphora. Assembled from several pieces and covered with concretion. Thick rim. Tall neck. (Pl. 16)

67. A 633 (Θ4/A1). Solokha II

MaxPrHt	75.1	HHt	24.6
BD	31.0	HWthT	04.7
RD	11.2	HWthS	04.5
RHt	01.4	HTh	02.3
RTh	01.4	TD	06.5
NHt	23.4	THt	06.5
NMmD	10.1		

Complete amphora. Vessel covered with concretion. The neck has been repaired. Small piece is missing from the neck. Thick rim. The handles have a pronounced upward curve at the upper attachment and they sit at the edge of the sloping and rounded shoulder. (Pl. 16)

68. A 634 (Θ4/A1). Solokha II

MaxPrHt	71.7	HHt	23.0
BD	32.7	HWthT	04.5
RD	10.8	HWthS	03.8
RHt	01.9	HTh	02.3
RTh	01.3		
NHt	22.4		
NMmD	09.9		

Incomplete amphora. Very poorly preserved. Clump of concretion on the handle. Belly has been assembled from several pieces, but large pieces are missing. The base of the toe is broken and the lower walls of the body converge to a peg-shaped extremity (see also No. 64). (Pl. 16)

69. A 640/A 605 (Θ4/A1). Solokha II

MaxPrHt	75.0	HHt	23.5
BD	32.5	HWthT	04.7
RD	12.0	HWthS	04.5
RHt	01.6	HTh	02.9
RTh	01.3	TD	06.5
NHt	22.5	THt	06.4
NMmD	10.4		

Complete amphora. Vessel covered with concretion. Assembled from two pieces; one includes the neck, both handles and part of the shoulder, and the other the belly and toe. Small pieces missing from the shoulder, below the handles. Thick rim. Amphora double-tagged; tag A640 was tied on the handle, and A605 was tied on the toe. (Pl. 17)

70. A 641 (Θ5/A1). Solokha II

MaxPrHt	75.2	HHt	23.9
BD	32.5	HWthT	04.3
RD	11.6	HWthS	03.7
RHt	01.5	HTh	02.7
RTh	01.2	TD	06.5
NHt	23.2	THt	06.9
NMmD	09.6		

Complete amphora. Body covered with concretion. Several fresh breaks on the body, and a small hole on the shoulder. Thick rim. Incised groove runs around the neck below the rim. Distinctive steep sloping shoulder. Munsell: 10YR 5/6 yellowish-brown from the surface on the shoulder, and 2.5YR 6/8 light red from a break on the belly. (Pl. 17)

71. A 642 (Θ5/A1). Solokha II

MaxPrHt	72.2	HHt	23.2
BD	32.4	HWthT	04.6
RD	11.5	HWthS	03.8
RHt	01.4	HTh	02.2
RTh	01.1	TD	06.9
NHt	20.4	THt	05.4
NMmD	11.4		

Complete amphora. Vessel covered with concretion. A calcareous clump remains attached on the handle. Small pieces are chipped off below the rim and on the toe. Thick rim. It is contracted to an oval shape where the handles attach to the neck. The neck is considerably larger in diameter. Numerous fresh breaks around the body and cracks on the clay. (Pl. 17)

72. A 643 (Θ5/A1). Solokha II

MaxPrHt	76.1	HHt	24.1
BD	33.2	HWthT	04.5
RD	11.5	HWthS	04.5
RHt	01.6	HTh	02.6
RTh	01.2	TD	07.0
NHt	22.6	THt	06.6
NMmD	10.3		

Complete amphora. Body is covered with concretion. Black patches spread over most of the shoulder and lower body. Thick rim. Tall vessel. (Pl. 17)

73. A 644 (Θ5/A1). Solokha II

MaxPrHt	75.2	HHt	23.9
BD	32.0	HWthT	04.5
RD	12.1	HWthS	04.2
RHt	01.6	HTh	02.8
RTh	01.5	TD	06.8
NHt	21.8	THt	06.2
NMmD	10.0		

Complete amphora. Vessel covered with concretion. Thick rim. Steep sloping shoulder. The handles attach at the edge of the shoulder. (Pl. 18)

74. A 645 (Θ5/A1). Solokha II

MaxPrHt	75.1	HHt	23.9
BD	31.0	HWthT	04.5
RD	11.4	HWthS	04.2
RHt	01.3	HTh	02.8
RTh	01.1	TD	06.8
NHt	21.8	THt	06.2
NMmD	10.0		

Complete amphora: Body covered with concretion. Small hole on the belly and fresh break on the toe. Thin rim. The shoulder is angular in contrast to the shape that in No. 73. (Pl. 18)

75. A 646 (Θ5/A1). Solokha II

MaxPrHt	75.0	HHt	23.1
BD	33.2	HWthT	04.2
RD	11.7	HWthS	04.2
RHt	01.6	HTh	02.5
RTh	01.2	TD	06.4
NHt	22.1	THt	06.4
NMmD	10.4		

Complete amphora. Body covered with concretion. (no photograph)

76. A 647/A 663 (Θ5/A1). Solokha II

MaxPrHt	72.2	HHt	23.2
BD	31.4	HWthT	04.5
NHt	19.0	HWthS	04.2
NMmD	10.1	HTh	02.6
		TD	09.8
		THt	06.5

Incomplete amphora. Amphora was assembled together from three pieces. Part of the body is covered with black patches and some concretion. Rim, part of the neck, and upper attachment of one handle are missing. The vessel is double-tagged: A647 was tied to the neck and the handle, and A663 was tied to the toe. Height measurement for the neck taken from the highest preserved point. Incised groove runs around neck at 14.0 cm. (Pl. 18)

77. A 649 (Θ5/A1). Solokha II

MaxPrHt	73.9	HHt	23.8
BD	30.0	HWthT	04.6
RHt	01.2	HWthS	04.1
RTh	01.3	HTh	02.3
NHt	22.5	TD	06.2
NMmD	09.9	THt	05.4

Incomplete amphora. Poorly preserved. The vessel has cracked open at the lower part of the belly and has several fresh breaks on it. Body covered with concretion and black patches. Part of rim, neck, and one handle are missing. A hole appears at the lower attachment of the missing handle. The toe has a wider shaft. Sloping shoulder. Body slimmer in form comparing to other vessels. (Pl. 18)

78. A 650 (Θ5/A1). Solokha II

MaxPrHt	71.8	HHt	23.9
BD	32.7	HWthT	04.4
NHt	21.0	HWthS	03.7
NMmD	10.0	HTh	02.2
		TD	06.6
		THt	06.8

Incomplete amphora. Vessel is fairly clean from concretion. The rim and small piece from the neck are broken. Neck height measurement has been taken from the highest preserved point. Very well defined toe, with the ridge at the base and the beveled underside. Incised groove runs around the shoulder at 30.5 cm. (Pl.19)

79. A 651 (Θ5/A1). Solokha II

MaxPrHt	71.1	HHt	23.5
BD	31.6	HWthT	04.1
RD	10.9	HWthS	04.1
RHt	01.4	HTh	02.7
RTh	01.4	TD	06.7
NHt	21.6	THt	07.0
NMmD	09.8		

Complete amphora. Fairly well cleaned from concretion. Black patches on the body. Small pieces chipped off from the rim. Fresh breaks appear on the body, and toe. Thick rim. The underside of the toe is flat and not beveled. (Pl. 19)

80. A 652 (Θ5/A1). Solokha II

MaxPrHt	69.3	HHt	23.4
BD	31.8	HWthT	04.1
RD	11.5	HWthS	04.0
RHt	01.2	HTh	02.3
RTh	01.1		
NHt	22.3		
NMmD	09.1		

Incomplete amphora. Poorly preserved. One of the handles and the neck have been repaired. The toe is missing as in No. 68, and the body ends at a peg-shaped extremity. Small black patches on the body. Thin rim, contracted into an oval shape where the handles attach to the neck. Angular shoulder. (Pl. 19)

81. A 653 (Θ5/A1). Solokha II

MaxPrHt	73.3	HHt	24.0
BD	31.8	HWthT	03.8
RD	11.8	HWthS	04.2
RHt	01.6	HTh	02.5
RTh	01.2	TD	06.4
NHt	22.9	THt	06.0
NMmD	10.2		

Complete amphora. Body covered with concretion. The clay has cracked open on the lower belly and toe. Small piece from rim is missing. Thick rim. Steep sloping shoulder. (Pl. 19)

82. A 655 (Θ5/A1). Solokha II

MaxPrHt	75.2	HHt	23.9
BD	31.8	HWthT	04.0
RD	11.5	HWthS	03.9
RHt	01.6	HTh	02.5
RTh	01.2	TD	06.2
NHt	22.0	THt	05.9
NMmD	10.2		

Complete amphora. Poorly preserved. Patches of concretion and black patches appear on the body. Part of the rim has been repaired. Sloping shoulder. Cracks appear on the neck and shoulder. Thin section of clay has been 'peeled off' from the shoulder. There is a hole on the shoulder just below one of the handles. Small piece is missing from the side of the toe. Thick rim. Underside of the toe is flatter than usual with no bevel. (Pl. 20)

83. A 660 (Θ5/A1). Solokha II

MaxPrHt	74.7	HHt	23.7
BD	32.1	HWthT	04.2
RD	11.5	HWthS	04.4
RHt	01.4	HTh	02.7
RTh	01.3	TD	06.6
NHt	23.8	THt	07.2
NMmD	10.0		

Incomplete amphora. Fairly clean from concretion with few calcareous and black patches on the body. Fresh break appears on the rim. Piece is missing from the rim, and neck has been repaired. Large piece is missing from the shoulder and upper belly, but this does not affect the overall dimension measurements. Thick rim. Sloping and rounded shoulder. (Pl. 20)

84. A 661 (Θ5/A1). Solokha II

MaxPrHt	74.6	HHt	24.5
BD	32.7	HWthT	04.5
RD	11.6	HWthS	04.3
RHt	01.6	HTh	02.7
RTh	01.4	TD	06.2
NHt	23.9	THt	07.1
NMmD	09.9		

Complete amphora. Body is covered with concretion. Small breaks on one of the handles and cracks on the shoulder. Thick rim. Underside of toe is flatter than usual, no bevel. (Pl. 20)

85. A 664 (Θ6/A1). Solokha II

MaxPrHt	76.1	HHt	24.5
BD	33.8	HWthT	04.4
RD	12.3	HWthS	04.3
RHt	01.6	HTh	02.7
RTh	01.3	TD	06.8
NHt	23.5	THt	05.9
NMmD	10.7		

Complete amphora. The vessel has been assembled from several pieces. Small piece is missing from the belly. Black patches appear on the body. Thick rim. Stocky toe. Munsell: 2.5YR 5/6 red from the surface on the shoulder, and 2.5YR 5/8 red from a break on the base. (Pl. 20)

86. A 665 (Θ6/A1). Solokha II

MaxPrHt	72.8	HHt	24.4
BD	32.2	HWthT	04.2
RD	12.1	HWthS	04.1
RHt	01.5	HTh	02.6
RTh	01.5	TD	06.8
NHt	23.2	THt	06.0
NMmD	10.5		

Complete amphora. Lumps of concretion on one handle and the body. Thick rim. Wide neck base and steep sloping shoulder. (Pl. 21)

87. A 666 (Θ6/A1). Solokha II

MaxPrHt	74.1	HHt	22.4
BD	32.7	HWthT	03.9
RD	11.0	HWthS	04.2
RHt	01.5	HTh	02.5
RTh	01.2	TD	06.7
NHt	22.0	THt	07.4
NMmD	10.4		

Complete amphora. Fairly well cleaned from concretion. Several cracks appear on the body. Two small holes on the belly. Thick rim. Angular shoulder. Munsell: 10R 4/4 weak red from the surface, and 2.5YR 6/6 red from a break. (Pl. 21)

88. A 667 (Θ6/A1). Solokha II

MaxPrHt	73.2	HHt	22.9
BD	32.8	HWthT	04.6
RD	11.5	HWthS	04.0
RHt	01.4	HTh	02.5
RTh	01.2	TD	06.2
NHt	21.8	THt	05.8
NMmD	10.3		

Complete amphora. Body fairly cleaned from concretion. Small piece is missing from the rim. The clay has cracked open on several places around the body. Thick rim. (Pl. 21)

89. A 668 (Θ6/A1). Solokha II

MaxPrHt	77.2	HHt	25.0
BD	32.3	HWthT	04.7
RD	12.3	HWthS	04.4
RHt	01.6	HTh	02.8
RTh	01.3	TD	06.6
NHt	22.3	THt	06.5

Complete amphora. Lumps of concretion on handles, neck and body. Incised groove runs around belly at 44.2 cm. Thick rim. Sloping shoulder. (Pl. 21)

90. A 669 (Θ6/A1). Solokha II

MaxPrHt	73.6	HHt	23.7
BD	32.4	HWthT	04.3
RD	12.1	HWthS	04.1
RHt	01.4	HTh	02.5
RTh	01.2	TD	05.9
NHt	21.6	THt	09.4
NMmD	10.1		

Complete amphora. There are patches of concretion on the body. Clay badly eroded at the lower body and toe. Thick rim. It is contracted in shape where the handles attach to the neck. Angular shoulder. Faint incised grooves run around the body. (Pl. 22)

91. A 670 (Θ6/A1). Solokha II

MaxPrHt	67.7	TD	06.8
BD	33.3	THt	06.3

Incomplete amphora. Amphora has been assembled from several pieces. Rim and upper neck are missing. Both handles are broken and stumps remain on their lower attachment. There is a hole on the shoulder. Sloping shoulder. (Pl. 22)

92. A 671 (Θ6/A1). Solokha II

MaxPrHt	66.2	HHt	23.4
BD	32.5	HWthT	04.4
RHt	01.4	HWthS	03.9
RTh	01.2	HTh	02.5
NHt	21.6	TD	06.8
NMmD	10.1	THt	09.0

Incomplete amphora. Vessel is covered with concretion and black patches. Clay has deteriorated, and cracks appear on the body. Part of the rim, neck and one handle are missing. Neck has been assembled together from three pieces. Thin rim. Angular shoulder. (Pl. 22)

93. A 672 (Θ6/A1). Solokha II

MaxPrHt	71.0	HHt	22.9
BD	31.0	HWthT	04.2
		HWthS	04.1
		HTh	02.8
		TD	06.2
		THt	08.4

Incomplete amphora. Neck, and one handle broken. Several fresh and old breaks around the body. Several incised faint grooves run intermittently around the body. Munsell: 2.5YR 5/6 red from the surface on the shoulder, and 2.5YR 5/8 red from a break on the neck. (no photograph)

94. A 676 (Θ6/A1). Solokha II

MaxPrHt	71.1	HHt	23.1
BD	31.6	HWthT	04.0
RD	11.4	HWthS	04.0
RHt	01.7	HTh	02.5
RTh	01.1	TD	06.2
NHt	22.0	THt	06.4
NMmD	10.6		

Complete amphora. Body covered with concretion. Fresh break on the neck. Concretion lumps remain on the neck, handle and the body. Thick rim. Angular shoulder. (Pl. 22)

95. A 677 (Θ6/A1). Solokha II

MaxPrHt	75.7	HHt	24.9
BD	33.4	HWthT	04.4
RD	11.6	HWthS	04.5
RHt	01.6	HTh	02.9
RTh	01.2	TD	06.7
NHt	22.5	THt	06.6
NMmD	10.7		

Incomplete amphora. Repaired from two broken pieces, the neck and the body. Small piece is missing from the rim and only one handle is preserved. Thick rim. Sloping shoulder. (Pl. 23)

96. A 679 (Θ6/A1). Solokha II

MaxPrHt	73.7	HHt	23.6
BD	30.6	HWthT	04.8
RD	11.6	HWthS	05.0
RHt	01.4	HTh	03.2
RTh	01.2	TD	06.4
NHt	21.8	THt	06.6
NMmD	10.7		

Complete amphora. Fairly well cleaned. Thick rim. Steep sloping shoulder. Incised groove runs around the upper belly at 39.1 cm. Three other run in the middle of the belly at 48.5, 51.5, and 55.5 cm. (Pl. 23).

97. A 681 (Θ6/A1). Solokha II

MaxPrHt	73.5	HHt	23.9
BD	32.2	HWthT	04.3
		HWthS	04.3
		HTh	02.7
		TD	06.7
		THt	07.0

Incomplete amphora. Upper part of neck and rim are missing. One handle is broken, only the stump remains at the lower attachment. Narrow and rounded shoulder. (Pl. 23)

98. A 740 (Θ6/A1). Solokha II

MaxPrHt	72.9	HHt	23.3
BD	32.0	HWthT	04.5
RD	11.5	HWthS	04.2
RHt	01.6	HTh	02.7
RTh	01.3	TD	06.4
NHt	20.8	THt	06.9
NMmD	10.3		

Complete amphora. Fairly well cleaned from concretion. One handle was broken and has been repaired. Thick rim. Narrow and rounded shoulder. Black patches appear on the belly. Three incised grooves run around the body at 33.8, 35.8, 46.8 cm. Munsell: 5YR 5/3 reddish brown from the surface, 10R 6/4 pale red from a break. (Pl. 23)

99. A 742 (Θ6/A2). Solokha II

MaxPrHt	73.7	HHt	23.4
BD	32.8	HWthT	04.4
RD	11.2	HWthS	04.0
RHt	01.1	HTh	02.5
RTh	01.3	TD	06.3
NHt	21.6	THt	06.9
NMmD	10.0		

Incomplete amphora. A small piece missing from the rim and a larger one from the belly, but it does not affect the dimension measurements. Thin rim. Narrow and rounded shoulder. Incised groove runs around neck at 17.4 cm. Well defined beveled toe base. (Pl. 24)

100. A 743 (Θ6/A2). Solokha II

MaxPrHt	74.1	HHt	24.5
BD	31.5	HWthT	04.6
RD	11.4	HWthS	04.3
RHt	01.4	HTh	02.4
RTh	01.2	TD	06.5
NHt	23.2	THt	06.7
NMmD	09.9		

Complete amphora. Repaired from broken pieces. Thick rim. Wide and angular shoulder. Incised groove right below rim at 2.9 cm. Three other incised grooves appear on the body, the first runs around the upper part of the shoulder at 24.2 cm; the second around the upper part of the belly at 36.7 cm, and the third around the lower part of the belly at 59.0 cm. (Pl. 24 and 38)

101. A 744 (Θ6/A2). Solokha II

MaxPrHt	73.9	HHt	24.5
BD	32.7	HWthT	04.2
RD	11.5	HWthS	04.2
RHt	01.4	HTh	02.7
RTh	01.5	TD	06.6
NHt	20.7	THt	08.4
NMmD	10.4		

Complete amphora. Body covered with thin layer of concretion. Black patches around the body. Thick rim. Long handles. Narrow and rounded shoulder. Incised grooves run beneath the maximum diameter of the body at 32.6 and 35.4 cm. (Pl. 24)

102. A 745 (Θ6/A2). Solokha II

MaxPrHt	74.3	HHt	23.8
BD	30.5	HWthT	04.5
RD	11.6	HWthS	04.1
RHt	01.3	HTh	02.4
RTh	01.2	TD	06.7
NHt	22.7	THt	07.2
NMmD	10.4		

Complete amphora. A lump of concretion remains on the rim and one of the handles. Thin rim. Wide neck base and narrow sloping shoulder. (Pl. 24)

103. A 746 (Θ6/A2). Solokha II

MaxPrHt	48.6	TD	06.7
BD	32.8	THt	08.0

Incomplete amphora. Upper body (rim, neck, handles and shoulder) broken and missing. Black patches appear on the upper belly. Maximum preserved height is taken from the highest point. Incised grooves run around the body at 9.0, 14.5, 17.2, 17.9 and 32.8 cm. Very characteristic toe, short and stocky, with a narrow ridge of 0.7 cm; it bevels on the underside. (Pl. 25)

104. A 755 (Θ6/A2). Solokha II

MaxPrHt	75.9	HHt	23.9
BD	31.4	HWthT	04.8
RD	11.9	HWthS	04.3
RHt	01.5	HTh	02.9
RTh	01.3	TD	06.8
NHt	20.1	THt	06.4
NMmD	10.3		

Complete amphora. Body covered with thin layer of concretion. A lump remains on the handle. A small hole appears on the shoulder. Thick rim. Wide neck base and narrow sloping shoulder. Two incised grooves run intermittently around the body at 32.9, and 36.0 cm. Only one thump impression on one of the handles. (Pl. 25)

105. A 758 (Θ6/A2). Solokha II

MaxPrHt	78.0	HHt	24.4
BD	33.4	HWthT	04.7
RD	11.6	HWthS	04.4
RHt	01.5	HTh	02.9
RTh	01.4	TD	07.1
NHt	21.5	THt	05.5
NMmD	10.0		

Complete amphora: Body covered with concretion. Thick rim. Wide neck base and sloping shoulder. Incised grooves run around the body at 39.5 and 56.1 cm. Small hole on the lower belly. (Pl. 25)

106. A 766 (Θ6/A2). Solokha II

MaxPrHt	73.5	HHt	22.7
BD	30.2	HWthT	04.6
RD	11.5	HWthS	04.4
RHt	01.1	HTh	02.9
RTh	01.1	TD	06.5
NHt	21.4	THt	07.7
NMmD	10.3		

Complete amphora. Poorly preserved fabric. Body covered with concretion. Assembled from several pieces. Black patches appear on shoulder and upper belly. Thin rim. It has a narrow neck base and wider shoulder. (Pl. 25)

107. A 773 (Θ6/A2). Solokha II

MaxPrHt	76.7	HHt	23.1
BD	32.9	HWthT	04.5
RD	12.4	HWthS	04.4
RHt	01.4	HTh	02.7
RTh	01.5	TD	06.5
NHt	23.4	THt	07.1
NMmD	10.9		

Complete amphora. Poorly preserved fabric. Body covered with concretion. Small piece is missing from the rim. There is a hole on the shoulder. Also fresh breaks appear on the toe. Thick rim. Wide neck base and narrow sloping shoulder. Incised groove runs around the neck at 17.1 cm. (Pl. 26)

108. A 774 (Θ6/A2). Solokha II

MaxPrHt	75.7	HHt	24.1
BD	32.5	HWthT	04.9
RD	12.0	HWthS	04.6
RHt	01.6	HTh	02.9
RTh	01.5		
NHt	23.0		

Incomplete amphora. Poorly preserved. Lumps of concretion on the body. Part of the rim, neck and one handle is broken. Thick rim. Wide neck base and narrow sloping shoulder. (Pl. 26)

109. A 977 (Θ5/A2). Solokha II

MaxPrHt	71.9	HHt	23.7
BD	32.2	HWthT	04.4
RD	12.3	HWthS	04.6
RHt	01.8	HTh	02.9
RTh	01.5	TD	06.6
NHt	22.9	THt	07.0
NMmD	10.5		

Complete amphora. Body covered with concretion. Thick rim. Wide neck base turns into a steep sloping shoulder. (Pl. 26)

110. A 978 (Θ5/A2). Solokha II

No measurements taken on this vessel. It is included as is one of the most characteristic examples with a deep incised groove running around its neck, similar to No. 133. (Pl. 26)

111. A 980 (Θ5/A2). Solokha II

MaxPrHt	74.7	HHt	23.4
BD	32.8	HWthT	04.5
RD	11.7	HWthS	04.4
RHt	01.4	HTh	02.6
RTh	01.3	TD	06.5
NHt	22.0	THt	06.5
NMmD	10.5		

Complete amphora: Poorly preserved fabric, covered with concretion. Black patches appear on the shoulder and the lower belly. Thick rim. Wide neck base turns into the steep sloping shoulder. (Pl. 27)

112. A 986 (Θ5/A2). Solokha II

MaxPrHt	76.4	HHt	23.9
BD	32.1	HWthT	04.7
RD	12.1	HWthS	04.3
RHt	01.8	HTh	02.8
RTh	01.3	TD	06.9
NHt	22.3	THt	06.9
NMmD	09.7		

Complete amphora. Poorly preserved vessel. Body covered with concretion. Several breaks on the shoulder and a hole and at the lower belly. The toe has been repaired. Thick rim. It has a wide neck base, but the shoulder is wider and more rounded. (Pl. 27)

113. A 987 (Θ5/A2). Solokha II

MaxPrHt	74.3	HHt	22.9
BD	32.3	HWthT	04.2
RD	10.9	HWthS	03.6
RHt	01.4	HTh	02.5
RTh	01.2	TD	07.2
NHt	22.2	THt	07.4
NMmD	10.6		

Complete amphora. Body covered with concretion; fabric poorly preserved. Small piece is missing from the rim, the neck and the toe. Thick rim. Wide neck base. The shoulder is wider and more rounded. (Pl. 27)

114. A 989 (Θ5/A2). Solokha II

MaxPrHt	78.3	HHt	25.1
BD	33.2	HWthT	04.7
RHt	01.7	HWthS	04.3
RTh	01.2	HTh	02.8
NHt	23.6	TD	06.5
		THt	06.9

Incomplete amphora. Body fairly well cleaned from concretion. Small back patch on the shoulder. Several blows appear on the body. Almost all of the rim, part of the neck and one handle are broken. Wide neck base. Narrow and steep sloping shoulder. (Pl. 27)

115. A 990 (Θ5/A2). Solokha II

MaxPrHt	73.3	HHt	24.2
BD	32.6	HWthT	04.6
RD	12.1	HWthS	04.3
RHt	01.5	HTh	02.7
RTh	01.4	TD	06.7
NHt	21.6	THt	06.0
NMmD	10.8		

Complete amphora: Body covered with concretion. Medium size hole on the upper belly and a crack on the body. Incised groove runs around belly at 37.8 cm. Thick rim. Wide neck base, and narrow inclining shoulder. (Pl. 28)

116. A 997 (Θ3/A1). Solokha II

MaxPrHt	76.7	HHt	25.2
BD	30.4	HWthT	04.6
RD	11.2	HWthS	04.1
RHt	01.4	HTh	02.2
RTh	01.3	TD	05.8
NHt	23.4	THt	07.8
NMmD	10.2		

Complete amphora. Body covered with concretion and black patches. Repaired from several pieces. Small hole on the belly. Thick rim. Wide neck base, and narrow sloping shoulder. (Pl. 28)

117. A 999 (Θ5/A3). Solokha II

MaxPrHt	61.8	TD	06.8
BD	32.2	THt	06.6

Incomplete amphora. Very poorly preserved. Assembled from several pieces. The rim, neck and both handles are broken. Only the stumps of the lower attachments remain in place. A large strip of gauze has been applied externally to keep the vessel in one piece. (Pl. 28)

118. A 1003 (Θ5/A3). Solokha II

MaxPrHt	74.8	HHt	24.7
BD	33.2	HWthT	04.4
RD	11.5	HWthS	04.1
RHt	01.5	HTh	02.9
RTh	01.4	TD	07.0
NHt	23.3	THt	06.7
NMmD	09.5		

Complete amphora. Body covered with concretion. Small piece missing from the rim. A number of cracks appear on the rim and the neck. Thick rim. Wide neck base and narrow sloping shoulder. (Pl. 28)

119. A 1009 (Θ5/A3). Solokha II

MaxPrHt	72.6	HHt	24.1
BD	32.4	HWthT	04.0
RHt	01.3	HWthS	04.0
RTh	01.5	HTh	02.7
NHt	23.4	TD	06.7
		THt	06.1

Incomplete amphora. Covered with concretion. Part of the rim, a piece of the neck and one handle are broken.. Thin rim. A narrow neck base flares to a wide and flat shoulder. (Pl. 29)

120. A 1016. Solokha II

MaxPrHt	74.8	HHt	23.9
BD	32.5	HWthT	04.1
RD	12.2	HWthS	04.2
RHt	01.5	HTh	02.9
RTh	01.3	TD	06.2
NHt	22.2	THt	06.2
NMmD	10.3		

Complete amphora. Body covered with concretion. Several old blows and black patches appear on the body. One of the handles is chipped off. Thick rim. Wide neck base gives into a narrow and steep sloping shoulder. No available information on the excavation square. (Pl. 29)

121. B3 (Θ6/B). Solokha II

MaxPrHt	75.4	HHt	22.4
BD	31.1	HWthT	04.6
RD	10.1	HWthS	04.0
RHt	01.1	HTh	02.3
RTh	01.1	TD	06.4
NHt	22.4	THt	07.4
NMmD	10.0		

Incomplete amphora. Body fairly well cleaned from encrustation. The greater part of the rim and the upper part of the neck is missing. Incised groove runs around the neck at 19.9 cm and two incised grooves run around the belly at 39.6 and 58.9 cm. Thin rim. Narrow neck base and very characteristic flat and wide shoulder. (Pl. 29)

122. B 4 (Θ6/B). Solokha II

MaxPrHt	75.8	HHt	23.2
BD	31.9	HWthT	04.7
RD	11.0	HWthS	04.6
RHt	01.2	HTh	02.6
RTh	01.2	TD	06.7
NHt	22.2	THt	07.9
NMmD	10.0		

Complete amphora. Well-preserved vessel. One of the handles has been repaired. Thin rim. It has a narrow neck base with wide sloping shoulder. Incised groove runs around the shoulder at 24.3 cm (the same area where the handles are attached) Munsell: 5YR 6/2 pinkish gray from a preserved surface on the belly, and 2.5 YR 6/4 light reddish brown from a break on the neck. (Pls. 29 and 38)

123. B 6 (Θ6/B). Solokha II

MaxPrHt	75.4	HHt	24.1
BD	32.3	HWthT	03.9
RD	12.4	HWthS	03.9
RHt	01.5	HTh	02.6
RTh	01.3	TD	06.1
NHt	21.7	THt	07.2
NMmD	09.0		

Incomplete amphora. Well-preserved. Large piece missing from the rim. Thick rim. Wide neck base and steep sloping shoulder. Incised groove runs around the lower belly at 62.9 cm (Pl. 30)

124. B 7 (Θ6/B). Solokha II

MaxPrHt	67.1	HHt	24.1
BD	30.7	HWthT	04.8
RHt	01.3	HWthS	04.4
RTh	01.2	HTh	02.6
NHt	22.9		
NMmD	09.7		

Incomplete amphora. Not very well-preserved. The fabric looks like it has been 'peeled off' in many spots. Part of the rim and neck are broken and missing. The toe is missing. (no photograph)

125. B 8 (Θ6/B). Solokha II

MaxPrHt	74.8	HHt	24.2
BD	30.8	HWthT	04.4
RD	11.2	HWthS	04.3
RHt	01.1	HTh	02.5
RTh	01.2	TD	06.4
NHt	22.3	THt	06.2
NMmD	09.6		

Incomplete amphora. A piece is missing from the rim, but other than that it is a very well-preserved vessel. Thin rim. The neck shaft tapers to a wide base; the latter turns into the narrow sloping shoulder. Two incised grooves run around the neck at 19.5 and around the belly at 35.1 cm. Distinctive incised groove encircles the round impression on the underside of the toe. (Pl. 30)

126. B 9 (Θ6/B). Solokha II

MaxPrHt	74.9	HHt	22.7
BD	30.6	HWthT	04.6
RD	12.0	HWthS	03.8
RHt	01.1	HTh	02.4
RTh	01.1	TD	06.9
NHt	22.4	THt	07.8
NMmD	09.7		

Complete amphora. One of the most well-preserved jars of the group. Probably it was totally buried in the sand and not exposed to the currents as the ones on top of it. It has no break to take a Munsell reading. Thin rim, contracted where the handles attach to the neck. Wide neck base with steep sloping shoulder. Incised groove runs around the neck at 18.2 cm. Munsell: 5YR 6/4 light reddish brown from a preserved surface on the shoulder. (Pls. 30 and 38)

127. B 10 (Θ6/B). Solokha II

MaxPrHt	75.4	HHt	24.6
BD	30.8	HWthT	04.5
RHt	01.3	HWthS	04.2
RTh	01.3	HTh	02.5
NHt	24.0	TD	06.6
		THt	07.5

Incomplete amphora. Extremely fragmented, assembled together from many smaller pieces. The greater part of the rim and the upper part of the neck are missing. One handle is broken and missing. Thin rim, possibly worn out, with wide neck base turning into a steep sloping shoulder. (Pl. 30)

128. B 11 (Θ6/B). Solokha II

MaxPrHt	75.7	HHt	24.3
BD	32.2	HWthT	04.6
RD	11.4	HWthS	04.5
RHt	01.8	HTh	02.5
RTh	01.4	TD	06.5
NHt	22.5	THt	07.4
NMmD	10.1		

Incomplete amphora. Body fairly well cleaned from the concretion. There is a round black patch in the middle of the belly. Small piece broken from the rim and a large one from the middle of the belly, but all dimensions were taken accurately. (Pl. 31)

129. B 12 (Θ5/Γ). Solokha II

MaxPrHt	76.1	HHt	24.5
BD	33.4	HWthT	04.6
RHt	01.5	HWthS	04.4
RTh	01.2	HTh	02.6
NHt	21.7	TD	06.4
NMmD	10.1	THt	06.7

Incomplete amphora. Body fairly well cleaned from concretion. The greater part of the rim, part of the upper neck, one handle, a large piece from the middle of the belly and another smaller below the preserved handles are broken and missing. Incised groove runs around the body beneath the shoulder. Thick rim. Wide neck base and rounded sloping shoulder. Munsell: 2.5YR 5/6 red from a preserved surface, and 10R 6/6 light red from a break on the handle. The thickness of the walls of the belly was measured, ranging from 0.75 cm to 1.15 cm. (Pl. 31)

130. B 20 (Θ6/B). Solokha II

MaxPrHt	74.0	HHt	22.6
BD	30.7	HWthT	04.4
RD	11.6	HWthS	04.1
RHt	01.2	HTh	02.2
RTh	01.3	TD	06.4
NHt	20.7	THt	08.3
NMmD	10.3		

Complete amphora. Well-preserved, but not so very well cleaned from concretion. Black spots appear on the body. Oval shaped, contracted and thin rim. The neck has a wide base, and the shoulder is wider and rounder that usually; it has a prominent convex profile. Two incised grooves run intermittently around the body at 32 and 38.6 cm. Another incised groove runs around the top of the toe. (Pls. 31 and 39)

131. B 23 (Θ6/B). Solokha II

MaxPrHt	73.4	HHt	24.5
BD	33.5	HWthT	04.7
		HWthS	04.4
		HTh	02.8
		TD	06.4
		THt	07.7

Incomplete amphora. Body fairly well cleaned. There are patches of thin layer of concretion and black spots on the body. The rim, part of the upper neck and one handle are broken and missing. The neck has a wide base, and the shoulder is wider and rounder that usually; it has a prominent convex profile. (Pl. 31)

132. B 24 (Θ6/B). Solokha II

MaxPrHt	75.0	HHt	23.2
BD	31.6	HWthT	04.7
RD	11.6	HWthS	04.2
RHt	01.7	HTh	02.6
RTh	01.3	TD	06.4
NHt	21.0	THt	06.2
NMmD	09.8		

Complete amphora. Well-preserved vessel. Body is covered with a thin layer of concretion. Black patches appear on the shoulder and lower belly. There are blows and cracks on the handle, the belly and the toe. Small hole on the shoulder. Thick rim. A wide neck base turns into a steep sloping and convex shoulder. Incised groove runs around the base of the toe at 1.00 cm. (Pl. 32)

133. B 25 (Θ6/B). Solokha II

MaxPrHt	74.3	HHt	23.7
BD	32.2	HWthT	04.6
RD	11.9	HWthS	04.4
RHt	01.2	HTh	02.9
RTh	01.4	TD	06.1
NHt	21.7	THt	05.7
NMmD	10.4		

Complete amphora. The vessel is in fair condition. The whole body is covered with black patches. Small piece chipped of from the base of the toe. Thin rim. A wide neck base turns into a fairly wide and flatter shoulder. A prominent incised groove runs around the neck at 10.7cm. (Pl. 32)

134. B 28 (Θ6/B). Solokha II

MaxPrHt	73.0	HHt	23.1
BD	32.7	HWthT	04.0
RHt	01.4	HWthS	03.9
RTh	01.3	HTh	02.7
NHt	23.6	TD	06.7
NMmD	10.2	THt	06.9

Incomplete amphora. Body covered with concretion. Part of the rim and upper neck are broken and missing. Thick rim. A wide neck base turns into the steep sloping and convex shoulder. (Pl. 32)

135. B 31 (Θ6/B). Solokha II

MaxPrHt	75.3	HHt	23.8
BD	33.3	HWthT	04.5
RD	11.8	HWthS	04.2
RHt	01.5	HTh	02.7
RTh	01.4	TD	06.7
NHt	22.0	THt	07.3
NMmD	09.8		

Complete amphora. Thick rim. (no photograph)

136. B 36 (Θ6/B). Solokha II

MaxPrHt	73.6	HHt	22.7
BD	32.4	HWthT	04.4
RD	12.4	HWthS	04.5
RHt	01.4	HTh	02.9
RTh	01.5	TD	06.6
NHt	20.8	THt	07.0
NMmD	10.5		

Complete amphora. Body covered with concretion and black patches appear around the shoulder and the belly. Thick rim. A wide neck base turns into a steep sloping and convex shoulder. One of the handles has an uneven, off centered, thump impression (Pl. 32)

137. B 38 (Θ6/B). Solokha II

MaxPrHt	77.3	HHt	24.2
BD	33.0	HWthT	04.4
RD	11.7	HWthS	04.2
RHt	01.5	HTh	02.5
RTh	01.1	TD	06.7
NHt	23.2	THt	06.8
NMmD	10.4		

Complete amphora. Well-preserved. Small hole on the body; looks like it has been pierced from a thin object, e.g. a nail. A number of cracks appear on the belly and the toe. Thick rim. A wide neck base turns into a steep sloping and convex shoulder. (Pl. 33)

138. B 40 (Θ6/B and Θ5). Solokha II

MaxPrHt	76.3	HHt	24.5
BD	33.0	HWthT	04.9
RD	11.7	HWthS	04.4
RHt	01.7	HTh	02.6
RTh	01.4	TD	06.2
NHt	23.3	THt	05.9
NMmD	10.2		

Complete amphora. Fairly well cleaned, but still covered with concretion. A number of blows and cracks appear on it. Toe is chipped off. Distinctive thick rim; slightly chipped on one side. Wide neck base and sloping shoulder. (Pl. 33)

139. B 63 (Θ5/B). Solokha II

MaxPrHt	73.7	HHt	24.1
BD	32.7	HWthT	04.5
RD	12.1	HWthS	04.1
RHt	01.4	HTh	02.8
RTh	01.6	TD	06.8
NHt	22.7	THt	07.4
NMmD	11.0		

Complete amphora. Thin layer of concretion encircles the body. Black marks appear on the lower belly. Small hole on the shoulder. Small pieces are chipped off from the toe. Thick rim. A wide neck base turns into a steep sloping shoulder. Incised groove runs around the neck at 15.7 cm, and another one runs intermittently around the belly at 44.0 cm. (Pls. 33 and 39)

140. В 65 (Θ5/В). Solokha II

MaxPrHt	72.8	HHt	24.4
BD	32.9	HWthT	04.4
		HWthS	04.2
		HTh	02.8
		TD	06.4
		THt	06.9

Incomplete amphora. Body covered with a thin layer of concretion. Black patches appear around its body. The rim, upper part of the neck and one handle are broken and missing. A wide neck turns into a steep sloping shoulder. (Pl. 33)

141. Г 61 (Θ5/Г). Solokha II

MaxPrHt	72.9	HHt	23.7
BD	31.9	HWthT	04.5
RD	12.0	HWthS	04.3
RHt	01.6	HTh	02.9
RTh	01.2	TD	06.2
NHt	21.0	THt	05.2
NMmD	10.9		

Complete amphora. Well-preserved. Some parts are covered with concretion, but the fabric is in a good condition. Black spots appear on the neck and the body. Small pieces are chipped off from the rim. Thick rim. A wide neck base turns into a steep sloping shoulder. (Pl. 34)

142. Г 64 (Θ5/Г). Solokha II

MaxPrHt	73.0	HHt	24.5
BD	32.4	HWthT	04.0
NMmD	10.0	HWthS	03.8
		HTh	02.4
		TD	06.3
		THt	07.1

Incomplete amphora. Part of the body is covered with concretion. The rim, upper neck and one handle are broken and missing. Small blow on the shoulder. The neck base is narrow and the shoulder wider than usually, with a steep slope towards the belly. (Pl. 34)

Miscellaneous Amphoras

Among the Mendaian and the Solokha II amphoras recovered to date, they were also found seven other amphoras. They are presented here with a preliminary identification. Four of them (Nos. 146, 147, 148, 149) were found in the same excavation square, Θ6, along with Solokha II and Mendaian amphoras, and two were recovered from the periphery of the site (Nos. 143, 144).[230]

143. BE 91/16-1 (13-10-91). (Pl. 35 and 39)
Chian straight-sided neck type, dated ca. 425-400.

MaxPrHt	63.9	HHt	17.4
BD	29.6	HWthT	04.3
RD	11.4	HWthS	03.8
RHt	01.4	HTh	02.5
RTh	01.4	TD	06.3
NHt	15.1	THt	03.5
NMmD	10.7		

Complete amphora. Recovered from the periphery of the wreck site during the underwater survey of the Alonnesos shipwreck in 1991.

It is very well cleaned, but in poor condition. One handle, part of the shoulder, and lower belly have been restored. There is a 'dent' on the upper belly. A wide crack, as though the clay burst open, appears on the lower belly; the overall shape of the body is deformed. The toe has a crack and is bent off the vertical axis, possibly a mishap during firing. The degree of such deformity raises questions about the usefulness of this jar. If the crack on the lower belly happened during foundering, then the jar might have been used for liquids regardless of its deformed toe.

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[230] It remains unknown how many more amphoras of different types are represent in the cargo.

The rim is thick and rounded outwards. Two straight handles oval in cross-section attach just below the rim. Their upper attachment compresses the sides of the neck to a slightly oval shape. They arch upward at the top, and the sides (shafts) follow the line of the neck downwards to the shoulder. The clay is smeared over the shoulder to reinforce the lower attachment of the handles. The sloping shoulder, nicely rounded, meets with the upper body at the maximum diameter. The pear-shaped belly ends on a flaring toe. A distinct concave curve separates the belly from the peculiar short and wide toe, which has a circular base like a knob with a beveled edge on the underside. Five incised grooves were measured running around its belly (measuring from the top) at 29.6, 38.8, 40.3, 49.4, and 50.5 cm.[231] The fabric is fine-grained, with red color (10R 5/6) from a preserved surface; the same reading was taken at a fresh break on the belly.

This vessel exhibits features characteristic of the Chian type with straight-sided neck dated to the last decades of the 5th century. The form resembles, though not precisely, the ones found at the Athenian Agora dated after 425. A distinct difference is that the upper body is rounded at the turn of the shoulder and not as angular as the familiar examples presented in previous studies. Also, the toe is somewhat different; it looks like a short knob with a wide diameter. The only other example, to my knowledge, that matches this particular toe is illustrated in Brashinsky.[232] Could this be another

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[231] The grooves are not incised on the same horizontal level, and their position varies (tilts). The drawing of No. 143 (Pl. 39) illustrates the grooves on the belly where they are mostly horizontal.

[232] Brashinsky, *Methods for the Study of Ancient Trade*, Table IX, no. 2 (Chian 5th - 4th c. B.C.): the toe looks very similar to ours. The handles, however, seem to form a narrower arch at the top and are set closer (somewhat tilted) towards the upper part of the neck.

example of a Chian straight necked jar with a slight variation in its upper body?[233] Judging from its straight neck, which flares at a lower point closer to the sloping shoulder, it does not seem to belong to the 'transitional' stage described by Lawall.[234]

144. BE 91/16-3 (13-10-91). (Pls. 35 and 39)
Thasian, biconical type, dated to the late 5th century.

MaxPrHt	68.1	HHt	20.9
BD	29.6	HWthT	04.4
RD	12.6	HWthS	04.4
RHt	01.7	HTh	02.5
RTh	01.8	TD	06.7
NHt	18.8	THt	10.5
NMmD	09.2		

Complete amphora. Recovered from the periphery of the wreck site during the underwater survey of the Alonnesos shipwreck in 1991.

The conservators cleaned it very well. A large piece of the area between shoulder and belly is missing. The wedge-shaped rim flares outwards and has an incised groove around its base. The handles attach just below the rim and are oval in cross-section. Arching at the top, their sides are vertical, and attach on top and close to the outer edges of the steeply sloping shoulder, right above the maximum diameter of the body. The

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[233] Lawall, "Transport Amphoras and Trademarks," 89, 91-94 and Figs. 22, 33, 35 and 36. Figures 22 (SS 1839 in R 13:4) and 35 (P 2372 in R 13:4) have sloping shoulders, but angular upper body and possibly more elongated body than No. 143. However, in his Fig. 36, the shape of the handles and the transition from neck to shoulder are closely similar to our example. Also, in his Fig. 32, the toe seems to be smaller in size and diameter. On the amphora SS 1839, see Grace, "Stamped Amphora Handles Found in 1931-1932," *Hesperia* 3 (1934): 296, 303-4. For another illustration of the amphora P 2372 and its price graffito of seven staters, see Lawall, "Graffiti, Wine Selling, and the Reuse of Amphoras," *Hesperia* 69, no. 1 (2000): 31, 66, and Fig. 15. For variations of Chian amphora feet, see J. K. Anderson, "Excavations on the Kofina Ridge, Chios," *BSA* 49 (1954): 168-9, 175, 181.

[234] The preliminary examination of No. 143 predated Lawall's notes for close attention to the details of the rim of a transitional form between his variant C/3 and the straight-neck. Thus, the author did not note whether the rim is 'thickened inwards', a detail that might be significant for its classification, if it is indeed a Chian straight-neck type.

lower attachment of the handles is reinforced by smearing the clay on the shoulder, and bears a thumb impression. The flaring neck smoothly gives into the sloping shoulder to meet the upper belly at a sharp angle. From there, the body tapers conically, ending in a tall stem toe. The base of the toe flares into a circular base with a depression on the underside. The fabric is fine-grained, well-fired, light red in color (10R 6/6) from a preserved surface on the shoulder; the same reading was taken from a fresh break on the rim.

This amphora bears the distinct traits of the Thasian biconical type dated to the end of the 5th century.[235] Four examples are presented in Grace, who calls them αμφορείδια (small amphoras), of which the first one, which was found in Cyprus, dates to 410 based on the eponym stamp on it. In comparing these four examples, she notes the general tendency for elongated and angular (at the shoulder) styles in the late fifth and early fourth centuries seems, which seem to apply to the Thasian vessels as well.[236] No. 144 compares closely to Grace's first example, but not precisely. The handles, in our case, do not have a pronounced upward arch and they attach on top a wider shoulder. The

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[235] For an illuminating description of the different Thasian forms found in the Athenian Agora, including the biconical type, see Lawall, "Transport Amphoras and Trademarks," 129-143. He reports one complete jar (P 4752) found in deposit G 12:21 closed ca. 400, but no illustration is provided. It would be helpful to compare it with No. 144 in the hope that we can extract more imformation about these early biconical forms.

[236] Grace, "Part III: Stamped Wine Jar Fragments," in "Small Objects from the Pnyx: II," *Hesperia Supplement* 10 (1956): 122-124 and Pl. 60 nos. 1-4. The first example, no. 1, is at the National Museum of Palestine in Tel Aviv. Its diameter, at 0.26 m, is smaller than No. 144, as is the case with the other three. Its capacity is reported at about 10,250 cc. The aforementioned biconical amphora from Cyprus (no. 1), along with five more, are illustrated in A.-M. Bon and A. Bon, *Les Timbres Amphoriques de Thasos*, 17, Fig. 3 no. 5, where a rare detail on this amphora is noted: '...the lower extremity of the handle finishes in a slight protrusion (pointing outwards) on the belly, instead of softly diminishing in a continuous curved line.'

transition between the shoulder and the upper belly is convex, and is not as steep and angular as her example, whose handles rest at the very edge of the shoulder. In addition, the stem toe stands out from the belly, extending below a smooth concave curve. Its base looks heavier (stocky), has a wider flare, and a larger diameter with a narrower and inconspicuous beveled edge on the underside. The other three Chian amphoras presented in Grace, as well as the one illustrated in Grandjean, have pronounced angular shoulders and their toe has become one with the body, to form a true biconical body shape.[237] Thus, our example should date from around 410 or somewhat before that date.

145. A 1051 (Pl. 40)
Unidentified, North Greek? (small size amphora?)
Recovered from column Θ, no available information from which square.

Fragmentary piece. Conical form. Two thirds of the lower part of the body is preserved, tapering on a tall stem toe. From what remains from the shoulder, it stands out in angular shape, probably coinciding with the maximum diameter of the body.

This amphora, based on the characteristics of its lower body and toe, can be compared to the North Greek examples, including those from Mende, and possibly not excluding Thasos, as it is reminiscent of the biconical type. Its diameter, however, seems to be much wider than the biconical type.

To my knowledge, Kantzia reports the only other illustration comparable to No. 145: the lower part of the body (with part of the shoulder) and the stem toe, which was discovered

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[237] Y. Grandjean, "Contribution à l'Établissement d'une Typologie des Amphores Thasiennes," *BCH* 116 (1992): 557, Fig. 7, no. 47. The deposit in which it was found is dated ca. 325.

among the debris of a pottery workshop in the city of Kos-Meropis. It is classified as Koan III type. We are informed that this type is represented by two sizes; the smaller one could have been a *hemiamphorion* (a half-size jar).[238] Early on, Grace expressed the same possibility for the Thasian type where reconstruction of the sequence of the shapes might prove difficult because "there were not only various types of vessels but also full-size and fractional vessels of the same type."[239] Dating is not possible at this time on any firm basis; I suggest by inference from the other amphoras and its elongated style, a date close to the end of the 5th century.

146. B 47 (Pl. 40)
Corinthian B/Corcyraean, dated to second half of 5th century.[240]
Fragmentary piece: it was found in square Θ6 during the 1992 excavation season.

The style of this amphora is unique in comparison to the others we have examined so far. The fragment looks very old and is covered with concretion. What remains is the lower part of the body from an amphora, with a very characteristic ovoid bottom. The toe protrudes out in the shape of a medium-size conical cap with a shallow depression on the underside. The fabric color is light brown (7.5YR 6/4) from a preserved surface on the belly, and pink (7.5YR 7/4) from a fresh break on the bottom of the belly.

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[238] Kantzia, "A Ceramic Amphora Workshop," in *Third Scientific Meeting on Hellenistic Ceramics*, 337-8, note 58, Fig. 5, second row, fragmentary amphora in the middle. On *hemiamphorion* and *hemikadia* (half-jars), see Grace, "Samian Amphoras," *Hesperia* 40 (1971): 82, and her bibliographic references on the origin and use of the word *kados* (container-jar).

[239] Grace, "Part III: Stamped Wine Jar Fragments," *Hesperia Supplement* 10 (1956): 124.

[240] For a brief mention of the Corinthian amphora, see Hadjidaki, "Underwater Excavations," *BCH* 120, II (1996): 571.

Although the upper part of its body is missing, the unique features of the shape of its lower body and the cap toe identify this piece as belonging to the Corinthian B/Corcyraean type. This type has been studied in particular by Koehler in her dissertation dedicated exclusively to Corinthian transport amphoras. Initially, Grace argued an origin in favor of Corfu, or Corcyra, (Corinth's colony), but further studies, including petrographic analyses including examples from both places and the discovery of production sites on Corcyra, suggest that this type may have been produced by both cities.[241]

Based on the sequence proposed by Koehler, where "changes in shape for Corinthian B lead steadily toward a longer, narrower body which tapers increasingly in the lower half," the shape of No. 146 fits well the description of an "ovoid body with a narrow lower part." In addition, this fragment does not seem to be a full-size jar, like the large ovoid earlier examples, but rather has small proportions, possibly of a fractional jar. Also, it matches one of the three variants, B/3, presented by Lawall as having "a narrower body...widening slightly from the shoulder, but then tapering continuously to the toe." So, its shape corresponds to the examples dated to the last decade of the 5th century.[242] The closest parallel to No. 146 seems to be one presented in Koehler and another one in Isserlin et al., with the

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[241] On the suggestion of Corcyraean origin, see Grace, "Wine Jars," in "Pottery of the Mid-Fifth Century from a Well in the Athenian Agora," *Hesperia* 22, no. 2 (1953): 108-9, no. 166, this find looks similar in shape to No. 146; on the first comprehensive study of the Corinthian types and references to sites, on land and underwater, where Corinthian B were found, see Koehler, "Corinthian A and B Transport Amphoras" (Ph.D. diss, Princeton University, Princeton, 1979). On an fresh overview of the Corinthian types, including B, and a summary on the 'lengthier debate in studies of ceramic provenience', see Lawall, "Transport Amphoras and Trademarks," 68-80.

[242] Koehler, "Corinthian A and B Transport Amphoras," 36; Lawall, "Transport Amphoras and Trademarks," 70-71, and Fig. 18: the illustration of his examples from deposit B 13:5 ca. 400, is similar, but somewhat rounded and shorter, than No. 146.

narrow, and ovoid-shaped lower half and the tall conical cap toe. Interesting is the coincidence that a contemporary Corinthian B/Corcyraean and a Mendaian were found in Motya (Sicily) and in the cargo of the Alonnesos shipwreck. [243]

147. B 49 (Pls. 35 and 40)
Unidentified, (early Thasian?, last quarter of 5th century)

MaxPrHt	55.8	HHt	16.1
BD	29.7	HWthT	03.5
RD	09.9	HWthS	03.4
RHt	01.4	HTh	02.2
RTh	01.4	TD	05.9
NHt	15.3	THt	07.4
NMmD	07.7		

Complete amphora. It was found in square Θ6 during the 1992 excavation season.

This is a small-sized amphora. It has survived in an excellent condition and was cleaned thoroughly by the conservators. It is a very interesting and puzzling find in regards to its form and type. The wedge-shaped rim flares outwards and has an incised groove around its base. The handles attach just below the incised groove, arch slightly on the top and descend vertically to the middle of a wide sloping shoulder. They are oval in cross-section with smeared clay at the lower attachment. The neck flares downwards. The shoulder smoothly follows a round curve to meet the upper belly at the maximum

[243] Koehler, "Corinthian A and B Transport Amphoras," Pl. 30, no. 233. This fragmentary amphora looks very close to No. 146. Also, take note of the narrow line of the lower body and the medium-sized cap toe in B. S. J. Isserlin, E. Macnamara, J. N. Goldstream, G. Pike, J. du Plat Taylor, and A. M. Snodgrass, "Motya, A Phoenician-Punic Site near Marsala, Sicily," *Annual of the Leeds University Oriental Society* 4 (1965): 125, Fig. 13, no. 8. The authors report the remains of necks and toes that were found in a robber pit dated initially to the 4th century (Phase IV), but the date was revised later to the end of the 5th century. In regards to the earlier dating see two references to communications with J. du Plat Taylor: a) Koehler, "Corinthian A and B Transport Amphoras," 45-46 notes 6 and 10, reports that Taylor found similar jars to her nrs. 232-235 dated to the 5th century at Motya, and b) Eiseman and Ridgway, *The Porticello Shipwreck*, 40 note 3, report on the revision of Motya's chronology, of interest to them because the neck and the foot of a Mendaian amphora were also found in the same robber pit.

diameter. The body tapers to a narrow conical shape, below which is a flaring stem toe. The latter consists of a short shaft and a circular base with beveled outer surface and a depression on the underside. The shape of the circular base of the toe looks very similar to the base of No. 143. The fabric is fine-grained, well-fired, and light reddish brown (5YR 6/4) from a preserved surface, and pink (5YR 7/3) from a fresh break on the rim.

The style of its triangular rim, the straight handles and rounded shoulder remind us of North Greek amphoras. The closest parallel is the 'unstamped Thasian' dated to the 5th century, in Grandjean.[244] Zeest reports more examples of these Thasian amphoras, an array of closely related forms, but here we are interested in the form of the upper body. The toe of No. 147, however, is peculiar, as it matches the earlier toes labeled by Zeest as 'Proto-Thasian.'[245] Could this be a variant of a late fifth century 'unstamped' type with the narrow conical body and a flaring toe with an elaborate base reminiscent of the earlier so-called 'Proto-Thasian' examples, or a piece which possibly exhibits a transitional style? It is yet to be determined.

The great variety in the shapes of the Thasian body styles and toes can be attested in yet another amphora with triangular rim, slightly curved handles, and a conical body

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[244] Grandjean, "Contribution à l'Établissement d'une Typologie des Amphores Thasiennes," *BCH* 116 (1992): 564-5, no. 73 and Fig. 11. This resembles the upper part of amphora No. 147, but the base of the toe is different.

[245] Zeest, "Ceramic Containers from Bosporos," *MIA* 83 (1960): 79-81, Pl. 6, no. 16b; for the 'proto-Thasian' toes which compare to No. 147, see Zeest's Pls. 5-6, no. 15. As I mentioned above, only the form of the bottom of the toe with its beveled surface is similar to that of amphora No. 143, which is identified as a Chian straight-neck type. We need to re-examine the toes (of Nos. 143 and 147) side-by-side for a closer comparison of their the shape and fabric.

with angular shoulder ending in a short conical toe, which looks like an inverted cup.[246] Lawall elaborated further on the difficulties in the identification of the 5th century 'Thasian?' amphoras. No. 147, if it is Thasian, shows that there much to be learned from the stylistic variations during the earlier times. At this point, the vessel is unidentified and I can only suggest a resemblance to the aforementioned type. Petrographic analysis is needed to include or exclude this example from the 'circle of the Thasian' amphoras.[247]

148. Γ 12 (Plate 35)
Unidentified, (North Greek?, last quarter of 5th century?)

RD	10.3	HHt	11.3
RHt	01.1	HWthT	03.9
RTh	01.4	HWthS	03.9
NHt	11.9	HTh	01.9
NMmD	10.2		

149. Γ 32 (Plate 35)
Unidentified, (North Greek?, last quarter of 5th century?)

RD	10.6	HHt	12.0
RHt	01.0	HWthT	04.1
RTh	01.2	HWthS	04.1
NHt	12.9	HTh	01.9
NMmD	09.2		

[246] I. M. Akamates, "Πρωτεύουσα Μακεδόνων Πέλλα: Εμπόριο Κρασιού (The Makedonian Capital of Pella: Wine Trade)," *in Αμπελοοινική Ιστορία στο Χώρο της Μακεδονίας και Θράκης (The History of Viticulture in Makedonia and Thrake). Ε' Τριήμερο Εργασίας. Νάουσα, 17-19 Σεπτεμβρίου 1993* (Athens, 1998), 35-37, Fig. 17. The amphora, based on its stamp, is dated to the second quarter of the 4th century.

[247] For a summary of the terminology of the early unstamped Thasian amphoras and discussion on the stylistic differences of the variants according to chronology and fabric, see Lawall, "Transport Amphoras and Trademarks," 137-143.

Fragmentary amphoras. Both were found in square Θ6 during the 1993 excavation season. The following observations and information apply to both, as they seem to be exactly the same type.

These two fragments seem to be very old in date on account of the very poor state of preservation. They are covered with organic concretion (the twisted worm tubes are visible on them), which has eroded the fabric and has solidified on it. Of course, we cannot exclude the possibility that, if they are not older in date than the other types of amphoras, then their poor state is the result of a combination of factors, such as their resting location and exposure to elements underwater. So far, no other amphora has been recovered in as bad a state of preservation as these two pieces.

The same parts have survived on both. The first fragment, No. 148, has a wedge-shaped rim flaring outwards, set off by an incised groove around its base. The neck is short and cylindrical, and flares downwards to meet the shoulder. Only a small section survives of the wide and rounded shoulder. One handle is preserved, oval in cross section, which attaches just below the rim, curves outwards and then drops straight to the rounded, sloping shoulder. The other fragment, No. 149, bears the same features: only one of its handles is preserved, and a small piece of the other. No. 148 has a weak red fabric (10R 5/3) from a preserved surface on the interior of the neck, and a pale red (10R 6/3) from a fresh break on the rim. No. 149 is covered thoroughly with concretion and it was difficult to take a reading on the preserved surface, but it looks close to light reddish brown (5YR 6/4), and light red (2.5YR 6/6) from a fresh break on the shoulder.

Tentatively, it is suggested that these two amphoras, based on the shape of the rim, neck and handles, belong to the *koine* of North Greek amphoras. Close parallels can be seen in Lawall, but it is puzzling to date them due to the absence of the toe, and because the roundness of the upper body suggests an early date, well before 425. They closely resemble one of the fragmentary amphoras from a well in the Athenian Agora for which Grace suggested a probable Mendaian origin.[248] Nevertheless, in the absence of comparable material from northern Greek ancient cities, we cannot exclude the possibility that No. 148 and 149 might be contemporary to the full-size Mendaian type from the wreck site; they might belong to a smaller size, produced by a different workshop in the same region.[249] Final classification will depend on the analysis of their fabrics.

The discovery of the seven miscellaneous vessels indicates that different types of vessels comprise the cargo of this enormous shipwreck. So, it should not come as a surprise the find of a variety of them among what seems to be a homogeneous cargo. But, rather their presence should be desirable as it will provide the best cross-reference material for studying the style and dating of all amphoras from this single deposit. From this brief examination, the dates of three out of the seven amphoras fall within the last quarter of the 5th century, with

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[248] Grace, "Wine Jars," in "Pottery of the Mid-Fifth Century from a Well in the Athenian Agora," *Hesperia* 22, no. 2 (1953): 107-8 no. 163, Pl. 40, clay micaceous, light red to buff; surface dingy buff. This fragmentary amphora bears a graffito on the handle.

[249] On the North Greek amphoras and the classification in progress of the shapes and fabrics, see Lawall, "Transport Amphoras and Trademarks," 165-169, Figs. 61-68. His Figures 61, 63, and 64 appear to relate to ours, but, if one looks closely, our examples have a taller and straighter neck and the shoulder does not seem to be as rounded as the one in Figs. 61 and 64. Also, they date quite early, to the first half and to the middle of the 5th century, but again no information is available about the use and survival rate of jars through time. On the other hand, the form of the North Greek 'amphipolite-rim' type vessel (Lawall's Fig. 68) indicates that globular or ovoid vessels with short handles were produced to 410-400.

two pieces (Nos. 144 and 146) being dated closer to the last decade of the century. These dates are comparable to those proposed for the Mendaian and Solokha II amphoras from the same site.

CONCLUSIONS

The present thesis has focused on the study and analysis of two types of well-preserved transport amphoras numbering 175 in total. They were recovered from the Alonnesos shipwreck as part of its cargo, which forms a formidable mound with an estimated maximum number of 4200 amphoras, according to the excavator.[250] In the sample, 51 amphoras have been identified as belonging to the Mendaian type, and 91 amphoras to the Solokha II type. Seven other amphoras, grouped under the miscellaneous section, were examined as cross references relevant for dating the main two types.

The vessels do not bear any official stamps on them that would ascertain their provenance. Nevertheless, I believe that the first type, based on the existing typological classification proposed in previous studies by V. Grace and advanced recently by M. Lawall, the 51 amphoras from the shipwreck share all the morphological characteristics that qualify them to be grouped within the Mendaian type.[251] However, the exact location of the manufacture of the amphoras cannot be determined at this time because of: a) the absence of petrographic or chemical analysis for any of these vessels, b) the lack of detailed information on production sites dated to the 5th century, and c) the lack of information on any complete transport amphoras from the terrestrial excavations at Mende. The only available indication for the place of manufacture of the amphoras from

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[250] Hadjidaki, "Underwater Excavations," *BCH* 120, II (1996): 588.

[251] See Chapters 2 and 4 on the Mendaian type amphora and references to studies by Grace and Lawall.

the shipwreck is based on a visual (hand specimen) examination of the fabric that showed the same texture and color as in earlier descriptions of the fabric by Grace and to those presented by Whitbread in his petrologic study of Mendaian amphoras.[252] In comparing the Mendaian amphoras from the Alonnesos shipwreck to fragmentary and complete examples found on land and underwater, I propose that our vessels belong to the "late variant" of Lawall. They have the features of what Lawall has described as the "early and late example" of the "late variant", ranging in date from after 425 to the very end of the 5th century. In the comparative analysis in the 'Amphora Description and Catalogue' (Chapter 4), I have narrowed the date to the last two decades of the 5th century based on my observations of the details in form (neck, handles, shoulder, and belly) appearing on either the "early and late example" of the "late variant". In regards to the "late example" of the "late variant", the jars with features such as the pronouncedly tall stem toe and the S-curved handles are comparable to the Mendaian amphoras from the Porticello shipwreck, but in our case they predate the latter, and are dated ca. 415-400.

At this stage it is difficult to determine without further examination of more amphoras from the shipwreck whether the "early" and the "late" examples represent a stylistic development put out in sequence, or whether they are co-existent variants produced in the same pottery workshop by different potters, or in different workshops.

Significant is the fact that a number of amphoras of the "late example" compare very closely to the amphoras from the Porticello shipwreck. Regardless of the date of loss

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[252] Whitbread, *Greek Transport Amphorae,* 198-209.

of either shipwreck, could it be that the Mendaian amphoras from the Alonnesos shipwreck were produced very close in time to those from the Porticello? Certainly, there is more work to be done on this point. Any questions pertaining to the provenance and dating of the Mendaian amphoras can only be answered with the help of petrological analysis by comparing vessels from the Alonnesos and Porticello shipwrecks and both of them to clay samples from the actual production sites in Mende and neighboring locations in the Pallene sub-peninsula.

The second main type represented in the cargo is the so-called Solokha II. Although this type has been found in land and underwater sites in a considerable quantity, its origin remains unknown. Doulgeri-Garlan proposed that the island of Peparethos and Ikos might have been the producers of the Solokha II, based on the examination of fragmentary amphoras found in the debris of four workshops on the islands. They identified different types, and they believe that one of them, the Peparethian I, closely resembles the Solokha II type.[253] However, one must be very cautious in identifying an amphora as belonging to this type. That is because those original amphoras, found at the Solokha tumulus excavated in Russia and grouped under the name Solokha II, most likely did not consist of a homogeneous group, but rather of various vessels 'similar in form' and of different sizes and fabrics. So, it is questionable whether the Solokha II group represents variants of the same type or different types from the same or different

[253] See Chapters 2 and 4 on the Solokha II type amphora and references to studies by Zeest, Vasilenko, Mantsevich, and Doulgeri-Intzessiloglou and Garlan.

production area. I suspect that Doulgeri-Garlan have compared and matched their finds from Peparethos and Ikos to those vessels in the Solokha II group which are similar only to theirs. The Solokha II group, however, includes other amphoras which seem to be very different; examples are presented by Zeest, Vasilenko and Mantsevich. As a result, Doulgeri-Garlan have possibly isolated one form (shape) which is included in the Solokha II group that relates to their Peparethian I.

The same applies in this case. The ninety-one amphoras match certain examples from the Solokha II group, but not all of them. But, they do not seem to match the ones that were recently linked to Peparethian I. It is obvious from the illustrations of the two complete amphoras presented by Doulger-Garlan (BE 6834 and BE 6843) that the Solokha II amphoras from the shipwreck do not match these particular Peparethian I examples. But, they closely resemble, besides the ones presented by Zeest, the two amphoras (C32 and C33) recovered from the Porticello shipwreck. They also match the Solokha II examples reported by Lawall and dated to ca. 400 from the Athenian deposits.

Nevertheless, the identification of the second type of amphoras appearing in great numbers among the cargo remains uncertain. Tentatively, I link them to certain ones of the Solokha II group. This identification is used conventionally as a 'label' and does not provide information about the city or region that might have endorsed the production of these vessels, nor about the actual site of manufacture.

Once more, we need to employ archaeometry, e.g. petrographic examination, to help with the question of provenance. Comparative analysis of clay samples from: a) the Solokha II from the Alonnesos shipwreck, b) the Solokha II from the Porticello

shipwreck, c) the Peparethian I amphoras and clay samples from the kilns found on Skopelos, d) the amphoras labeled as Solokha II (by comparison to the originals), and e) the original Solokha II from the tumulus (some of which were rediscovered recently), will suggest whether the amphoras have a common origin, and whether the ones from the shipwreck(s) were produced on the island of Skopelos.

The date of the Solokha II type amphoras from the Alonnesos shipwreck, based on the existing information should not be much different than the one proposed for the Mendaian amphoras at the end of the 5th century (ca. 420/415-400). The examination of the 7 miscellaneous amphoras and assessment of their dates point to the last quarter of the 5th century and closer to the last decade, and corroborate the proposed dating for the Mendaian and the Solokha II.

Having established with considerable degree of certainty that the amphora cargo dates to the last two decades of the 5th century, I used the amphoras to study another important aspect that makes this shipwreck unique; the enormous volume of its amphora cargo, which indicates of a high-tonnage merchant ship. In fact, this is the first underwater site found in undisturbed conditions that provides archaeological evidence bearing on previous opposing assertions from studies about the common range of ancient ship tonnage during the 5th century. A small but representative sample of contemporary Mendaian amphoras was used to calculate the average volumetric capacity with a dual purpose in mind: a) to add new information about the capacity of Mendaian transport amphoras and compare them to the existing database, and b) to use the average

volumetric figures taken from the amphoras to assess the approximate tonnage of the ship.

The results show that the average capacity of the Mendaian amphoras is 21.420 l., and the total approximate weight of a full vessel (including the tare of 12 kg) could have been close to 34 kg. Based on these figures and assuming a conservative estimate of 3,000 amphoras for the maximum number in the cargo (lower than that suggested by the excavator), the Alonnesos ship still could have been close to 100 tons. If so, then this shipwreck raises more questions for students of ancient Greek socio-economic history pertaining to shipbuilding techniques, sea-borne trade and the economy (or rather economies) of the 5th century. However, none can be answered properly until the wreck is fully excavated and all data become available for analysis. Herein, only a general discussion can be offered of the Alonessos shipwreck, the times it sailed, and the market(s) it might have served.

Where was a 100-ton merchant ship sailing, loaded with an apparently mixed cargo of wine amphoras, during the latter years, ca. 420/415-400, of the Peloponnesian War? The type of cargo and the resting place of the wreck, in the Northern Sporades, reveal at least a part of its voyage. The Mendaian type vessels carried aboard indicate that the ship was loaded in Mende or one of its neighboring cities, i.e., Skione, and then headed south along the coast to pass by or make a stop in the e.g. Northern Sporades.[254]

[254] Hadjidaki, "Underwater Excavations," *BCH* 120, II (1996): 591 suggested the possibility that the ship loaded Athenian black-glaze in Piraeus before it sailed for Mende. That supposition will be confirmed or rejected with the final comprehensive study and analysis of the fine and plainware, and the other utilitarian artifacts found among the cargo.

The major role played by these islands in maritime trade has already been expounded in the historical overview of this region.

Rightly so, today the locals call them the 'Gates of the Wind' (Ανεμοπύλες), for the forceful and unforgiving seasonal winds have 'their say' on these straits.[255] But, there is no doubt that their strategic position and local climatologic conditions made them the 'gates of trade' too, through which maritime traffic was filtered along the north-south axis of the eastern coast of Greece during antiquity. It remains uncertain whether the Alonnesos ship actually called on any of these islands. One is certainly tempted to assume that it did, based on the place it foundered, due east of the island of Alonnesos, where the sinking took place in plain view of one of the ancient cities (Ikos?) in the area of modern Kokkinokastro. It has also been proposed that earlier the ship might have picked up cargo on Peparethos (Skopelos) on the assumption that the Solokha II amphoras from the shipwreck fit the identification asserted by Doulgeri-Garlan. Without denying the possibility of such a course, I believe that at the present time there is lack of substantial evidence to link the Solokha II type from the Alonnesos shipwreck with the Peparethian I type from Skopelos. After all, the ship might have called on any one of these islands, and the surviving cargo consisting predominately of wine amphoras does not exclude the possibility that, if loading took place, other artifacts, perishable material, or people were brought on board.

[255] Carroll, *Gates of the Wind*, 2, 161.

Heavily laden with wine from Mende, itself or a nearby city, and with more cargo from another city or cities, what might have been the intended market and final destination the ship? It is hard to believe that the final destination of the ship was the Northern Sporades, because local markets must have been too small to order absorb such a quantity of wine. Their immediate needs must have been satisfied by their own wine production, and most likely they exported their wine, as indicated in the literary record. So, two main scenarios are suggested, that: a) the ship was heading for Athens to deliver to a market fond of Mendaian wine, or b) it was heading to the Black Sea to procure wine to people equally fond of Mendaian wine, and in exchange load grain for the return voyage.

Using the dates provided by the Mendaian and the Solokha II amphoras, I would guess that the Alonnesos ship made her last voyage during the final years of the Peloponnesian War, ca. 415-405. The wartime conditions and vicissitudes of political alliances within the Athenian Empire caused an increase in the maritime traffic of merchant ships and warships. For the most part, people, staples, and provisions moved by sea, and supply and demand fluctuated reciprocally. At the same time there was an increase in the amount and flow of currency produced by the states controlling silver mines, but primarily by Athens who controlled the mines in Laurion. She tried to impose her currency, the Attic drachma, over her allies and subordinates and to a degree succeeded in dominating the trade routes in the Aegean Sea and the Straits of the Hellespont. Consequently, the increase of currency resulted in prices to rise during the war. This triggered economic changes, such as lower rates of interest that pushed creation

of credit, with the eventual creation of a banking system. It seems that economic conditions in the second half of the 5th century would have permitted the manufacture and financing of large size merchant ships. The gradual increase of the population along the Mediterranean littoral after the Persian Wars, and the special needs of those people for provisions and communication created during the Peloponnesian War, would have supported the building of larger ships to carry heavier loads over long distances.[256]

Athens, besides having a large population which was as various as its needs, had also limitations on its self-sufficiency, which became pronounced under the stresses of war. Nevertheless, the city managed to maintain herself financially even under beleaguered conditions and kept open the lines of communication over the sea to procure the necessary resources for her people.[257] Even after the major disaster sustained during the Sicilian expedition and the capture of Decelea by the Spartans, who cut the landline of supplies from Euboia, she regrouped and built a new fleet in 413-412. But, things became critical when an oligarchic *coup d' état* took place in Athens, and many revolts followed, on Chios, in Eretria, and threatened ones on Thasos, Cyzicus, and Byzantion in the Hellespont. The loss of the last would have brought to an end Athens' seaborne line of supplies, most importantly of grain from the Black Sea. Further alarm was caused by the

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[256] For the wartime events, naval engagements, the maritime traffic, and insights on the economic changes during the Peloponnesian War, see J. Hatzfeld, *History of Ancient Greece*, (N.Y., 1966), 120-125; Hammond, *A History of Greece to 322 B.C.*, 376-419; C. G. Starr, *The Influence of Sea Power on Ancient History*, (Oxford, 1989), 42-46; Casson, *Ships and Seamanship in the Ancient World*, 183-190. High demand, short supply of goods and the prospect of increasing one's profits resulted in the foundering of ships from overloading, see Demosthenes, *Against Phormio*, XXXIV.10.

[257] Garnsey, *Famine and Food Supply in the Graeco-Roman World*, 131-132.

increasing strength of the Peloponnesian fleet in Aegean waters, instigating and supporting dissensions and destroying the Athenian fleet. Athens responded by claiming and securing the Hellespont Straits with the victories of her fleet in Cynossema (411) and Cyzicus (410) under the democratic generals Thrasybulos and Thrasyllos, who operated and 'defended the empire' out of Samos. Democracy was soon restored in Athens. During the following years the Athenian commanders Thrasyllos, Theramenes, Thrasybulos and Alcibiades co-operated to maintain control and recovered lost alliances. Activity increased in the northern Aegean Sea, emphasized by the appointment of Theramenes, who was "raising money by raids on enemy territory, deposing extreme oligarchies established in subject states by the Four Hundred, and fining the oligarchic leaders."[258] Certainly not a coincidence, Theramenes supported the Macedonian King Archelaos in an attack on Pydna and the latter, after his accession to the throne in 413, kept friendly relations with Athens, allowing the export of oars from his lands and giving the Athenians access to the timber resources for the building of ships according to the decree issued in his honor in 407/6.[259] During that time the Athenian fleet focused its operations in northern Aegean Sea and the Hellespont Straits when Alcibiades captured Byzantion in 408/7 and Thrasyllos reduced Thasos in 407/6, and every effort was made to "keep the passage open for the corn-ships bound from the Black Sea for Athens." And they

[258] Hammond, *A History of Greece to 322 B.C.*, 403-419; Hatzfeld, *History of Ancient Greece*, 165-170.

[259] Fornara, *Archaic Times to the End of the Peloponnesian War*, 192-3.

continued to do so until the Spartan admiral Lysander destroyed the Athenian fleet at Aegospotami in 405.[260]

If there was a time and conditions that demanded and justified the loading of a merchant ship with a cargo of thousands of amphoras that might have been the years between 411-405 when the ship would be afforded considerable protection by the revived Athenian fleet operating in northern Aegean. Under the circumstances, the ship may have sailed to the Black Sea to sell the cargo, likely of wine, and return with a full load of grain that was much-needed in Athens. It is also possible that the voyage of the Alonnesos ship could have taken place somewhat later, maybe right after the Spartan victory at Aegospotami and the final surrender of Athens in 404, when she was allowed to keep a fleet of a dozen ships. One would have to speculate about the economic conditions that supported the shipping of such a load in the years immediately after the fall of the Athenian Empire. In any case, the ship should not have sailed later than 400 unless new artifacts are recovered that would support a later date.[261]

The importance of the archaeological discovery of the Alonnesos shipwreck cannot be overemphasized. It certainly offers much new information to historians and archaeologists alike, some of which have been discussed here. And although each artifact aboard the ship adds new information for a specialized field, one should not fail to see the ship as a whole in time and space.

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[260] Garnsey, *Famine and Food Supply in the Graeco-Roman World*, 132-133.

[261] Ibid., 120-127 on the importance of grain for Athens (second half of 5th c.), her control over the Hellespont Straits, and attempts to interfere with the supply of grain destined for allies and foes.

The calamity that befell the Alonnesos ship twenty-four hundred years ago, captured for posterity an instance of an ordinary activity in maritime trade, which otherwise would have been lost to the 'bigger' or 'more important' events recorded by the ancient historians. The ship becomes the evidence for the everyday living and activities of the people who 'moved the economy', and who after all might have determined truly important events.

TABLES

Table 1. Linear Measurements of Mendaian Amphoras

CatNo	ExcNo	ExSq	C/I	Ph.	MPrHt	BD	RD	HHt	NHt	TD	AvgCap	Muns/a	Muns/b
1.	Peristera Well	-	C	Y	64.8	38.6	13.4	16.7	17.0	8.6			
2.	BE 91/16-6	-	C	Y	65.7	40.1	13.5	17.9	15.7	8.5	24.43	2.5YR 5/4	7.5YR 7/6
3.	ΠΕ 11	-	I	Y	64.4	38.1	13.6	17.9	15.1	8.9			
4.	ΠΕ 12	-	C	Y	66.1	39.5	14.2	16.1	15.6	8.4	23.70		
5.	ΠΕ 20	-	I	Y	N/A	37.0	12.7	16.6	16.2	N/A	18.93	7.5YR 6/4	N/A
6.	ΠΕ 32	-	I	Y	N/A	38.7	13.2	19.3	18.6	N/A	N/A	10YR 6/4	10YR 7/4
7.	A607	Θ4/A1	C	Y	66.1	37.7	13.7	17.5	15.9	9.3	20.82		
8.	A654	Θ5/A1	C	Y	64.3	38.0	13.1	17.6	16.5	8.6	21.78		
9.	A656	Θ5/A1	I	Y	N/A	38.6	N/A	N/A	N/A	8.8			
10.	A658	Θ5/A1	C	Y	63.1	38.5	12.4	15.9	15.1	8.9	23.65		
11.	A659	Θ5/A1	C	Y	44.2	N/A	N/A	N/A	N/A	11.0			
12.	A673	Θ6/A1	C	Y	65.5	39.5	13.0	14.5	14.7	8.4	24.74		
13.	A674	Θ6/A1	I	Y	65.5	37.4	N/A	17.2	17.4	9.2			
14.	A675	Θ6/A1	C	Y	63.7	39.5	12.8	17.2	15.4	8.4	23.05		

Note: CatNo: Catalogue Number; ExcNo: Excavation Number; ExSq: Excavation Square; C/I: Complete/Incomplete; Ph.: Photograph (Yes/No); AvgCap: Average Capacity; Muns/a: Munsell reading on preserved surface; Muns/b: reading on break. Linear measurements in centimeters; capacity in liters. N/A: The measurements for broken or missing parts of incomplete vessels have been omitted from these tables; average measurements (Avg ms) are calculated only on the intact parts of the amphoras.

Table 1 (continued)

CatNo	ExcNo	ExSq	C/I	Ph.	MPrHt	BD	RD	HHt	NHt	TD	AvgCap	Muns/a	Muns/b
15.	**A680**	Θ6/A1	I	Y	65.8	37.5	N/A	17.3	16.5	9.0			
16.	**A741**	Θ6/A2	C	Y	62.8	38.6	12.6	18.0	16.2	8.8	20.08	5YR 6/4	5YR 7/6
17.	**A769**	Θ6/A2	C	Y	62.6	38.4	12.7	19.1	15.3	8.8	21.58		
18.	**A770/A657**	Θ6/A2	C	I	63.9	37.4	12.9	N/A	15.9	7.6			
19.	**A979**	Θ5/A2	I	Y	65.2	36.9	13.1	17.9	15.7	8.4		5YR 6/4	5YR 6/6(b2)
20.	**A981**	Θ5/A2	C	N	63.4	39.3	13.2	16.9	16.1	8.8	21.88		
21.	**A982**	Θ5/A2	I	Y	N/A	39.4	13.1	17.0	17.2	N/A			
22.	**A983**	Θ5/A2	I	Y	66.1	38.6	13.4	18.1	16.1	9.2	22.11	5YR 6/4	5YR 7/6
23.	**A984**	Θ5/A2	I	Y	N/A	38.8	N/A	17.4	17.0	N/A			
24.	**A985**	Θ5/A2	C	Y	62.3	39.3	12.3	15.9	14.5	8.5			
25.	**A988**	Θ5/A2	C	Y	64.9	38.8	12.4	18.1	16.5	9.1	20.61		
26.	**A1000**	Θ5/A3	I	Y	65.5	39.6	13.0	17.2	16.6	8.4			
27.	**A1001**	Θ5/A3	I	Y	58.8	37.4	13.1	19.0	19.0	N/A		5YR 6/6	5YR 7/6
28.	**A1002**	Θ5/A3	I	Y	61.2	38.2	12.3	15.0	15.3	8.8	19.39		
29.	**A1004**	Θ5/A3	C	N	63.8	39.6	12.1	16.4	16.1	8.8			

Table 1 (continued)

CatNo	ExcNo	ExSq	C/I	Ph.	MPrHt	BD	RD	HHt	NHt	TD	AvgCap	Muns/a	Muns/b
30.	**A1005**	Θ5/A3	I	Y	65.9	38.3	12.5	18.3	16.7	9.1	21.14		
31.	**A1006**	Θ5/A3	I	Y	60.7	37.2	N/A	16.2	15.9	8.2			
32.	**A1007**	Θ5/A3	C	Y	63.3	38.5	12.4	16.3	16.5	8.2			
33.	**A1008**	Θ5/A3	C	Y	64.4	37.9	12.6	16.8	17.3	8.5			
34.	**B5**	Θ6/B	I	N	54.8	39.2	12.4	18.2	17.9	N/A		5YR 5/4	7.5YR 6/6
35.	**B22**	Θ6/A2	C	Y	N/A	N/A	N/A	N/A	N/A	N/A			
36.	**B26**	Θ6/B	C	Y	67.3	38.9	14.0	18.8	17.0	9.7	20.61		
37.	**B29**	Θ6/B	C	Y	62.0	37.0	13.2	17.8	15.4	9.2	20.15	10YR 7/3	5YR 6/4
38.	**B30**	Θ6/B	C	Y	65.3	38.1	12.7	17.2	17.6	8.6			
39.	**B50**	Θ5/B	I	Y	N/A	37.9	13.2	19.5	15.5	N/A			
40.	**B52**	Θ5/B	C	Y	59.7	38.1	13.0	17.5	16.7	8.9	18.75		
41.	**B53**	Θ5/B	C	Y	63.6	37.9	13.2	17.5	16.4	9.1	19.76		
42.	**B55**	Θ5/B	C	Y	66.5	39.6	13.1	18.5	17.2	9.2	23.06		
43.	**B57**	Θ5/B	C	Y	61.5	38.4	13.0	17.5	16.2	8.8	19.86		
44.	**B59**	Θ5/B	I	Y	N/A	37.6	N/A	17.1	15.9	9.4	21.56		

Table 2. Linear Measurements of Solokha II Amphoras

CatNo	ExcNo	ExcSq	C / I	Ph.	MPrHt	BD	RD	HHt	NHt	TD	Muns/a	Muns/b
52.	**BE 91/16-2**	-	C	Y	78.4	32.1	11.8	24.4	23.0	6.5		
53.	**ПЕ 2**	-	C	Y	74.9	32.5	11.6	23.0	2.9	6.5		
54.	**ПЕ 16**	-	C	Y	73.9	31.9	11.8	24.1	22.8	6.8	2.5YR 4/4	2.5YR 5/6
55.	**A498**	-	I	Y	N/A	32.0	N/A	23.1	N/A	6.8		
56.	**A520**	Θ4/A1	C	Y	73.6	32.8	11.3	24.0	22.0	6.1		
57.	**A591**	Θ3/A1	C	Y	76.7	31.8	11.2	23.9	22.4	6.5		
58.	**A603**	Θ4/A1	I	Y	N/A	31.8	N/A	23.7	N/A	6.2		
59.	**A604**	Θ4/A1	C	Y	76.0	31.8	12.0	24.2	22.2	6.8		
60.	**A606**	Θ4/A1	I	N	74.9	30.2	N/A	23.7	23.2	6.5		
61.	**A608**	Θ4/A1	I	Y	N/A	33.3	N/A	N/A	N/A	6.9	2.5YR 5/4	2.5YR 6/6
62.	**A609**	Θ4/A1	C	Y	75.8	33.1	11.6	24.7	21.8	6.6		
63.	**A610**	Θ4/A1	I	Y	N/A	N/A	N/A	N/A	N/A	N/A		
64.	**A617**	Θ3/A1	I	Y	73.2	32.3	N/A	23.1	21.0	6.6	2.5YR 5/4	2.5YR 6/6
65.	**A626**	Θ3/A1	C	Y	76.2	30.5	11.6	23.4	21.9	6.8		

Note: CatNo: Catalogue Number; ExcNo: Excavation Number; ExSq: Excavation Square; C/I: Complete/Incomplete; Ph.: Photograph (Yes/No); AvgCap: Average Capacity; Muns/a: Munsell reading on preserved surface; Muns/b: reading on break. N/A: The measurements for broken or missing parts of incomplete vessels have been omitted from these tables; average measurements (Avg ms) are calculated only on the intact parts of the amphoras. Linear measurements in centimeters; capacity in liters.

Table 2 (continued)

CatNo	ExcNo	ExcSq	C / I	Ph.	MPrHt	BD	RD	HHt	NHt	TD	Muns/a	Muns/b
66.	**A628**	Θ3/A1	C	Y	75.8	31.2	10.6	24.3	24.0	6.2		
67.	**A633**	Θ4/A1	C	Y	75.1	31.0	11.2	24.6	23.4	6.5		
68.	**A634**	Θ4/A1	I	Y	N/A	32.7	10.8	23.0	22.4	N/A		
69.	**A640/A605**	Θ4/A1	C	Y	73.9	31.9	11.8	24.1	22.8	6.8		
70.	**A641**	Θ5/A1	C	Y	75.2	32.5	11.6	23.9	23.2	6.5	10YR 5/6	2.5YR 6/8
71.	**A642**	Θ5/A1	C	Y	72.2	32.4	11.5	23.2	20.4	6.9		
72.	**A643**	Θ5/A1	C	Y	76.1	33.2	11.5	24.1	22.6	7.0		
73.	**A644**	Θ5/A1	C	Y	75.2	32.0	12.1	23.9	21.8	6.8		
74.	**A645**	Θ5/A1	C	Y	75.1	31.0	11.4	23.0	23.0	6.7		
75.	**A646**	Θ5/A1	C	N	75.0	33.2	11.7	23.1	22.1	6.4		
76.	**A647/663**	Θ5/A1	I	Y	72.2	31.4	N/A	23.2	N/A	6.5		
77.	**A649**	Θ5/A1	I	Y	73.9	30.0	N/A	23.8	22.5	6.2		
78.	**A650**	Θ5/A1	I	Y	71.8	32.7	N/A	23.9	N/A	6.6		
79.	**A651**	Θ5/A1	C	Y	71.1	31.6	10.9	23.5	21.6	6.7		
80.	**A652**	Θ5/A1	I	Y	69.3	31.8	11.5	23.4	22.3	N/A		
81.	**A653**	Θ5/A1	C	Y	73.3	31.8	11.8	24.0	22.9	6.4		

Table 2 (continued)

CatNo	ExcNo	ExcSq	C / I	Ph.	MPrHt	BD	RD	HHt	NHt	TD	Muns/a	Muns/b
82.	**A655**	Θ5/A1	C	Y	75.2	31.8	11.5	23.9	22.0	6.2		
83.	**A660**	Θ5/A1	I	Y	74.7	32.1	11.5	23.7	23.8	6.6		
84.	**A661**	Θ5/A1	C	Y	74.6	32.7	11.6	24.5	23.9	6.2		
85.	**A664**	Θ6/A1	C	Y	76.1	33.8	12.3	24.5	23.5	6.8	2.5YR 5/6	2.5YR 5/8
86.	**A665**	Θ6/A1	C	Y	72.8	32.2	12.1	24.4	23.2	6.8		
87.	**A666**	Θ6/A1	C	Y	74.1	32.7	11.0	22.4	22.0	6.7		
88.	**A667**	Θ6/A1	C	Y	73.2	32.8	11.5	22.9	21.8	6.2		
89.	**A668**	Θ6/A1	C	Y	77.2	32.3	12.3	25.0	22.3	6.6		
90.	**A669**	Θ6/A1	C	Y	73.6	32.4	12.1	23.7	21.6	5.9		
91.	**A670**	Θ6/A1	I	Y	67.7	33.3	N/A	N/A	N/A	6.8		
92.	**A671**	Θ6/A1	I	Y	66.2	32.5	N/A	23.4	20.6	6.8		
93.	**A672**	Θ6/A1	I	N	71.0	31.0	N/A	22.9	N/A	6.2	2.5YR 5/6	2.5YR 5/8
94.	**A676**	Θ6/A1	C	Y	75.6	31.6	11.4	23.1	22.0	6.2		
95.	**A677**	Θ6/A1	I	Y	75.7	33.4	11.6	24.9	22.5	6.7		
96.	**A679**	Θ6/A1	C	Y	73.7	30.6	11.6	23.6	21.8	6.4		

Table 2 (continued)

CatNo	ExcNo	ExcSq	C / I	Ph.	MPrHt	BD	RD	HHt	NHt	TD	Muns/a	Muns/b
97.	**A681**	Θ6/A1	I	Y	73.5	32.2	N/A	23.9	N/A	6.7		
98.	**A740**	Θ6/A1	C	Y	72.9	32.0	11.5	23.3	20.8	6.4	5YR 5/3	10R 6/4
99.	**A742**	Θ6/A2	I	Y	73.7	32.8	11.2	23.4	21.6	6.3		
100.	**A743**	Θ6/A2	C	Y	74.1	31.5	11.4	24.5	23.2	6.5		
101.	**A744**	Θ6/A2	C	Y	73.9	32.7	11.5	24.5	20.7	6.6		
102.	**A745**	Θ6/A2	C	Y	74.3	30.5	11.6	23.8	22.7	6.7		
103.	**A746**	Θ6/A2	I	Y	N/A	32.8	N/A	N/A	N/A	6.7		
104.	**A755**	Θ6/A2	C	Y	79.9	31.4	11.9	23.9	20.1	6.8		
105.	**A758**	Θ6/A2	C	Y	78.0	33.4	11.6	24.4	21.5	7.1		
106.	**A766**	Θ6/A2	C	Y	73.5	30.2	11.5	22.7	21.4	6.5		
107.	**A773**	Θ6/A2	C	Y	76.7	32.9	12.4	23.1	23.4	6.5		
108.	**A774**	Θ6/A2	I	Y	75.7	32.5	12.0	24.1	23.0	N/A		
109.	**A977**	Θ5/A2	C	Y	71.9	32.2	12.3	23.7	22.9	6.6		
110.	**A978**	Θ5/A2	C	Y	N/A	N/A	N/A	N/A	N/A	N/A		
111.	**A980**	Θ5/A2	C	Y	74.7	32.8	11.7	23.4	22.0	6.5		

Table 2 (continued)

CatNo	ExcNo	ExcSq	C / I	Ph.	MPrHt	BD	RD	HHt	NHt	TD	Muns/a	Muns/b
112.	**A986**	Θ5/A2	C	Y	76.4	32.1	12.1	23.9	22.3	6.9		
113.	**A987**	Θ5/A2	C	Y	74.3	32.3	10.9	22.9	22.2	7.2		
114.	**A989**	Θ5/A2	I	Y	78.3	33.2	N/A	25.1	23.6	6.5		
115.	**A990**	Θ5/A2	C	Y	73.3	32.6	12.1	24.2	21.6	6.7		
116.	**A997**	Θ3/A1	C	Y	76.7	30.4	11.2	25.2	23.4	5.8		
117.	**A999**	Θ5/A3	I	Y	61.8	32.2	N/A	N/A	N/A	6.8		
118.	**A1003**	Θ5/A3	C	Y	74.8	33.2	11.5	24.7	23.3	7.0		
119.	**A1009**	Θ5/A3	I	Y	72.6	32.4	N/A	24.1	23.4	6.7		
120.	**A1016**	-	C	Y	74.8	32.5	12.2	23.9	22.2	6.2		
121.	**B3**	Θ6/B	I	Y	75.4	31.1	10.1	23.6	22.4	6.4		
122.	**B4**	Θ6/B	C	Y	75.8	31.9	11.0	23.2	22.2	6.7	5YR 6/2	2.5YR 6/4
123.	**B6**	Θ6/B	I	Y	75.4	32.3	12.4	24.1	21.7	6.1		
124.	**B7**	Θ6/B	I	N	67.1	30.7	N/A	24.1	22.9	N/A		
125.	**B8**	Θ6/B	I	Y	74.8	30.8	11.2	24.2	22.3	6.4		
126.	**B9**	Θ6/B	C	Y	74.9	30.6	12.0	22.7	22.4	6.9	2.5YR 5/6	N/A

Table 2 (continued)

CatNo	ExcNo	ExcSq	C / I	Ph.	MPrHt	BD	RD	HHt	NHt	TD	Muns/a	Muns/b
127.	**B10**	Θ6/B	I	Y	75.4	30.8	N/A	24.6	24.0	6.6		
128.	**B11**	Θ6/B	I	Y	75.7	32.2	11.4	24.3	22.5	6.5		
129.	**B12**	Θ5/Γ	I	Y	76.1	33.4	N/A	24.5	21.7	6.4	2.5YR 5/6	10R 6/6
130.	**B20**	Θ6/B	C	Y	74.0	30.7	11.6	22.6	20.7	6.4		
131.	**B23**	Θ6/B	I	Y	73.4	33.5	N/A	24.5	N/A	6.4		
132.	**B24**	Θ6/B	C	Y	75.0	31.6	11.6	23.2	21.0	6.4		
133.	**B25**	Θ6/B	C	Y	74.3	32.2	11.9	23.7	21.7	6.1		
134.	**B28**	Θ6/B	I	Y	73.0	32.7	N/A	23.1	23.6	6.7		
135.	**B31**	Θ6/B	C	N	75.3	33.3	11.8	23.8	22.0	6.7		
136.	**B36**	Θ6/B	C	Y	73.6	32.4	12.4	22.7	20.8	6.6		
137.	**B38**	Θ6/B	C	Y	77.3	33.0	11.7	24.2	23.2	6.7		
138.	**B40**	Θ6/B	C	Y	76.3	33.0	11.7	24.5	23.3	6.2		
139.	**B63**	Θ5/B	C	Y	73.7	32.7	12.1	24.1	22.7	6.8		
140.	**B65**	Θ5/B	I	Y	72.8	32.9	N/A	24.4	N/A	6.4		
141.	**Γ61**	Θ5/Γ	C	Y	72.9	31.9	12.0	23.7	21.0	6.2		
142.	**Γ64**	Θ5/Γ	I	Y	73.0	32.4	N/A	24.5	N/A	6.3		
	Avg ms				**74.18**	**32.12**	**11.63**	**23.81**	**22.06**	**6.55**		

Table 3. Mendaian Amphoras - Capacity Measurements by Water Volume

CatNo	ExcNo	A 1st ms	B 2nd ms	C Avg ms
2.	**BE 91/16-6**	24.38	24.47	24.43
4.	**ΠΕ 12**	23.68	23.71	23.70
5.	**ΠΕ 20**	18.91	18.95	18.93
7.	**A 607**	20.82	-	20.82
8.	**A 654**	21.78	-	21.78
10.	**A 658**	23.64	23.66	23.65
12.	**A 673**	24.74	-	24.74
14.	**A 675**	23.03	23.06	23.05
16.	**A 741**	20.06	20.10	20.08
17.	**A 769**	21.59	21.57	21.58
20.	**A 981**	21.88	-	21.88
22.	**A 983**	22.11	22.11	22.11
25.	**A 988**	20.61	-	20.61
28.	**A 1002**	19.39	-	19.39
30.	**A 1005**	21.14	-	21.14
36.	**B 26**	20.61	-	20.61
37.	**B 29**	20.10	20.15	20.13
40.	**B 52**	18.75	-	18.75
41.	**B 53**	19.76	-	19.76
42.	**B 55**	23.06	-	23.06
43.	**B 57**	19.86	-	19.86
44.	**B 59**	21.56	-	21.56
48.	**B 66**	22.48	-	22.48
49.	**B 69**	20.08	-	20.08
	Avg ms	21.42	21.98	21.42

Note: CatNo: Catalogue number; ExcNo: Excavation number; Avg ms: average measurement. Column C is the average measurement of column A and B. Capacity measurements are in liters. No. 37: lower and higher of the three measurements entered here. Table prepared by ascending order and sorted by amphora catalogue sequence.

Table 4. Mendaian Amphoras - Capacities and Linear Dimensions

CatNo	ExcNo	Avg ms	Depth	BD	Ht
40.	**B 52**	18.75	49.1	38.1	59.7
5.	**ΠE 20**	18.93*	54.4	36.6	57.0
28.	**A 1002**	19.39	53.2	38.2	61.2
41.	**B 53**	19.76	53.7	37.9	63.6
43.	**B 57**	19.89	51.7	38.4	61.5
16.	**A 741**	20.08*	51.8	38.6	62.8
49.	**B 69**	20.08	54.3	38.0	63.7
36.	**B 29**	20.13*	53.0	37.0	62.0
25.	**A 988**	20.61	54.2	38.8	64.9
36.	**B 26**	20.61	63.7	38.9	67.3
7.	**A 607**	20.82	55.6	37.7	66.1
30.	**A 1005**	21.14	54.9	38.3	65.9
44.	**B 59**	21.56	52.9	37.6	64.6
17.	**A 769**	21.58*	53.3	38.4	62.6
8.	**A 654**	21.78	54.2	38.0	64.3
20.	**A 981**	21.88	52.0	39.3	63.4
22.	**A 983**	22.11*	55.7	38.6	66.1
48.	**B 66**	22.48	54.1	38.4	63.5
14.	**A 675**	23.05*	56.6	39.2	63.7
42.	**B 55**	23.06	57.2	39.6	66.5
10.	**A 658**	23.65*	54.1	38.5	63.1
4.	**ΠE 12**	23.70*	57.6	40.0	66.1
2.	**BE 91/16-6**	24.43*	56.4	40.1	65.7
12.	**A 673**	24.74	55.4	39.2	66.2
	Avg ms	21.42	54.5	38.5	63.8

Note: BD: Body Diameter; Ht: Height. Table sorted by Avg. capacity ms in ascending order. Capacity measurements are in liters, linear measurements in centimeters. The asterisk (*) indicates vessels that were measured twice for testing repeatability of the results.

Table 1 (continued)

CatNo	ExcNo	ExSq	C/I	Ph.	MPrHt	BD	RD	HHt	NHt	TD	AvgCap	Muns/a	Muns/b
45.	**B60/A768**	Θ5/B	C	N	63.2	38.2	13.0	17.6	16.8	9.0			
46.	**B61**	Θ5/B	I	Y	N/A	38.5	13.0	16.8	16.1	N/A			
47.	**B62**	Θ5/B	C	Y	63.5	38.5	11.4	16.3	15.0	8.5			
48.	**B66**	Θ5/B	C	Y	63.5	38.4	13.5	15.2	14.9	8.8	22.48		
49.	**B69**	Θ5/B	C	Y	63.7	38.0	12.7	18.3	17.1	8.4	20.08		
50.	**B71**	Θ5/B	I	Y	N/A	37.5	N/A	N/A	N/A	8.8			
51.	**Γ63**	Θ5/Γ	I	Y	64.9	38.7	12.8	17.1	16.1	8.7		10YR 5/2	5YR 6/4
	Avg ms				**63.26**	**38.40**	**12.94**	**17.31**	**16.29**	**8.82**			

Table 5. Mendaian Amphoras - Munsell Soil Color Chart Readings

MENDAIAN	Preserved surface
51. Γ 63	10YR 5/2, grayish brown
6. ΠΕ 32	10YR 6/4, light yellowish brown
37. B 29	10YR 7/3, very pale brown
2. BE 91/16-6, belly	2.5YR 5/4, reddish brown
34. B 5	5YR 5/4, reddish brown
2. BE 91/16-6, belly (second ms)	5YR 6/4, light reddish brown
16. A 741, toe	5YR 6/4, light reddish brown
19. A 979	5YR 6/4, light reddish brown
22. A 983	5YR 6/4, light reddish brown
27. A 1001, neck	5YR 6/6, reddish yellow
5. ΠΕ 20, shoulder	7.5YR 6/4, light brown
MENDAIAN	**Broken edge**
19. A 979, belly	10YR 7/2, light gray
6. ΠΕ 32	10YR 7/4, very pale brown
37. B 29, handle	5YR 6/4, light reddish brown
51. Γ63, rim	5YR 6/4, light reddish brown
19. A 979, handle (second ms)	5YR 6/6, reddish yellow
16. A 741, shoulder	5YR 7/6, reddish yellow
22. A 983, rim	5YR 7/6, reddish yellow
27. A 1001, shoulder	5YR 7/6, reddish yellow
34. B 5	7.5YR 6/6, reddish yellow
2. BE 91/16-6, rim	7.5YR 7/6, reddish yellow

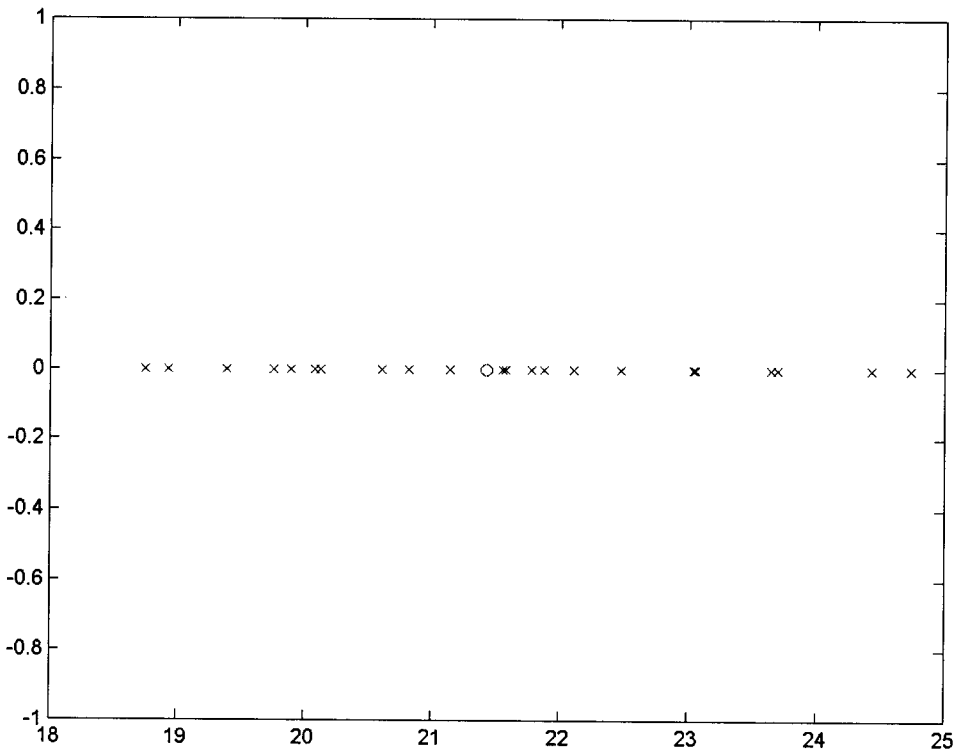
Note: ms: measurement. Table sorted by Hue (e.g. 10YR, etc.). For detailed explanations on Hue, Value, and Chroma dimensions, consult any edition of the *Munsell Soil Color Charts*.

Table 6. Solokha II Amphoras- Munsell Soil Color Chart Readings

SOLOKHA II	**Preserved surface**
87. A 666	10R 4/4, a weak red
70. A 641, shoulder	10YR 5/6, a yellowish brown
54. ПЕ 16	2.5YR 4/4, a reddish brown
61. A 608	2.5YR 5/4, a reddish brown
64. A 617, shoulder	2.5YR 5/4, a reddish brown
85. A 664, shoulder	2.5YR 5/6, a red
93. A 672, shoulder	2.5YR 5/6, a red
129. B 12	2.5YR 5/6, a red
98. A 740	5YR 5/3, a reddish brown
122. B 4, belly	5YR 6/2, a pinkish gray
126. B 9, shoulder	5YR 6/4, a light reddish brown
SOLOKHA II	**Broken edge**
98. A 740	10R 6/4, a pale red
129. B 12, handle	10R 6/6, a light red
54. ПЕ 16	2.5YR 5/6, a red
85. A 664, toe	2.5YR 5/8, a red
93. A 672, neck	2.5YR 5/8, a red
122. B 4, neck	2.5YR 6/4, a light reddish brown
61. A 608, neck	2.5YR 6/6, a light red
64. A 617, shoulder	2.5YR 6/6, a light red
87. A 666	2.5YR 6/6, a light red
70. A 641, belly	2.5YR 6/8, a light red

Note: Table sorted by Hue (e.g. 10YR, etc.). For detailed explanations on Hue, Value, and Chroma dimensions, consult any edition of the *Munsell Soil Color Charts*.

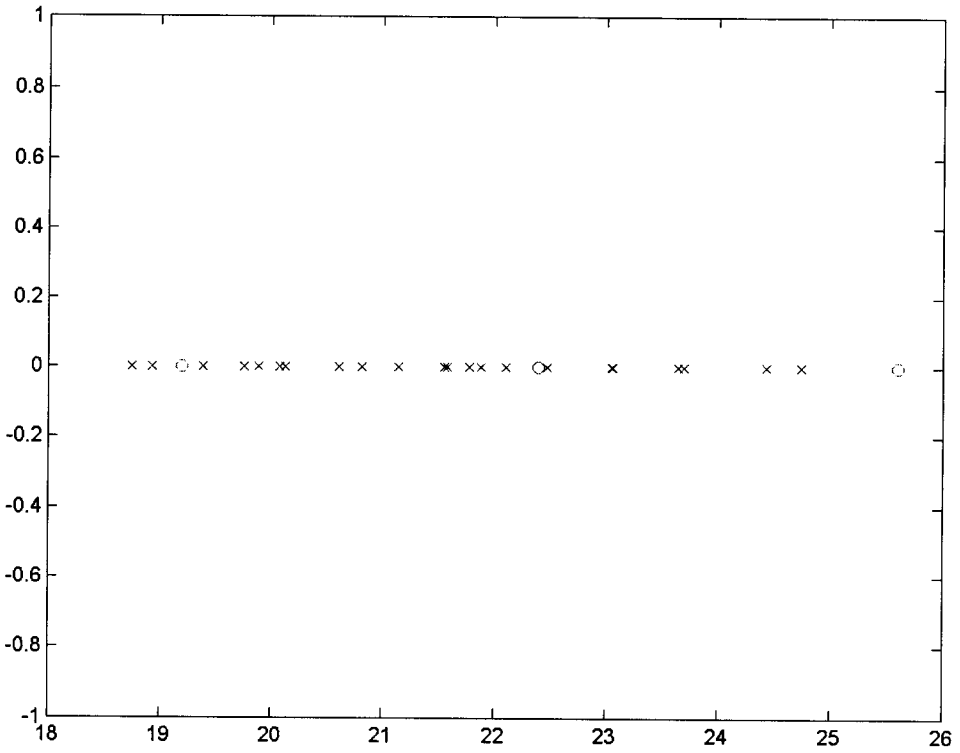
Table 7. Fuzzy K-Means Algorithm Analysis for 21.420 l. Volume



Note: Table prepared by Dr. Pitsianis. Units are in liters.
For definition of the k-means algorithm:
http://mathworld.wolfram.com/K-MeansClusteringAlgorithm.html

The 'o' mark denotes the 'centroid' volume of 21.420 l. (mean capacity), and the 'x' marks denote the 24 Mendaian capacity measurements (from Table 3) as they cluster around the 'centroid'. Results: The volumes do not cluster around the mean, but appear uniformly distributed. This analysis does not support the claim that 21.420 l. was intended to be the average 'target' capacity for these volumes.

Table 8. Fuzzy K-Means Algorithm Analysis for 6, 7, and 8 Attic Choes



Note: Table prepared by Dr. Pitsianis. Units are in liters.
For definition of the k-means algorithm:
http://mathworld.wolfram.com/K-MeansClusteringAlgorithm.html

The three 'o' marks denote the 'centroid' standard capacities of 6, 7, and 8 Attic choes (19.200 l., 22.400 l., and 25.600 l. respectively). The 'x' marks denote the 24 Mendaian capacity measurements (from Table 3) as they cluster around the 'centroids'.
Results: the volumes do not cluster around the three targets, but appear uniformly distributed. The data are not adequate to support or refute a claim that the amphoras were intended to hold 6, 7, or 8 Attic choes.

FIGURES

Figure. 1. Greece during the Classical times (Boardman 1988, 22).

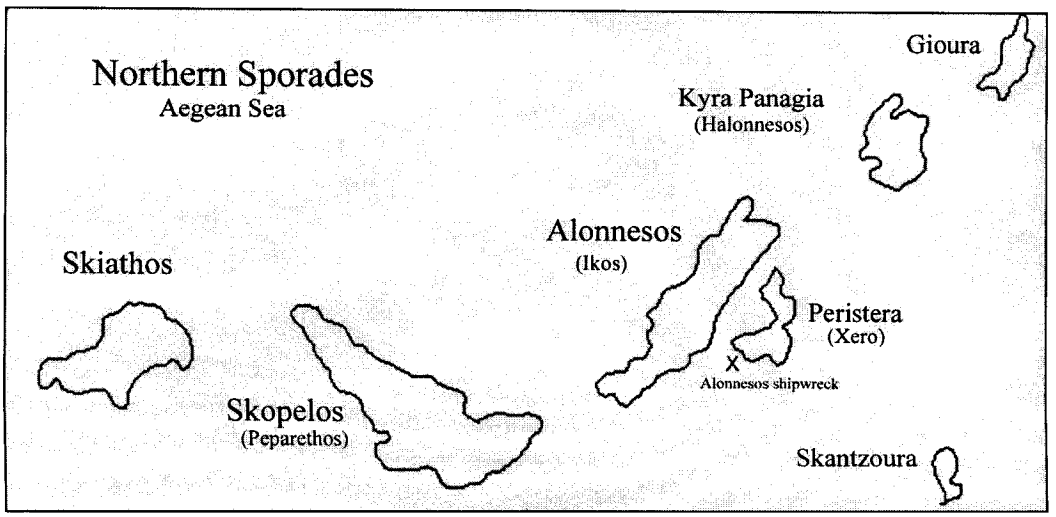


Figure. 2. The islands of Northern Sporades.

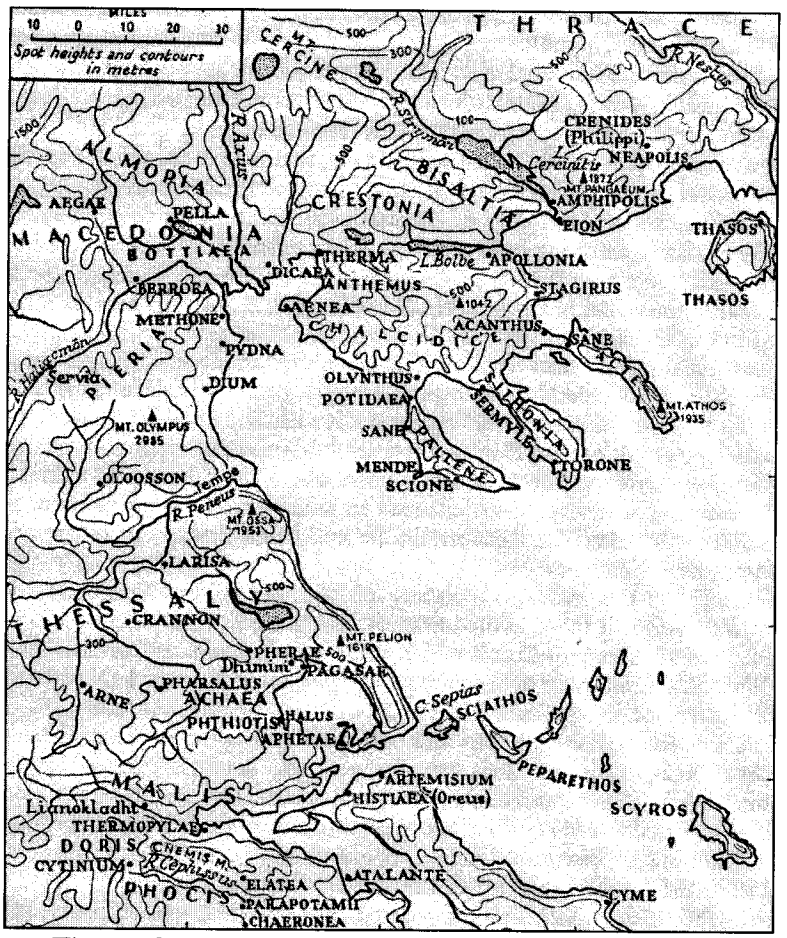


Figure. 3. North-east Greece (Hammond 1971, 3, Fig. 2).

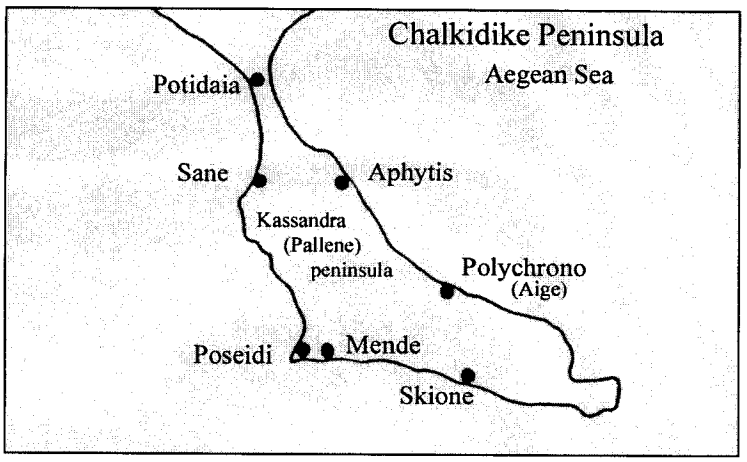


Figure. 4. The Pallene sub-peninsula in Chalkidike.

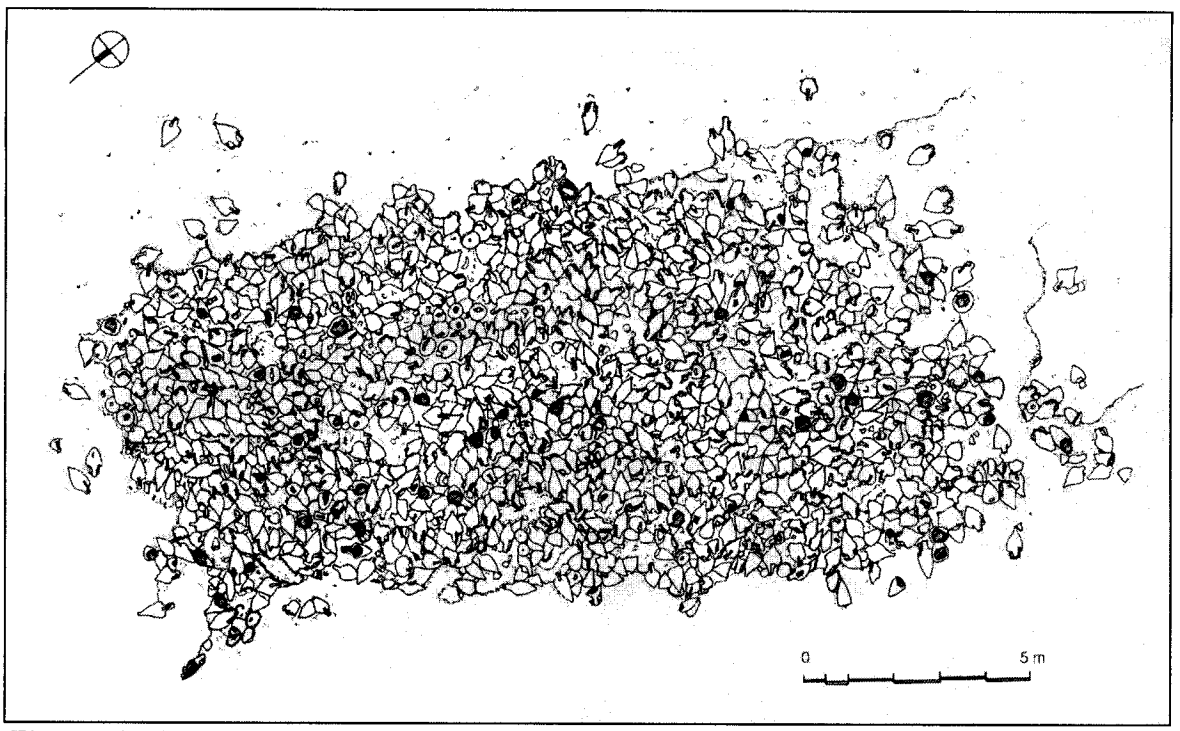


Figure. 5. Photogrammetric plan of the Alonnesos shipwreck (Hadjidaki 1996, 41, Fig. 6; plan by N. Lianos, Aik. Tagonidou).

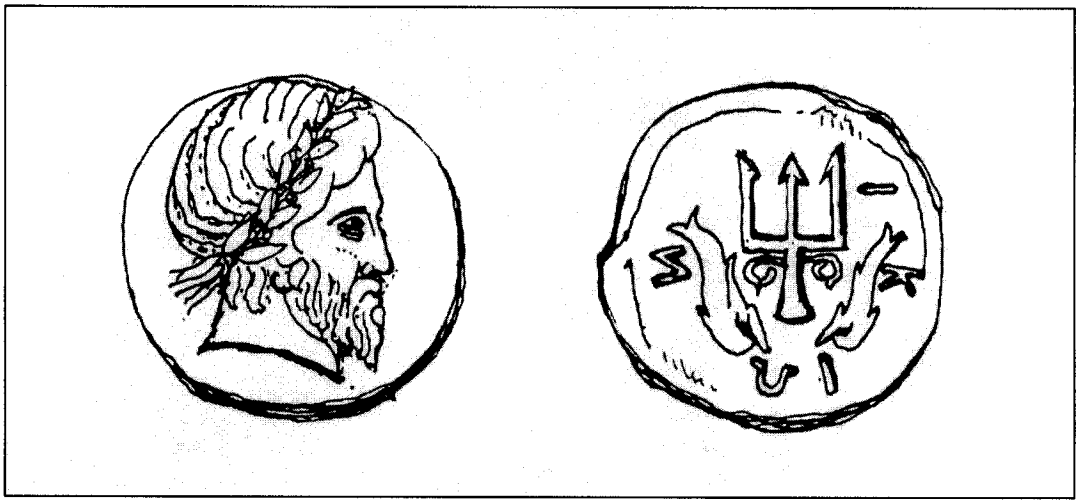


Figure. 6. Ikian copper coin (Sampson 1970, 355, 4th c. B.C.)

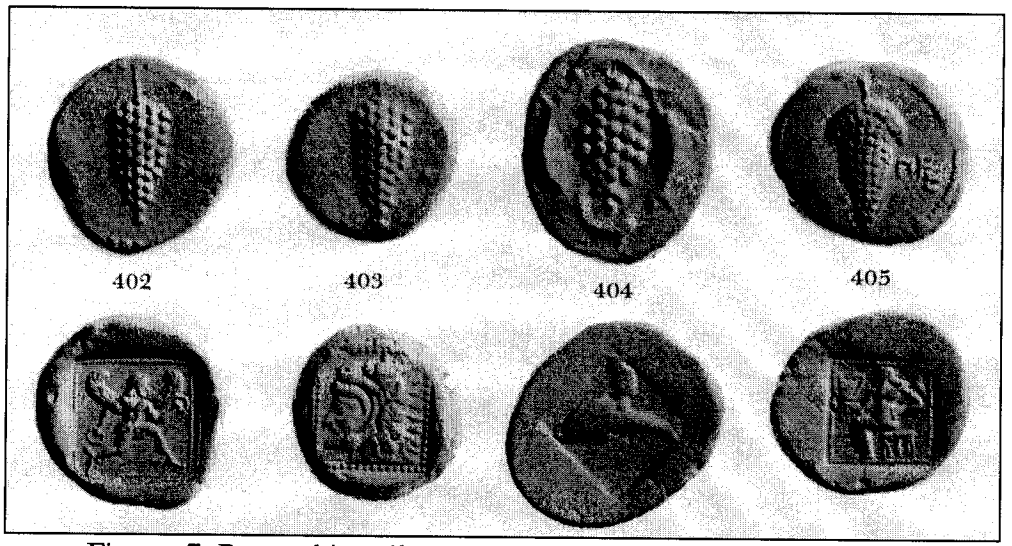


Figure. 7. Peparethian silver coins (Kraay 1976, Pl. 22, 510-480 B.C.).

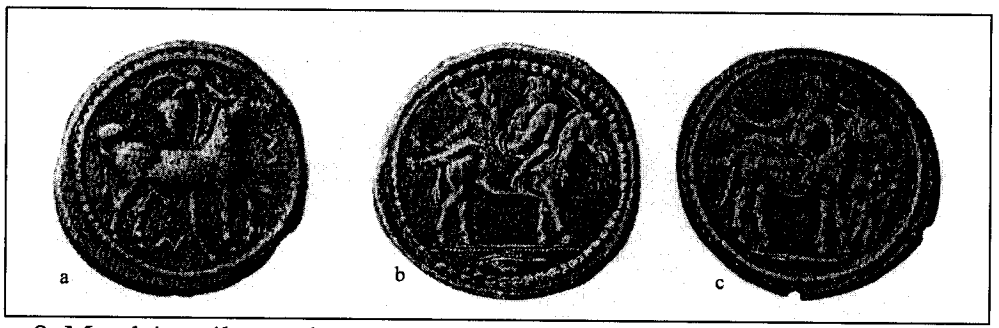


Figure. 8. Mendaian silver coins: a. Mendaian ithyphallic ass with starling pecking at its root (ca. 520-460); b. & c. Dionysos on ass, ca. 460-423 (Papageorgiadou-Bone 1998, 120, Figs. 13 and 14).

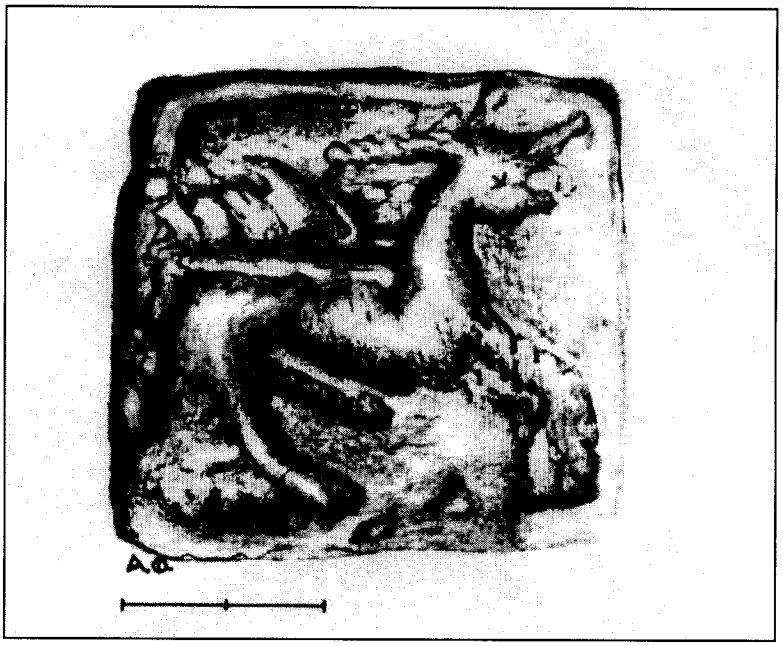


Figure. 9. Roof tile stamped with the 'Mendaian Ass'
(Vokotopoulou, *AEMTh II* 1988, 335, Fig. 3, 6th c. B.C.)

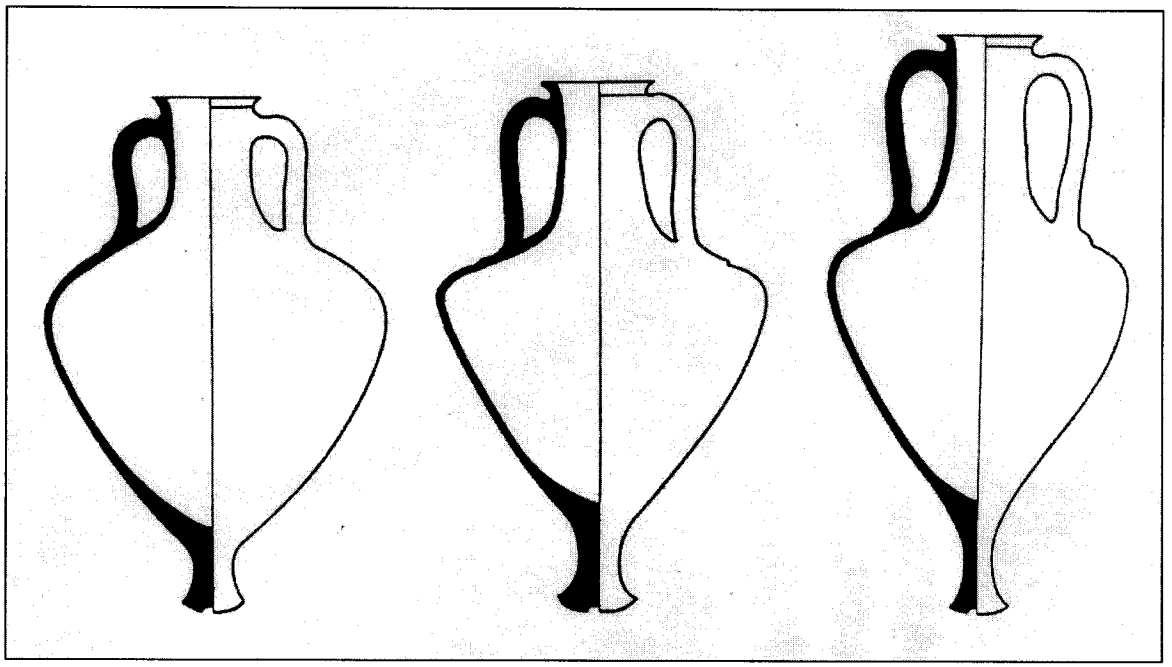


Figure. 10. Mendaian type amphoras (Brashinsky 1976, 70; from the left: Fig. 3, last quarter of the 5th c., Figs. 4 and 5, early 4th c. B.C.).

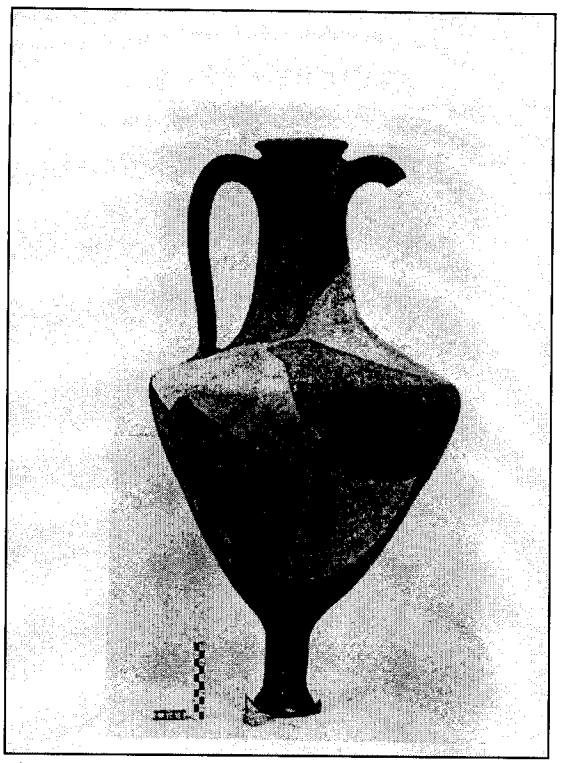


Figure. 11. Amphora A 282 found on Kos (Kantzia 1994, Pl. 256ε, 4th c. B.C.).

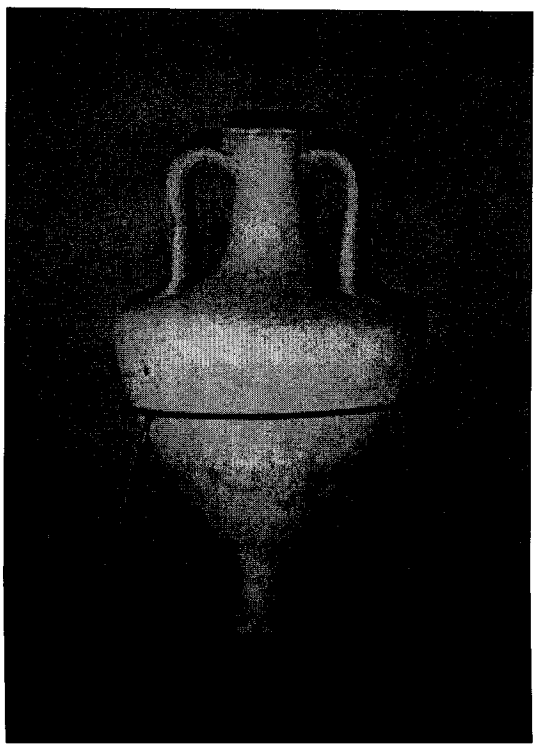


Figure. 12. Mendaian type amphora (Courtesy of the Archaeological Museum of Seteia, Crete).

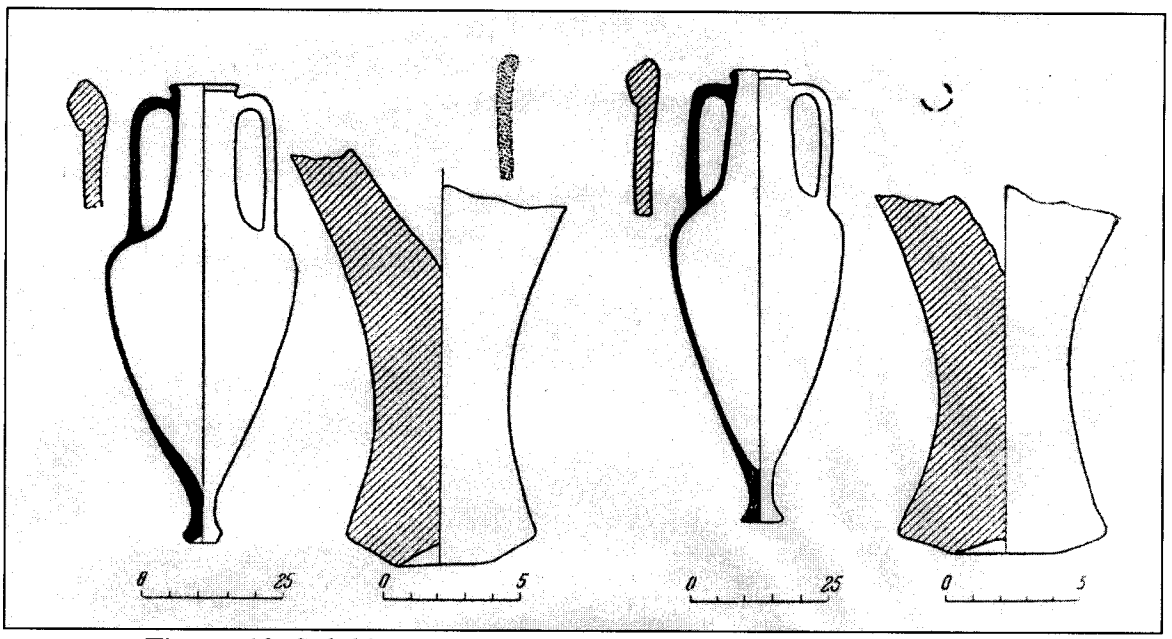


Figure. 13. Solokha II type amphoras (Zeest 1960, 154, Pl. XVIII.35.g,d).

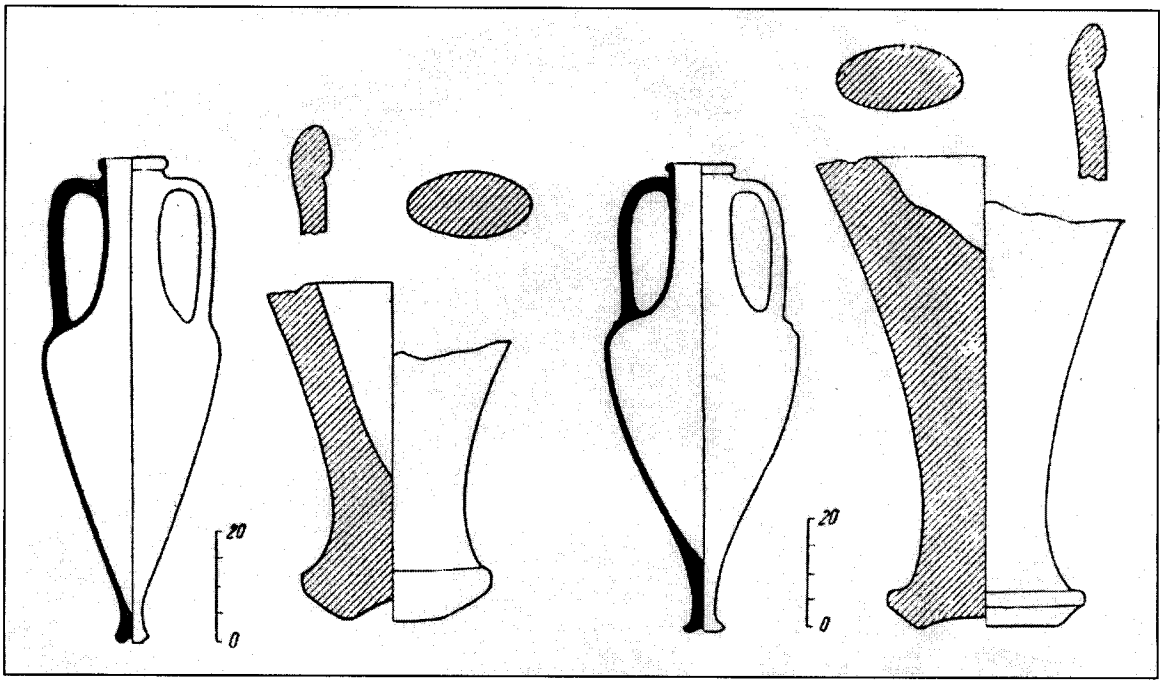


Figure. 14. Solokha II type amphoras (Zeest 1960, 155, Pl. XIX.35.z,i).

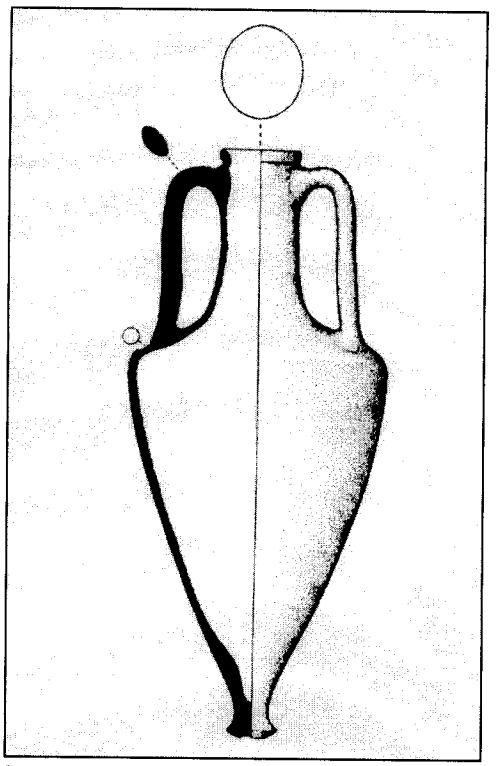


Figure. 15. Solokha II type amphora (Eiseman and Ridgway 1987, 50, Fig. 4-16, C32, early 4th c. B.C.).

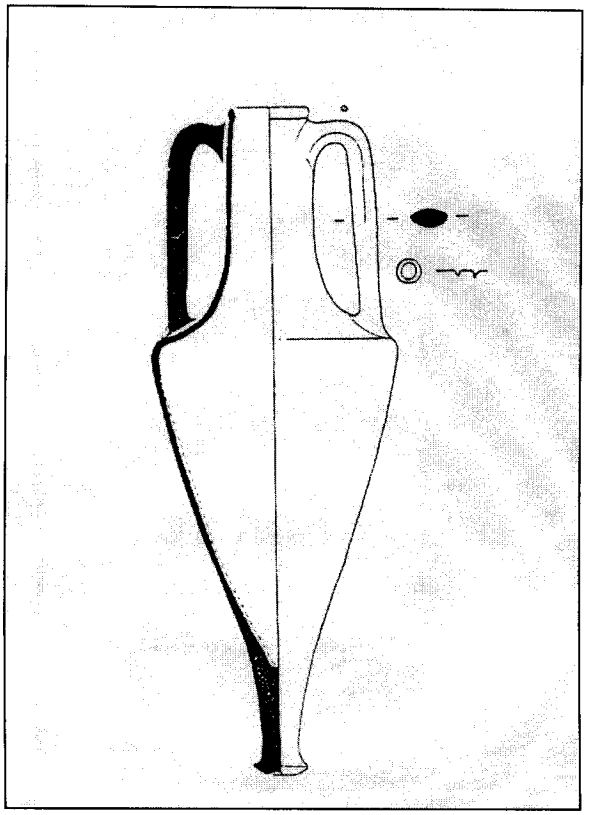


Figure. 16. Peparethian I type amphora (Doulgeri-Garlan 1990, 374, Fig. 8, BE 6843).

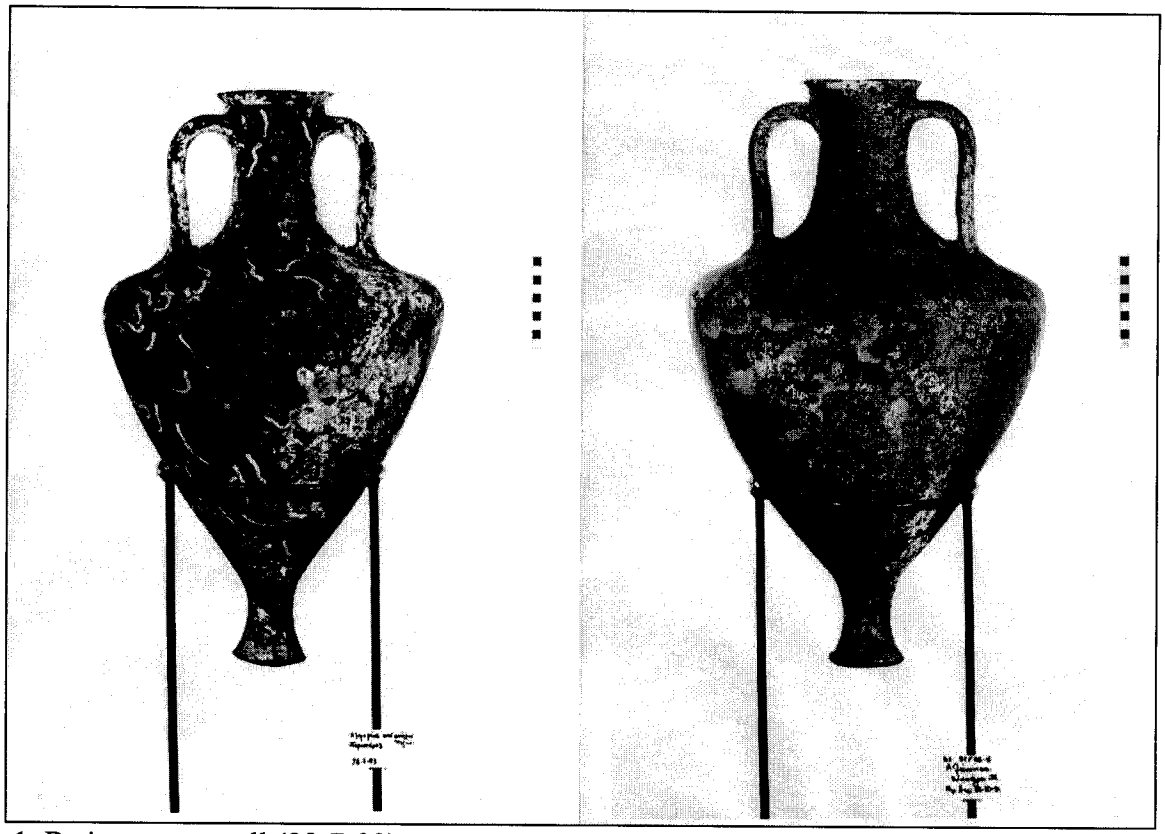
PLATES

Photographs and Drawings of Mendaian, Solokha II, & Miscellaneous Amphoras

Note: The numbers under the photographs 1-148 correspond to the numbers in the 'Amphora Description and Catalogue' (Chapter 4): Mendaian (Pls. 1-12, Nos. 1-51), Solokha II (Pls. 13-34, Nos. 52-142), and Miscellaneous amphoras (Pl. 35, Nos. 143-148). Each photograph includes a scale that represents 10 cm.; the images of the jars are somewhat larger than 1:10.

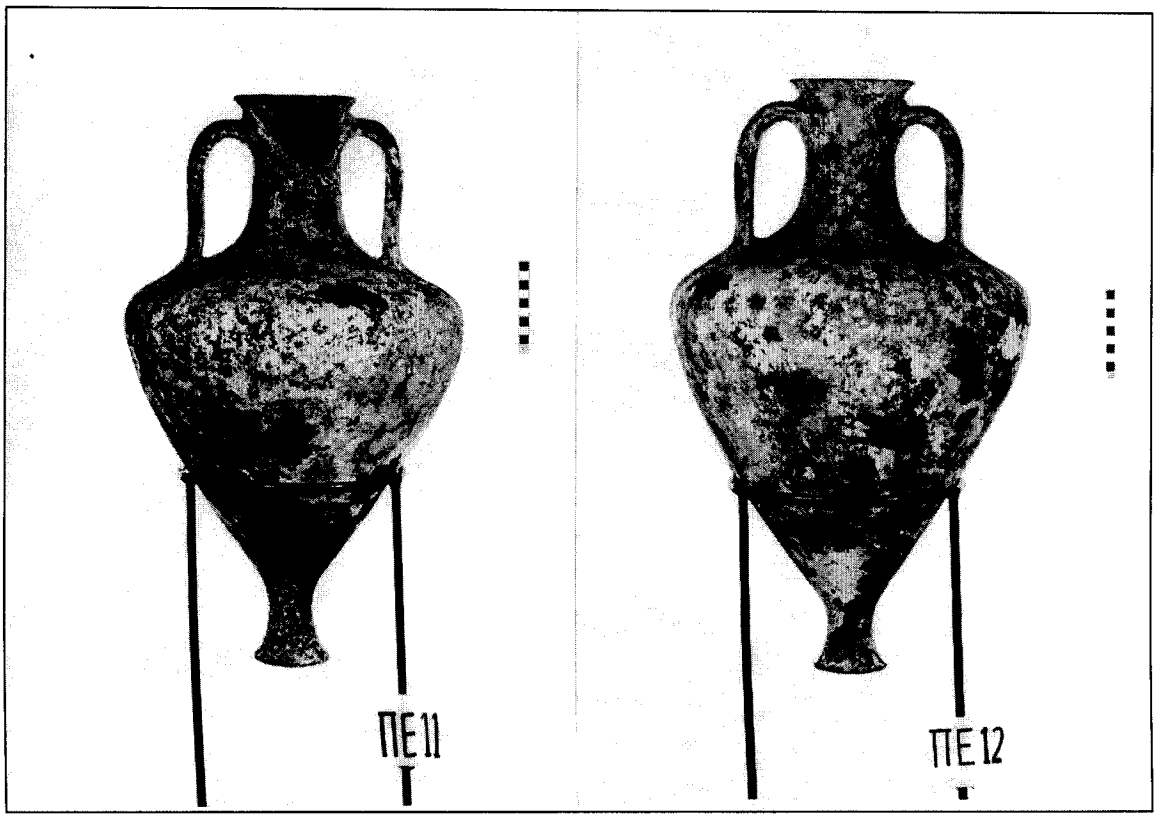
The numbers under the drawings (Pls. 36-40) correspond to the numbers in the Amphora Catalogue. They are illustrated at 1:8. Each drawing includes a scale that represents 4 cm.

The photographs were taken by Mr. Petros Vezirtzis, and the drawings were done by Mr. Kostas Phaphoutis and Mr. Vasilios Skouphis.



1. Peristera sea well (28-7-93)

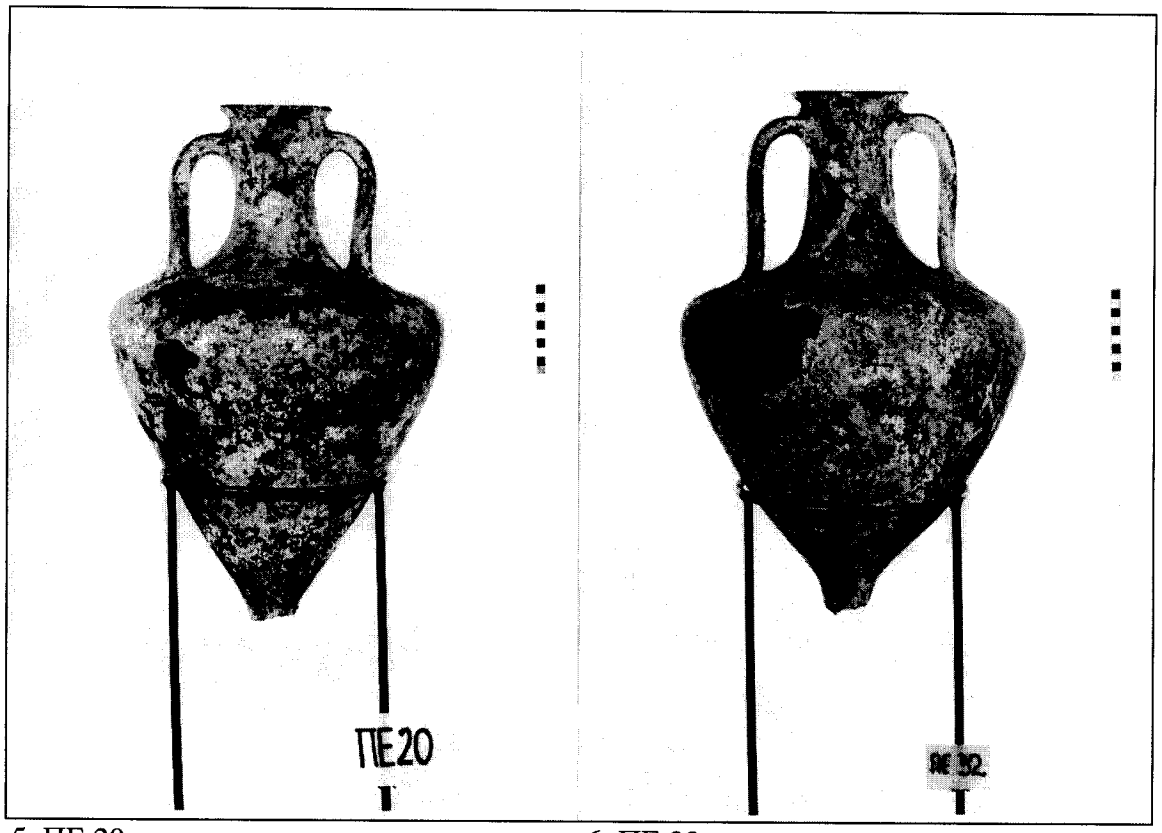
2. BE 91/16-6



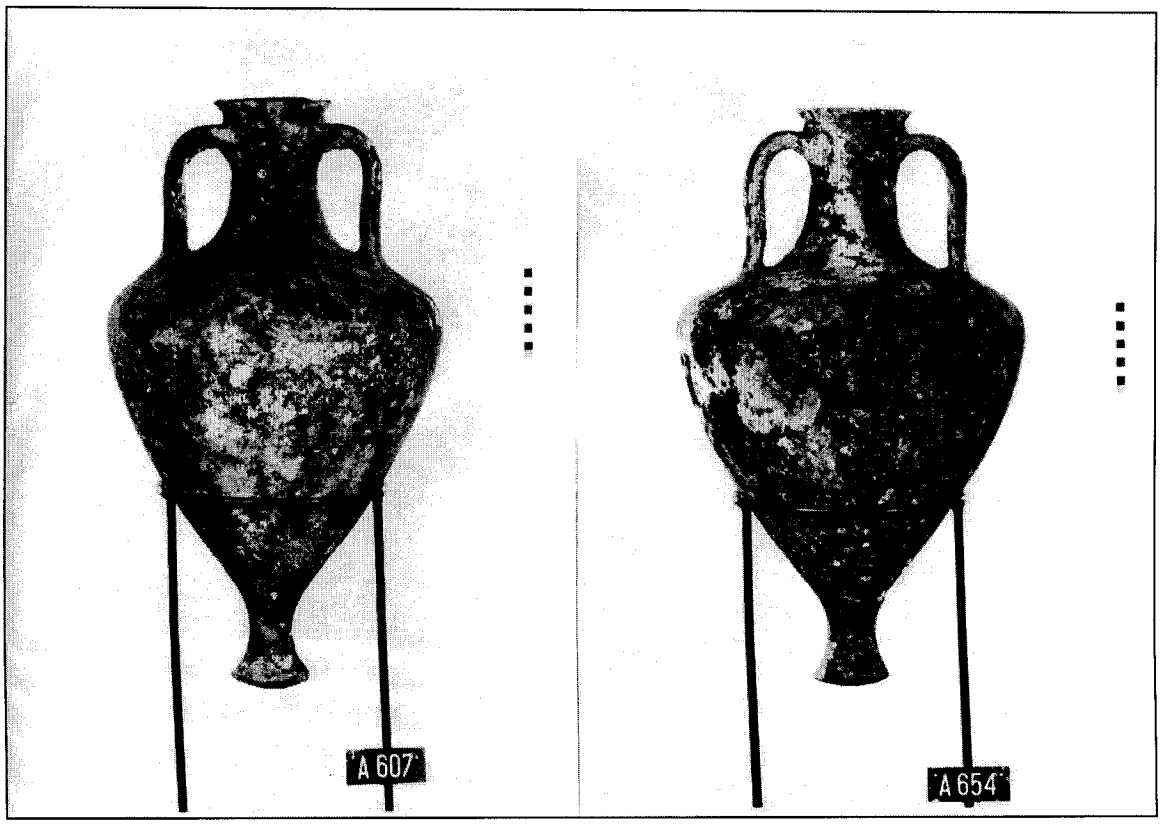
3. ΠΕ 11

4. ΠΕ 12

PLATE 1. Mendaian Amphoras.

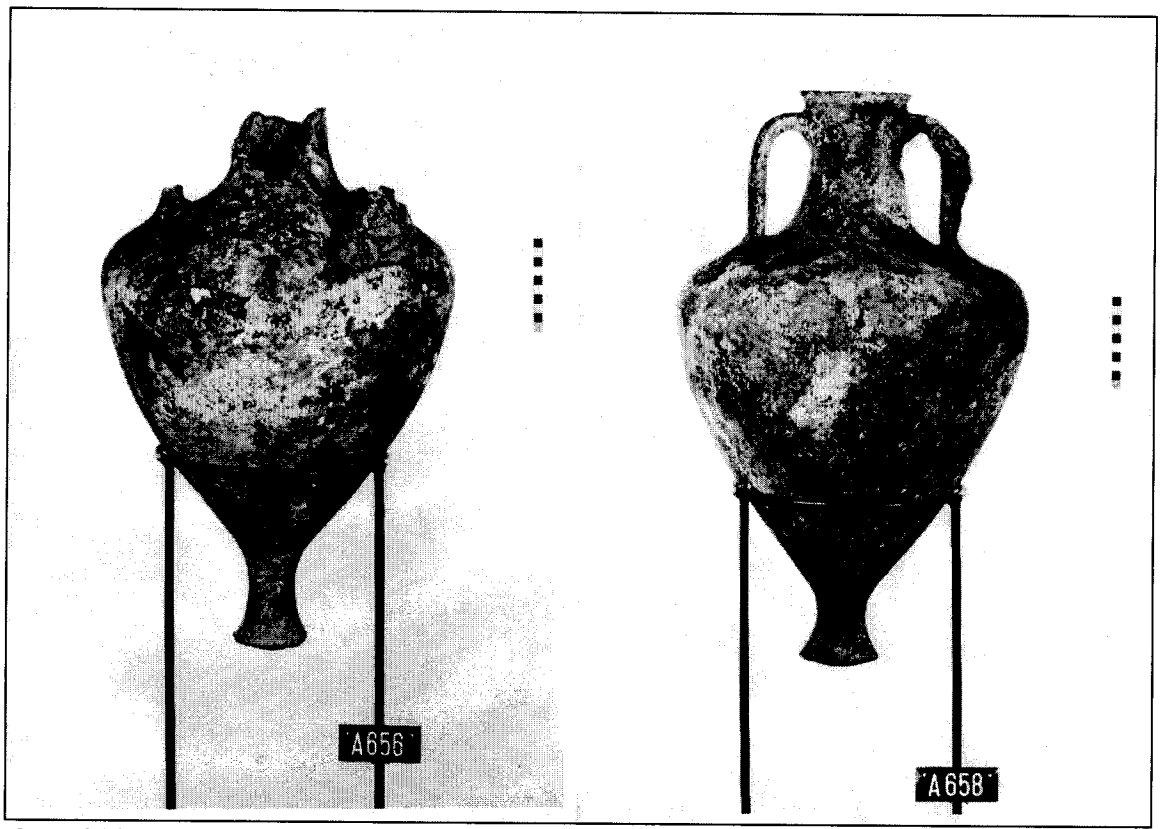


5. ΠΕ 20 6. ΠΕ 32

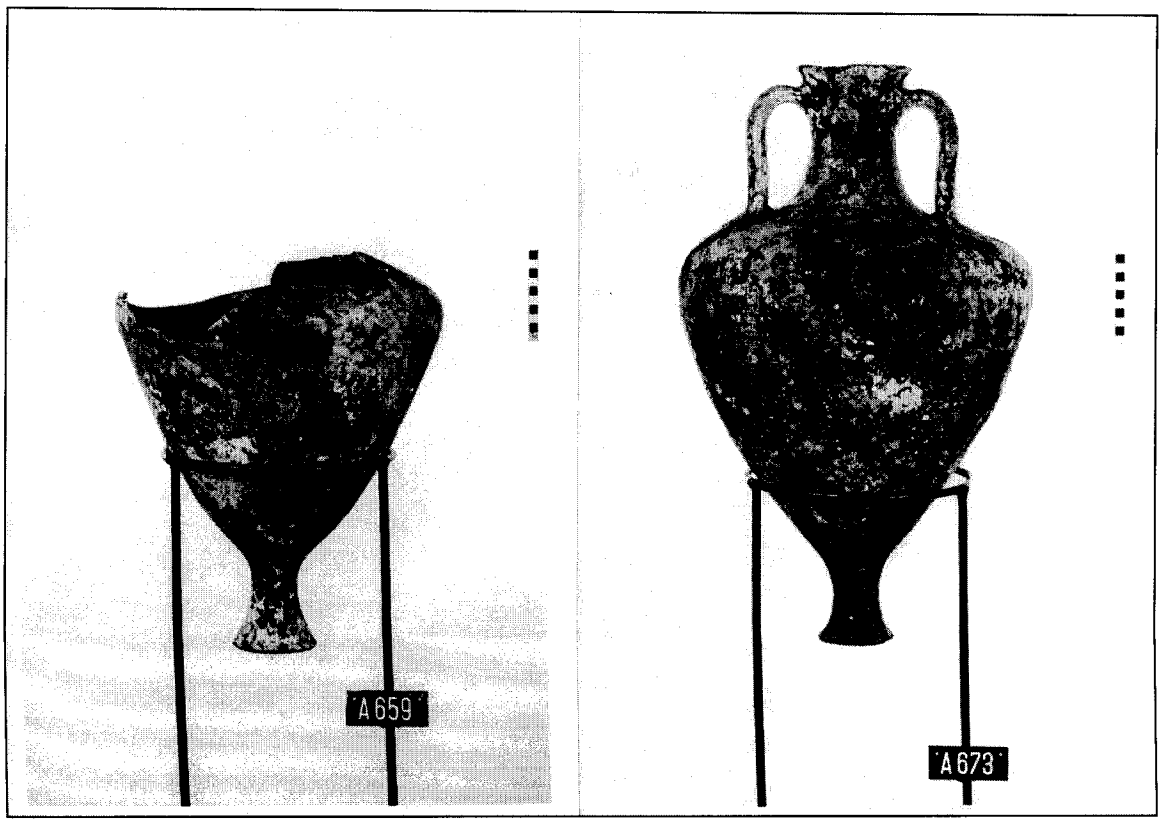


7. A 607 8. A 654

PLATE 2. Mendaian Amphoras.

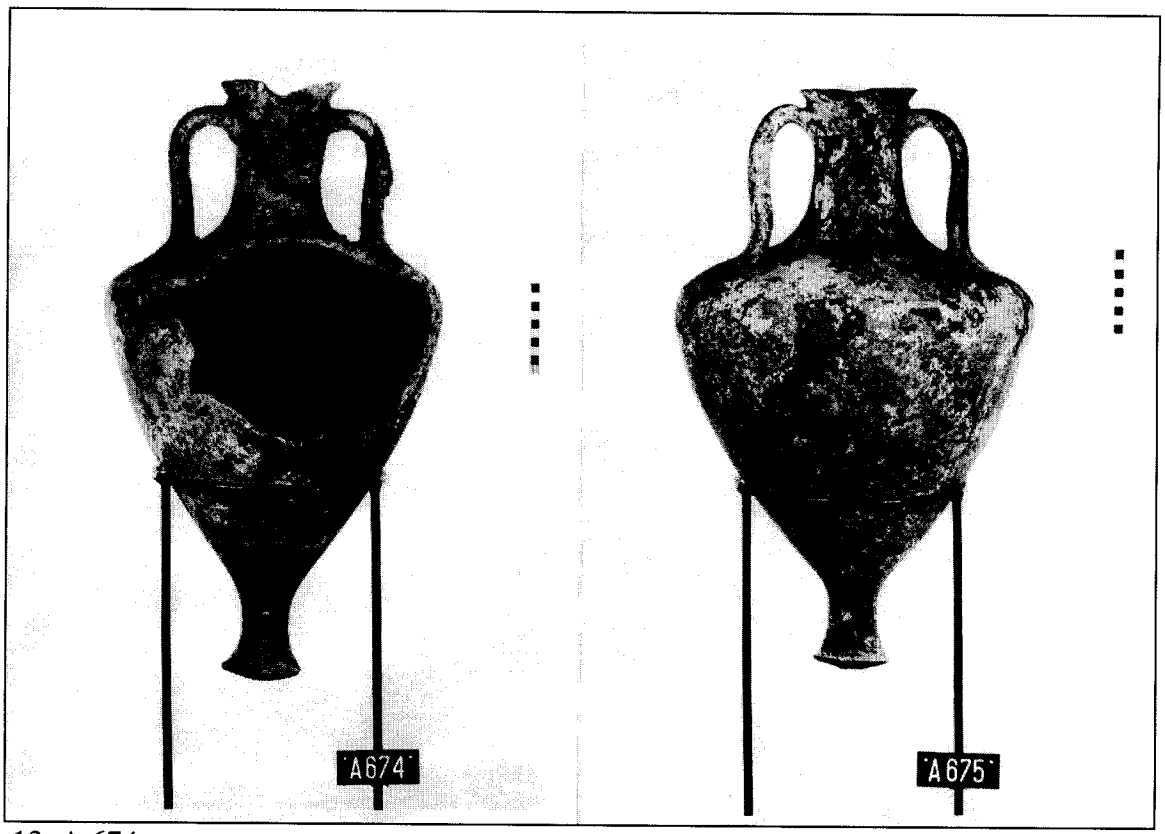


9. A 656 10. A 658

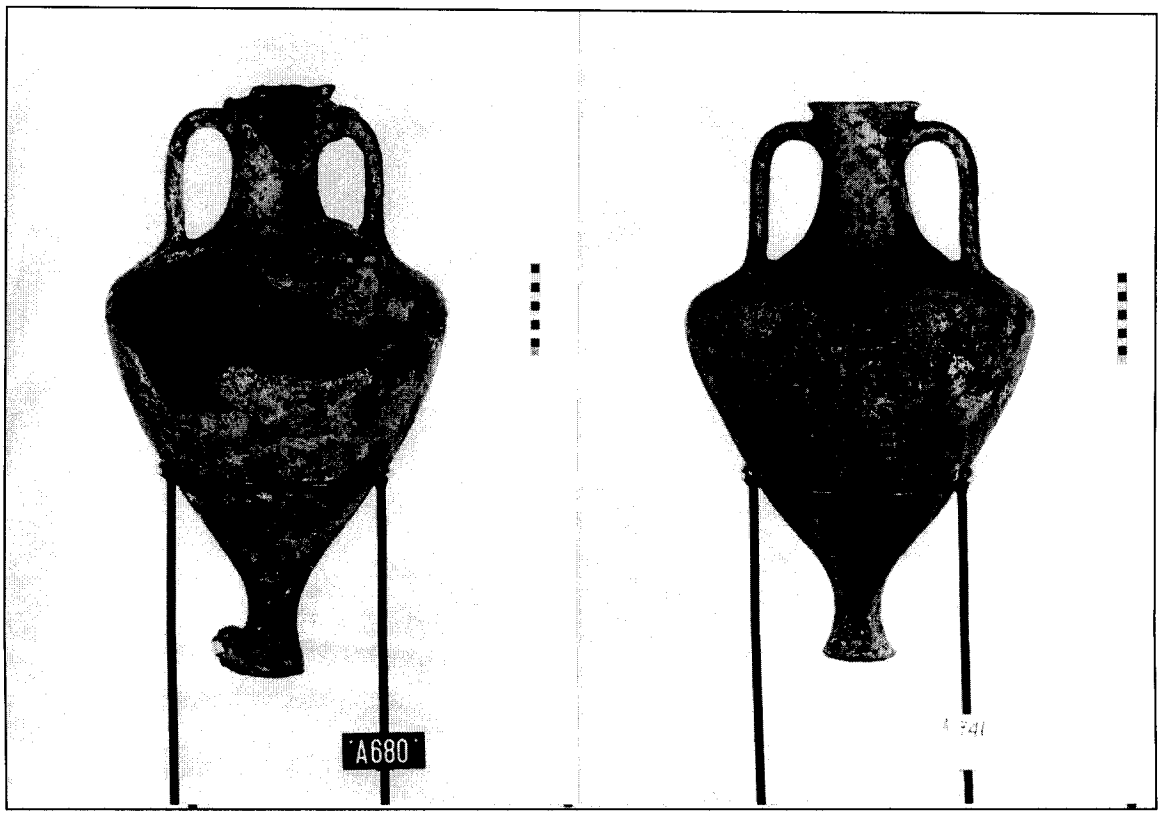


11. A 659 12. A 673

PLATE 3. Mendaian Amphoras.

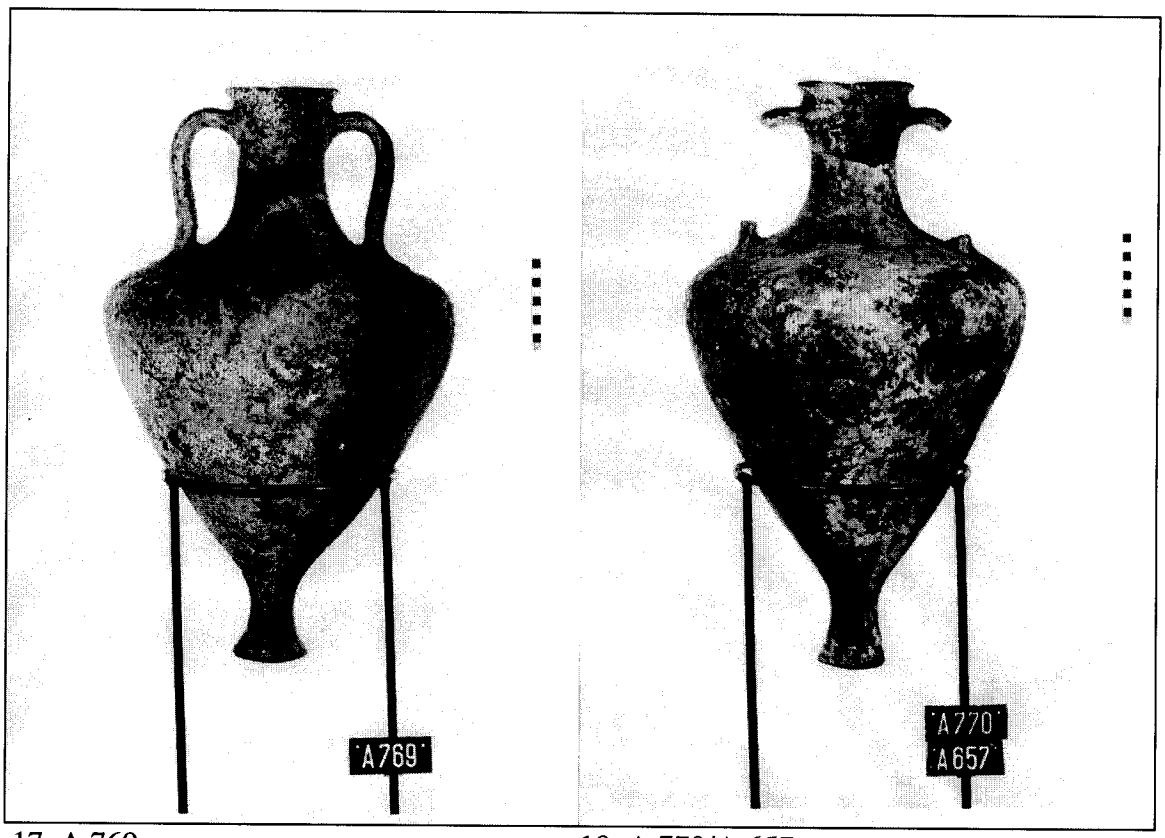


13. A 674 14. A 675



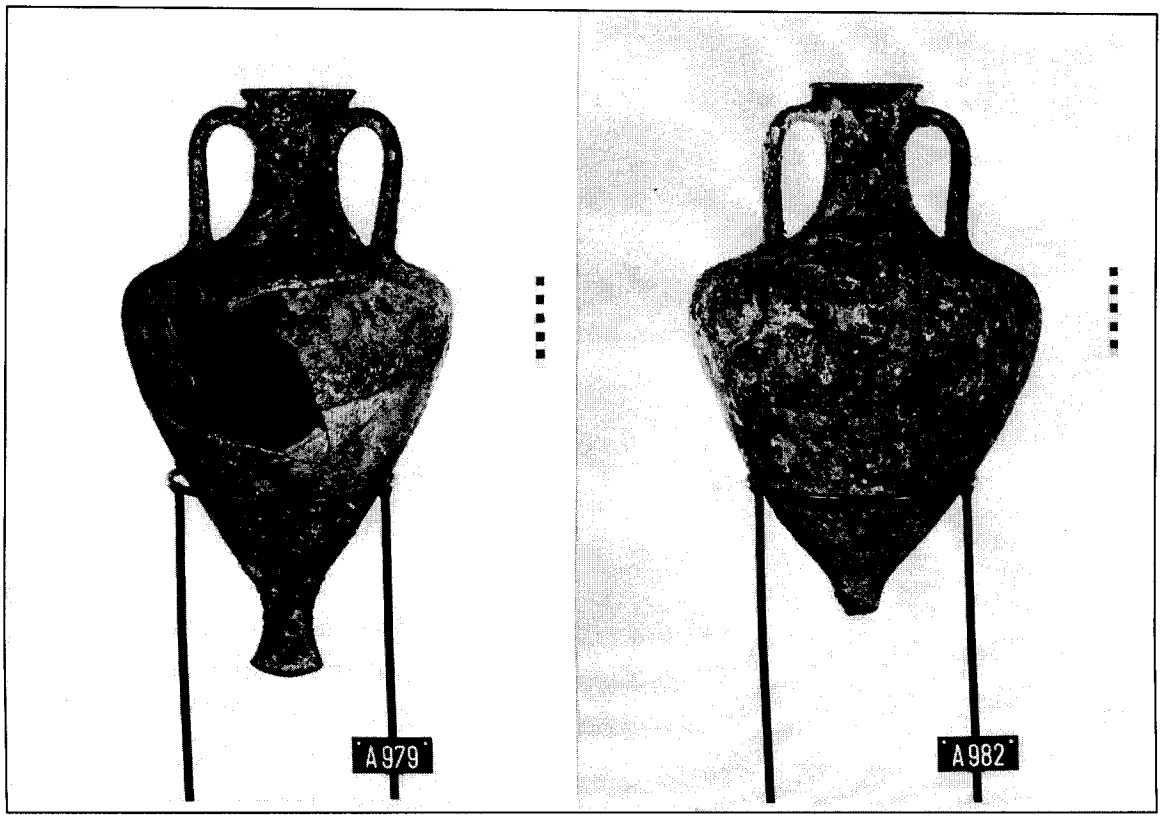
15. A 680 16. A 741

PLATE 4. Mendaian Amphoras.



17. A 769

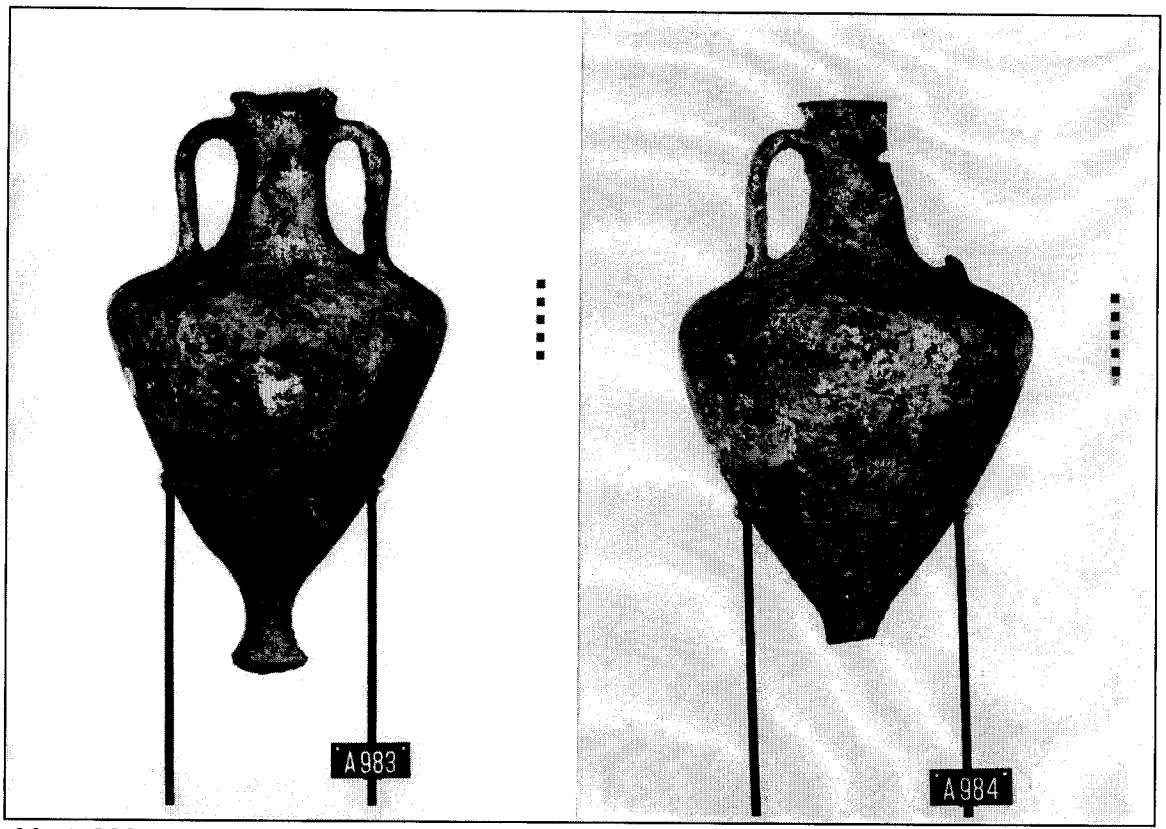
18. A 770/A 657



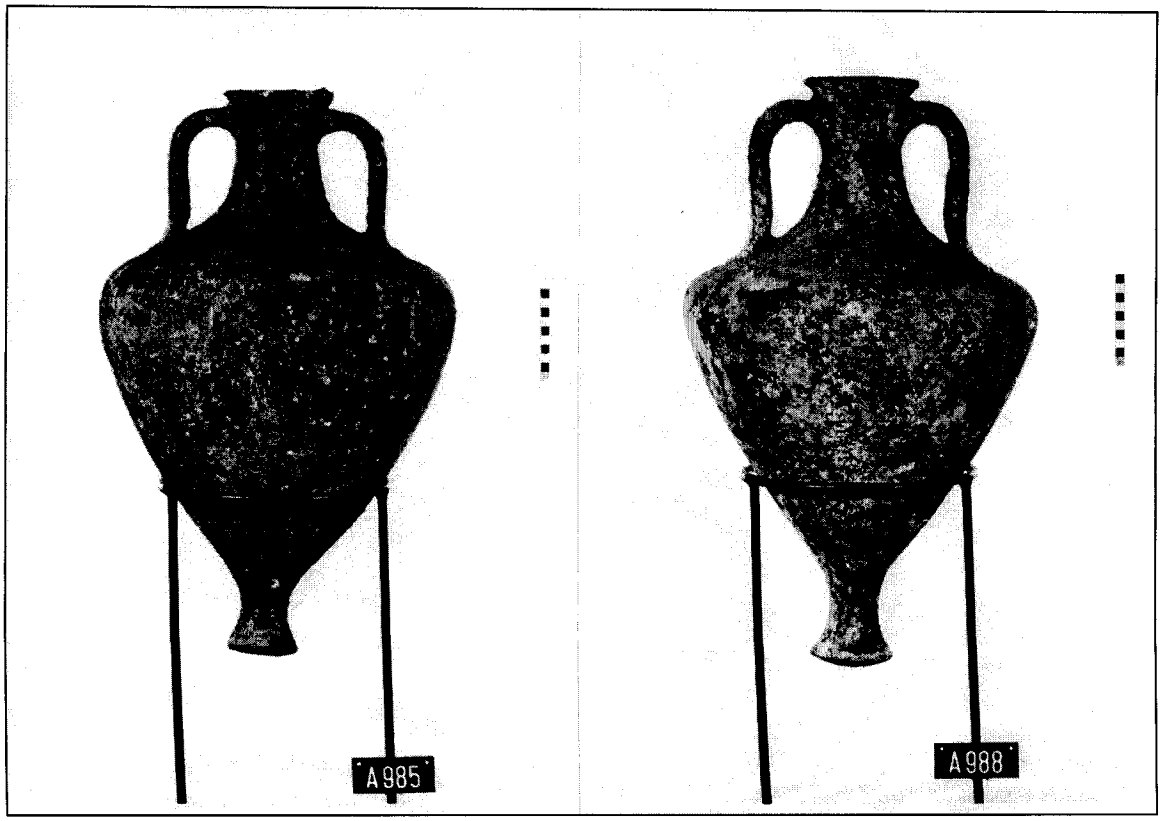
19. A 979

21. A 982

PLATE 5. Mendaian Amphoras.

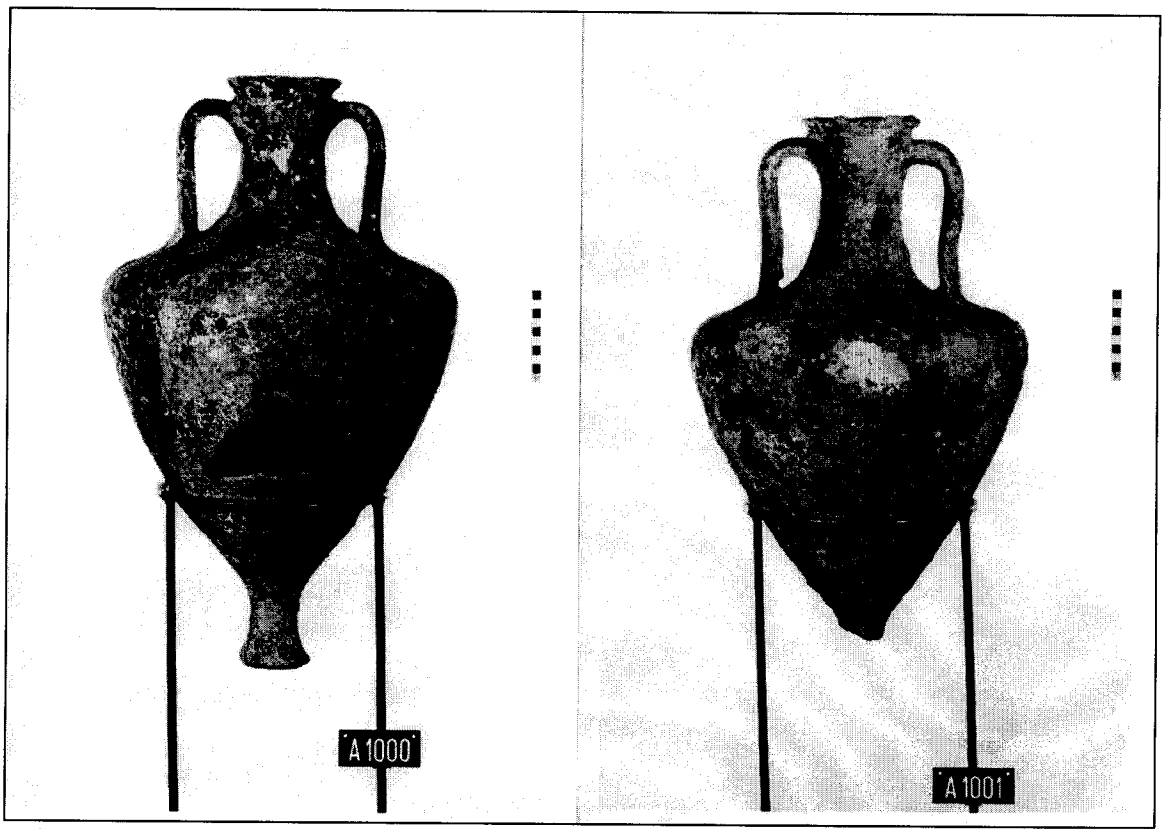


22. A 983 23. A 984



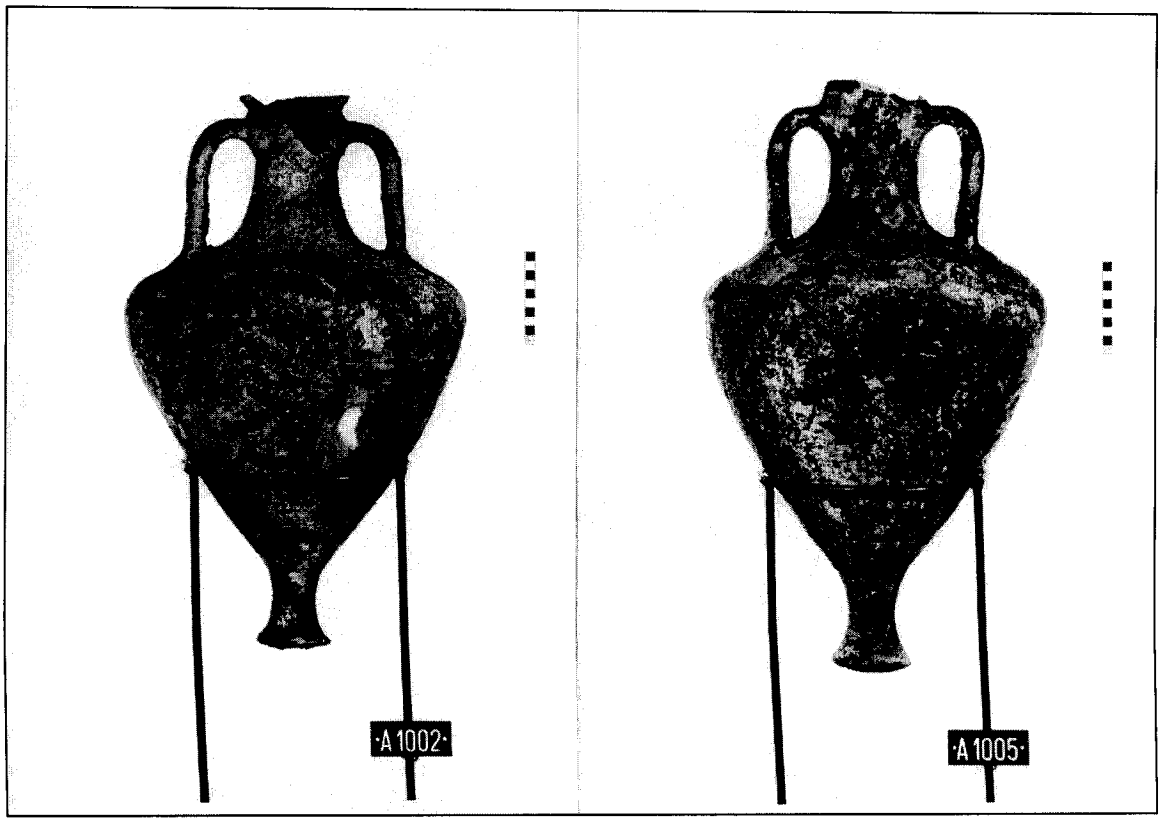
24. A 985 25. A 988

PLATE 6. Mendaian Amphoras.



26. A 1000

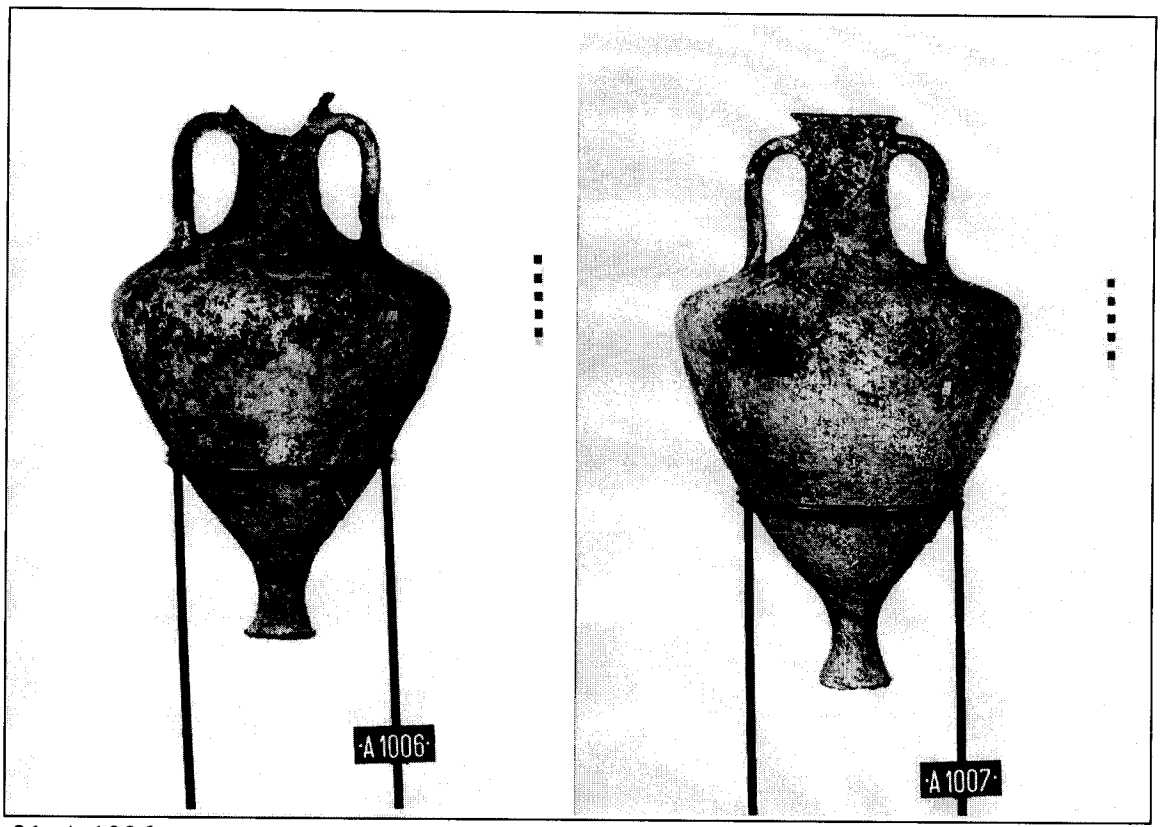
27. A 1001



28. A 1002

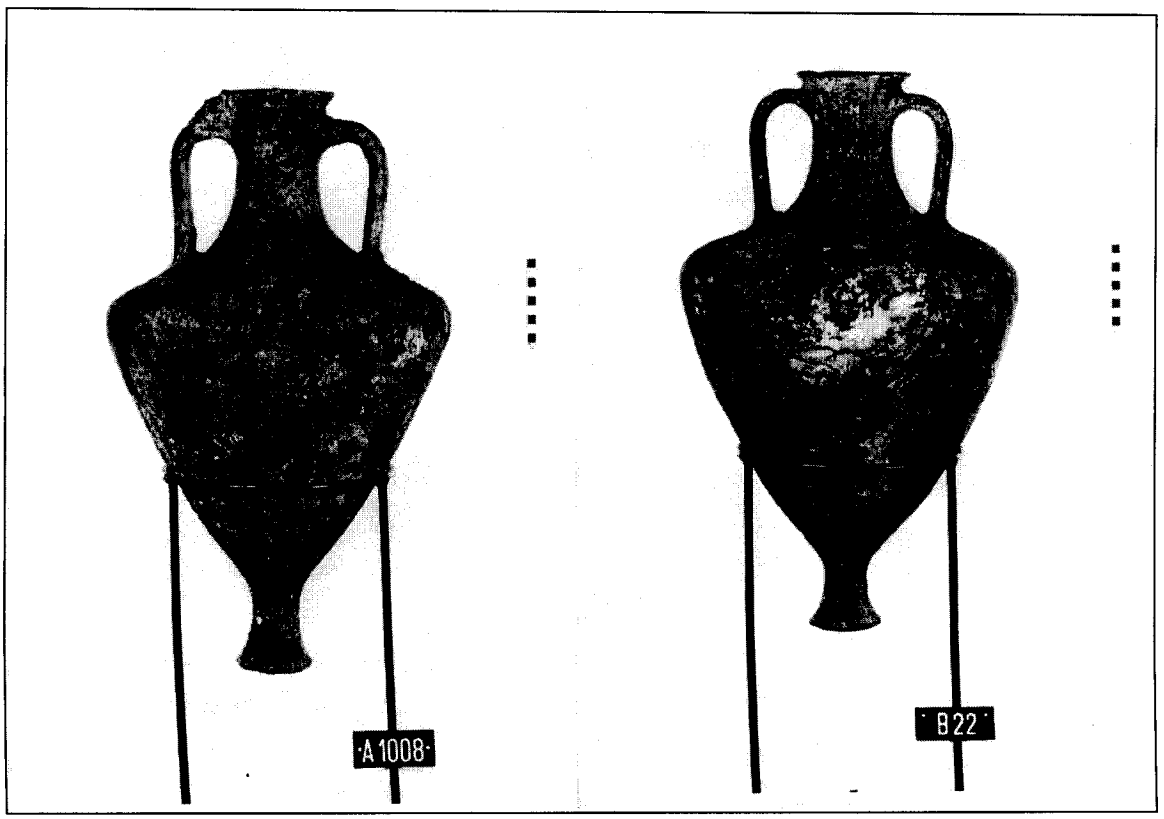
30. A 1005

PLATE 7. Mendaian Amphoras.



31. A 1006

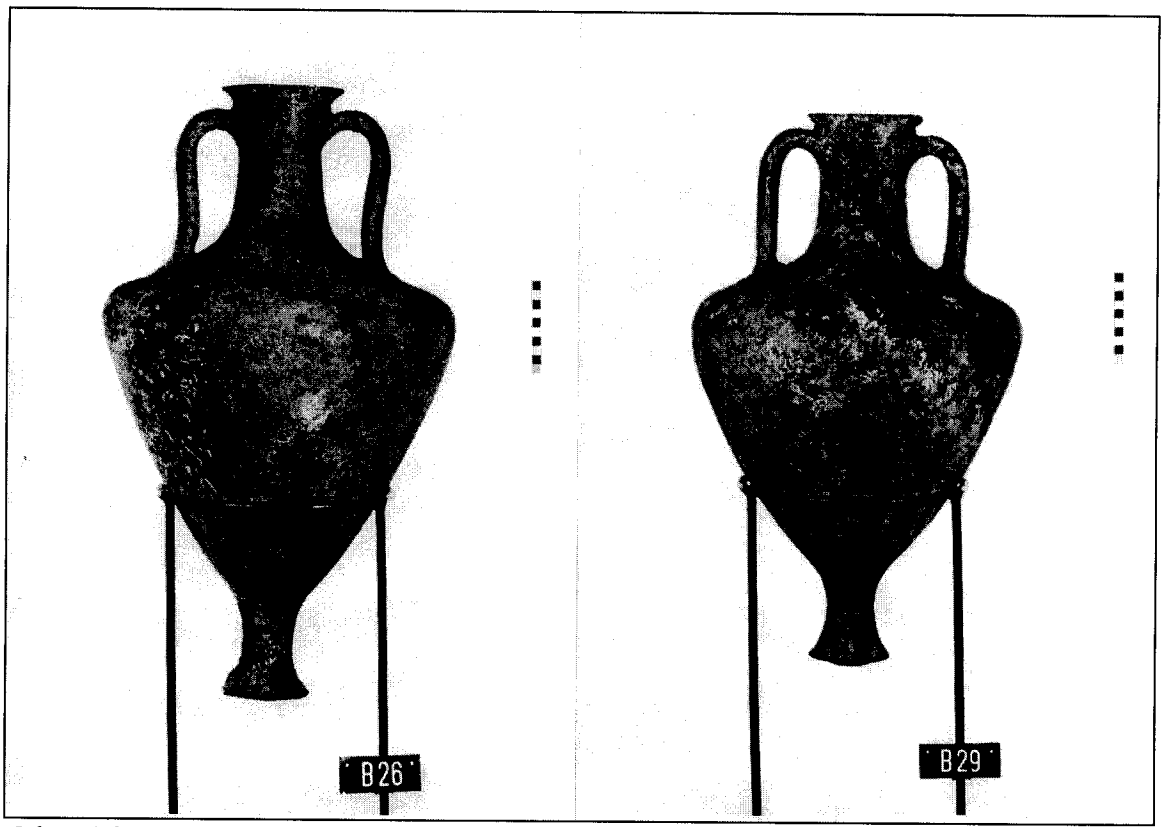
32. A 1007



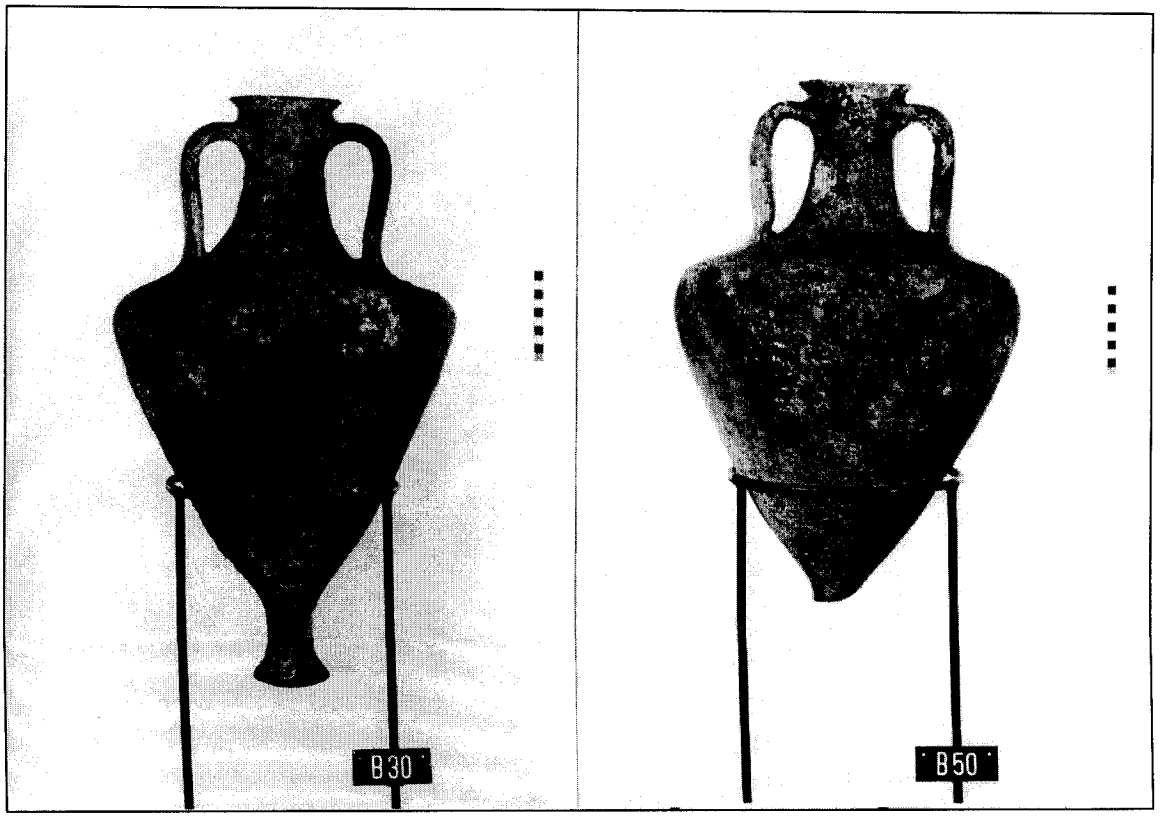
33. A 1008

35. B 22

PLATE 8. Mendaian Amphoras.

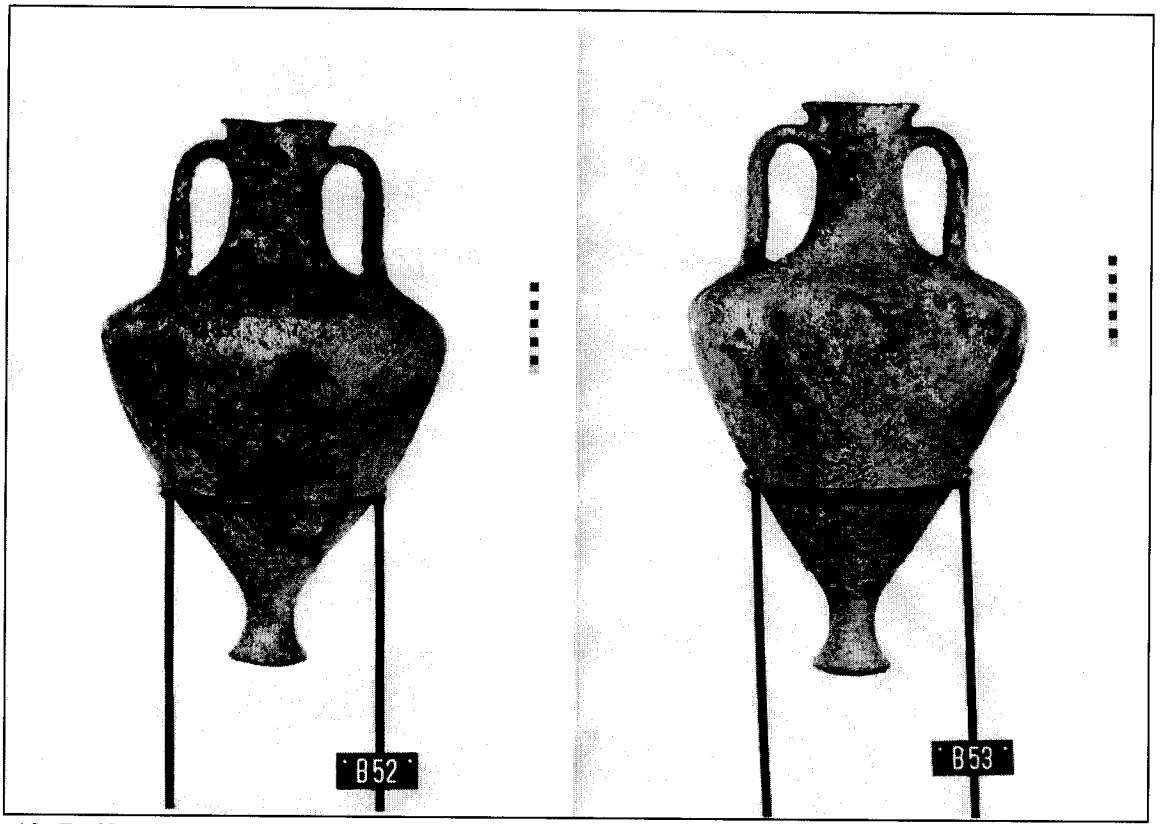


36. B 26 37. B 29

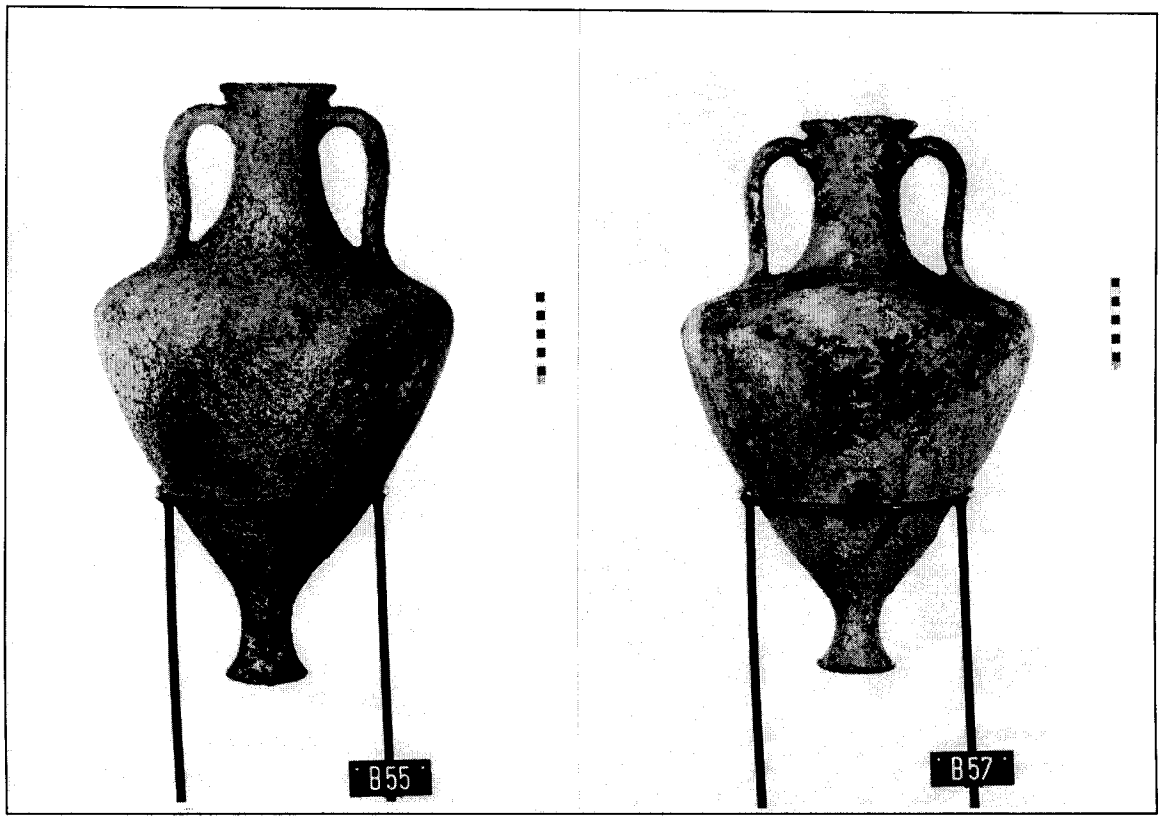


38. B 30 39. B 50

PLATE 9. Mendaian Amphoras.

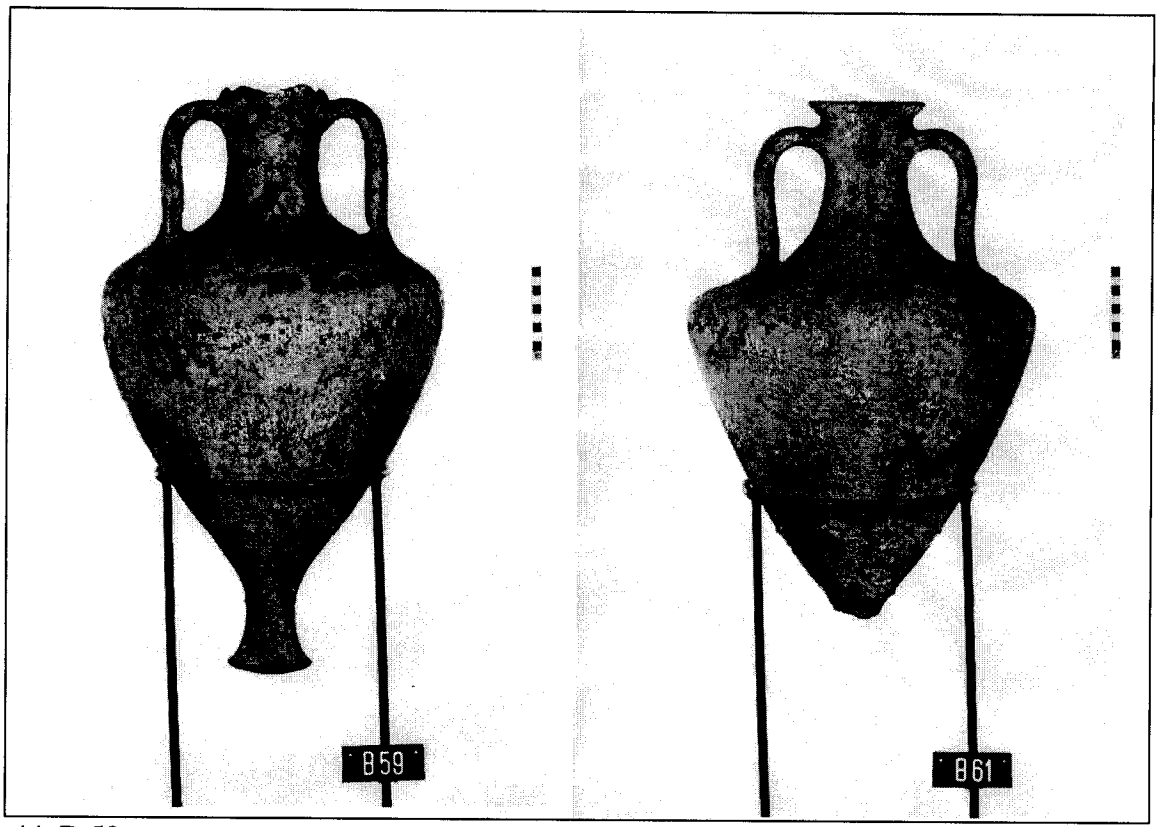


40. B 52 41. B 53

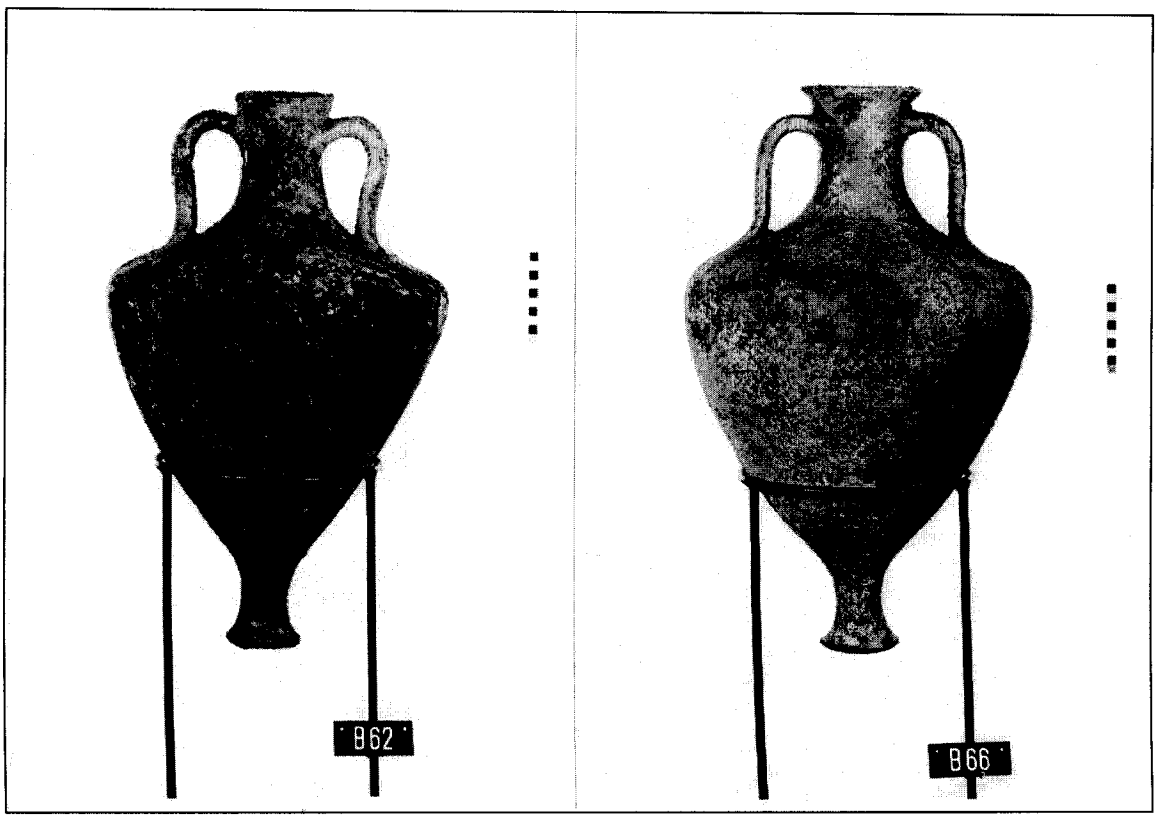


42. B 55 43. B 57

PLATE 10. Mendaian Amphoras.

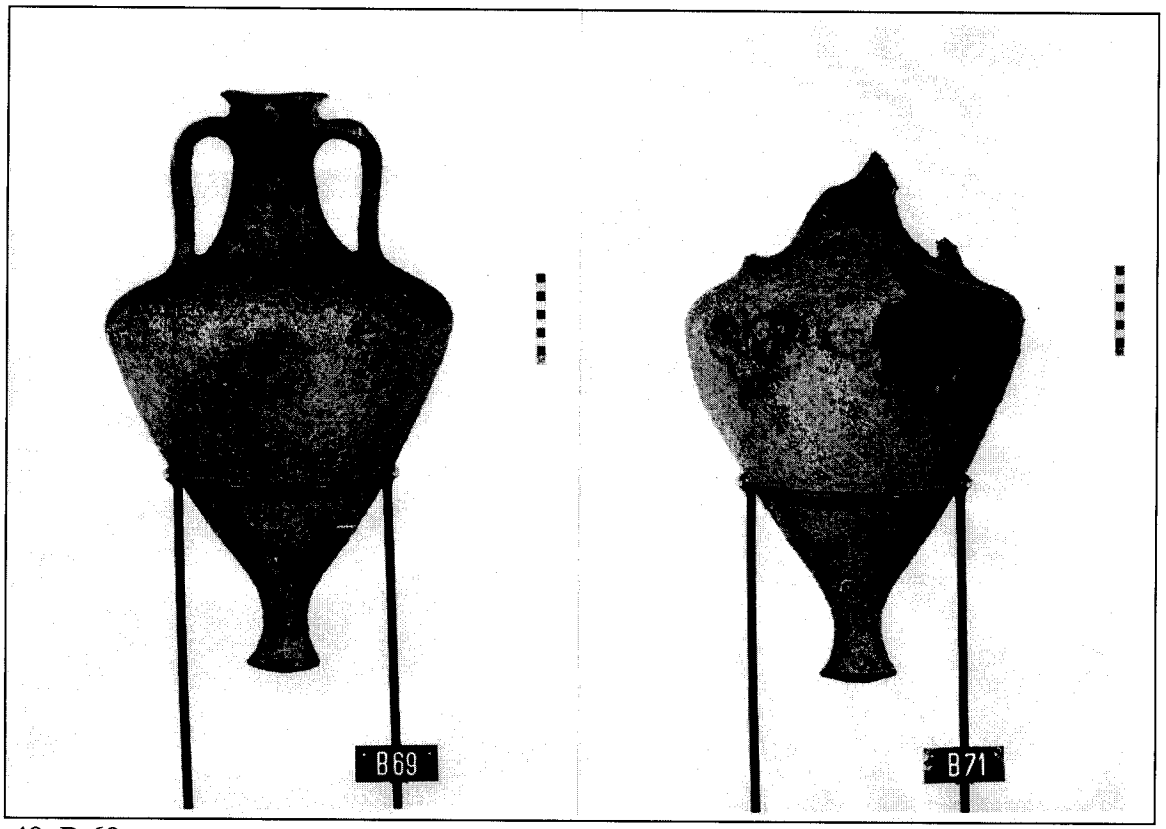


44. B 59 46. B 61



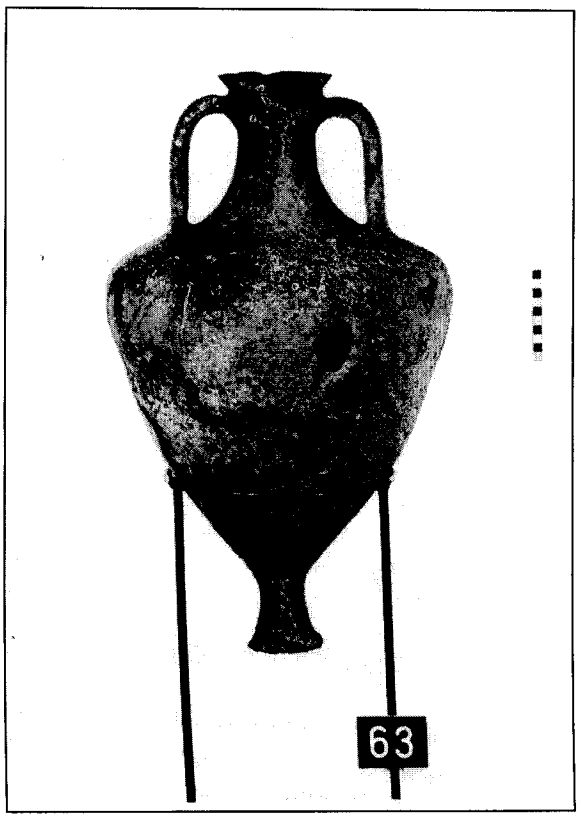
47. B 62 48. B 66

PLATE 11. Mendaian Amphoras.



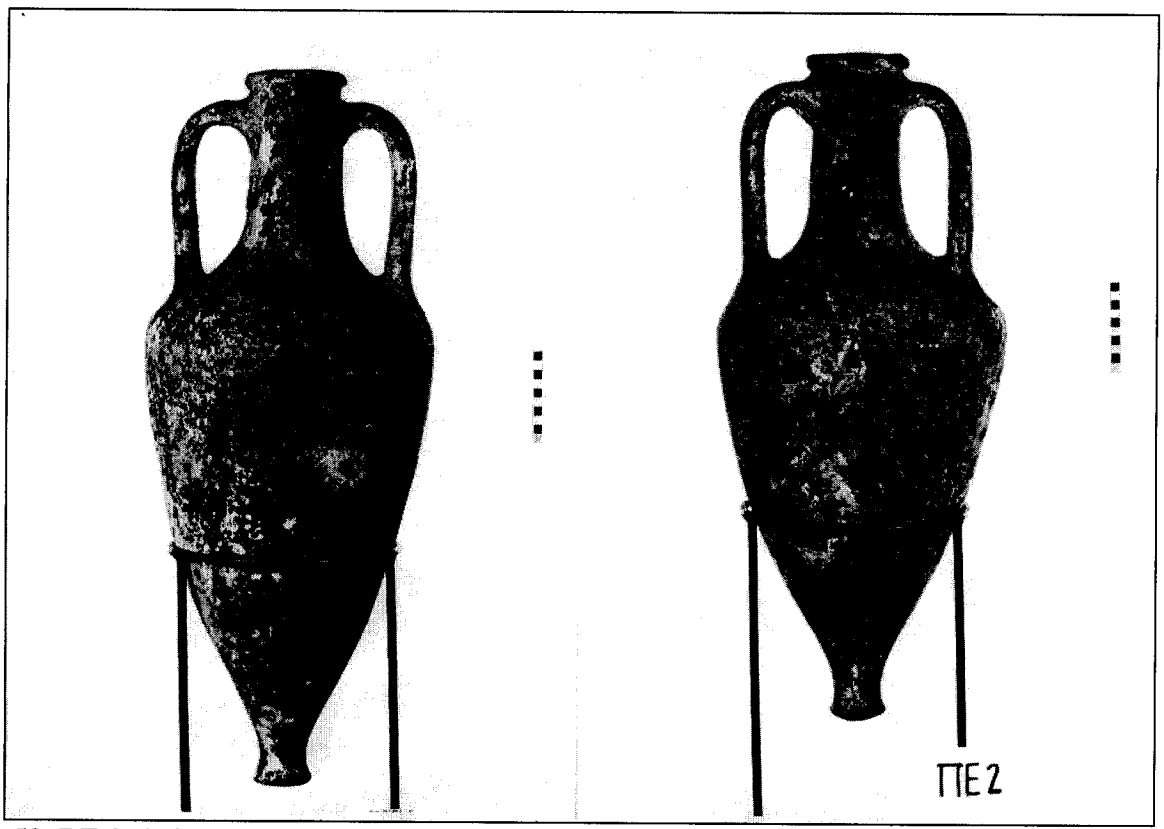
49. B 69

50. B 71

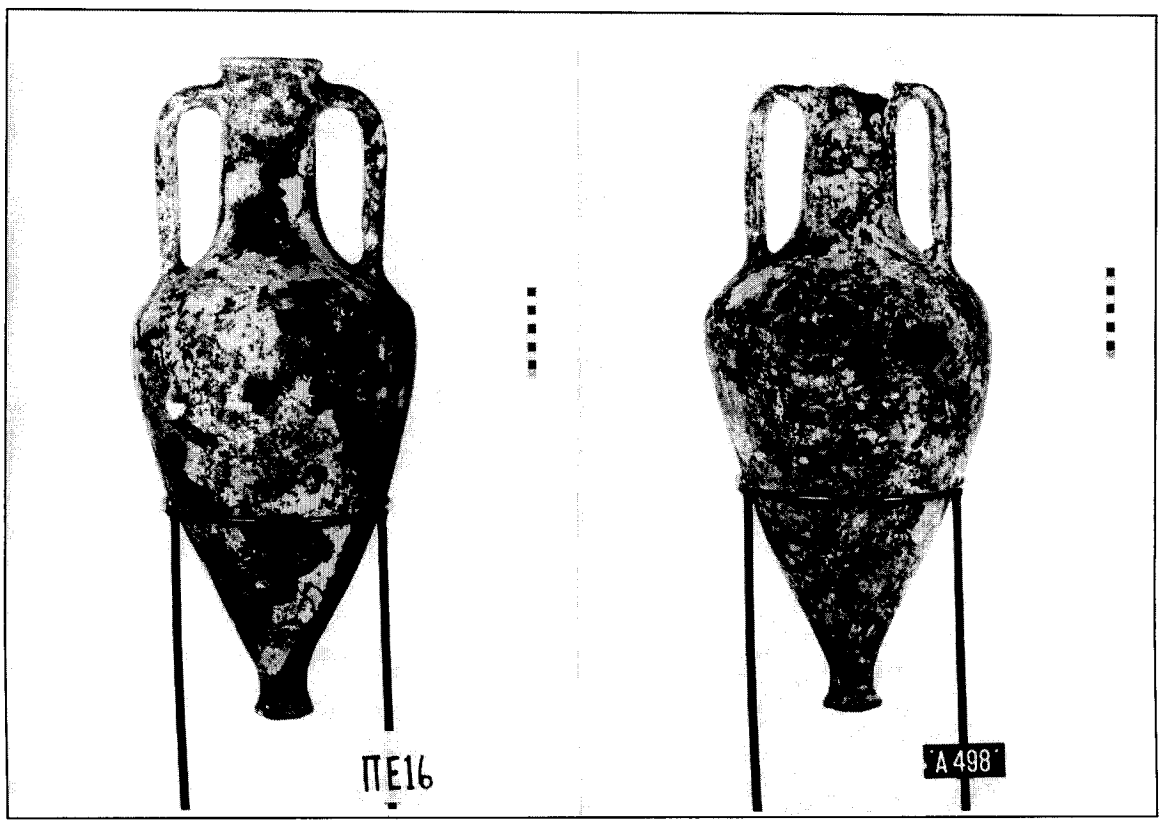


51. Γ 63

PLATE 12. Mendaian Amphoras.

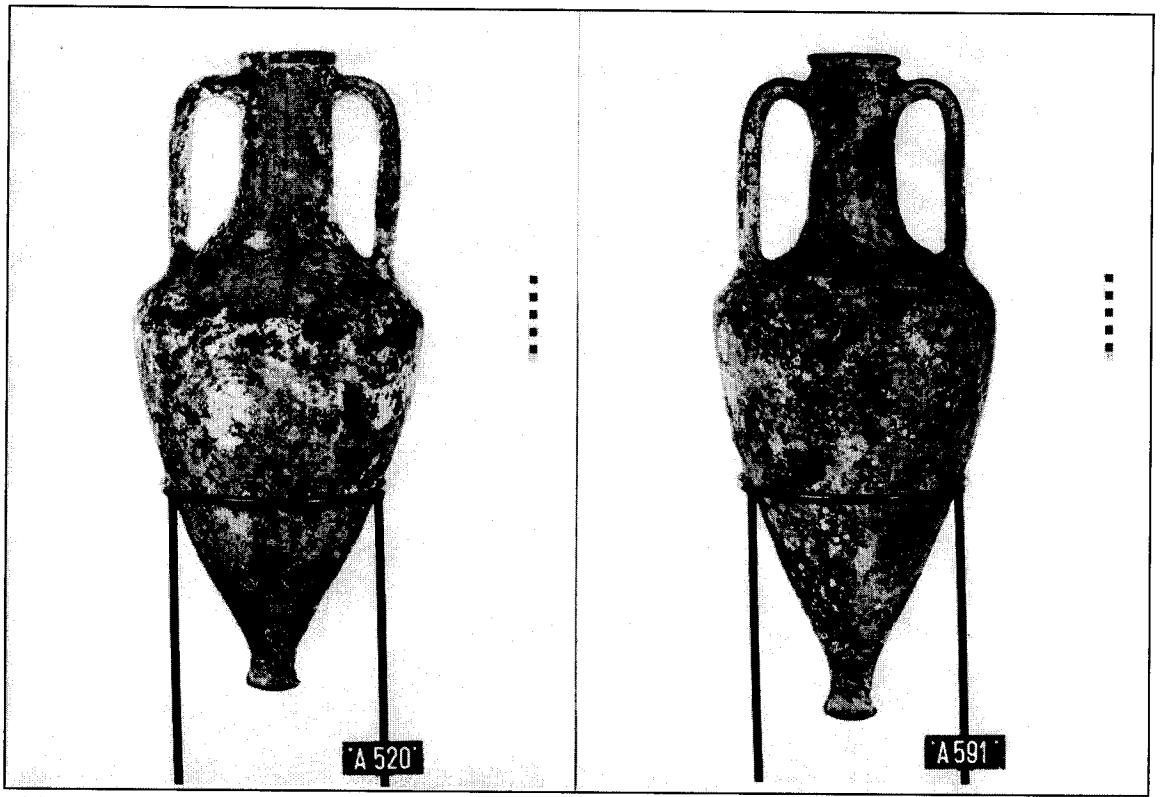


52. BE 91/16-2 53. ΠΕ 2



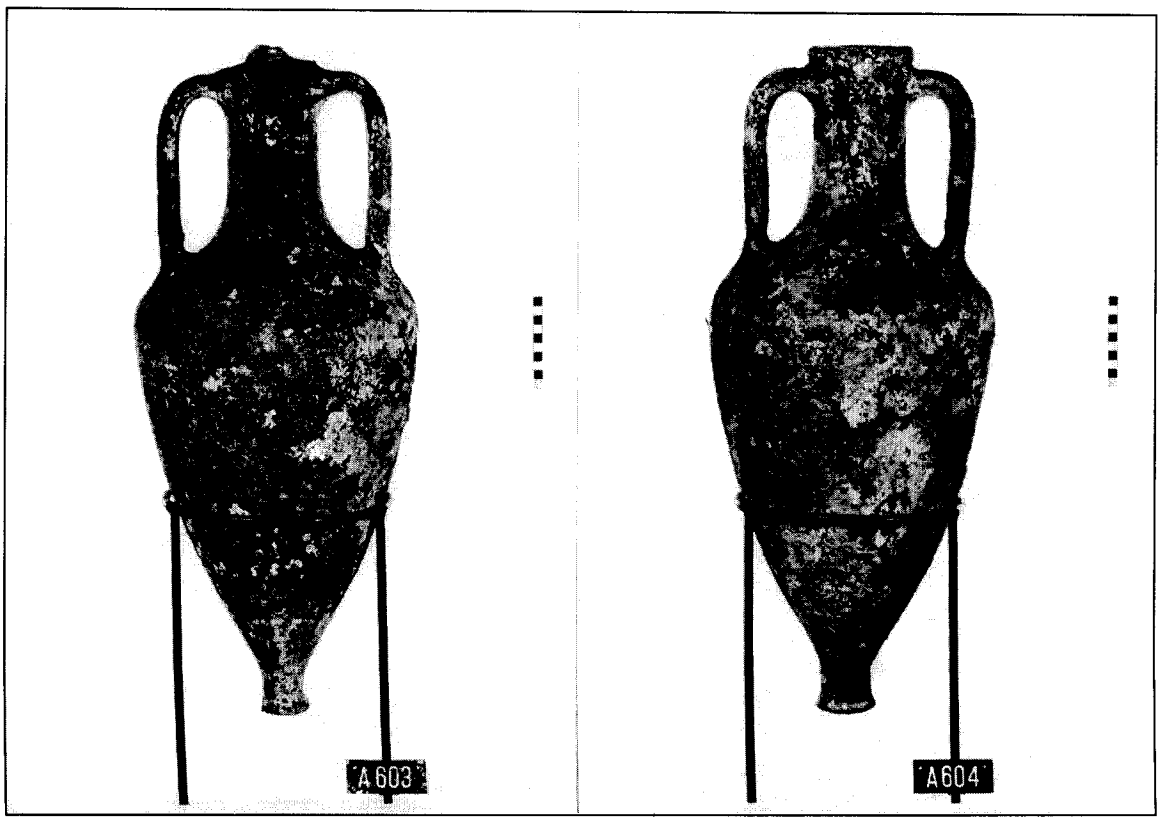
54. ΠΕ 16 55. A 498

PLATE 13. Solokha II Amphoras.



56. A 520

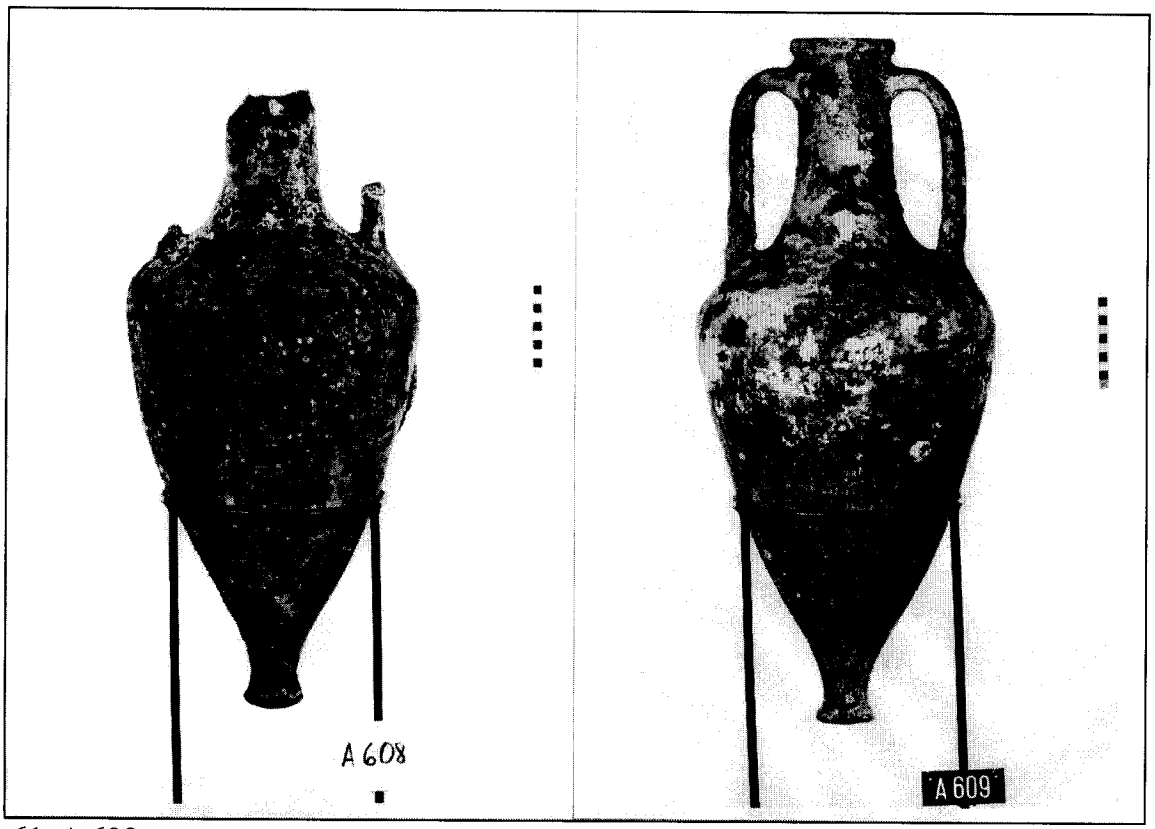
57. A 591



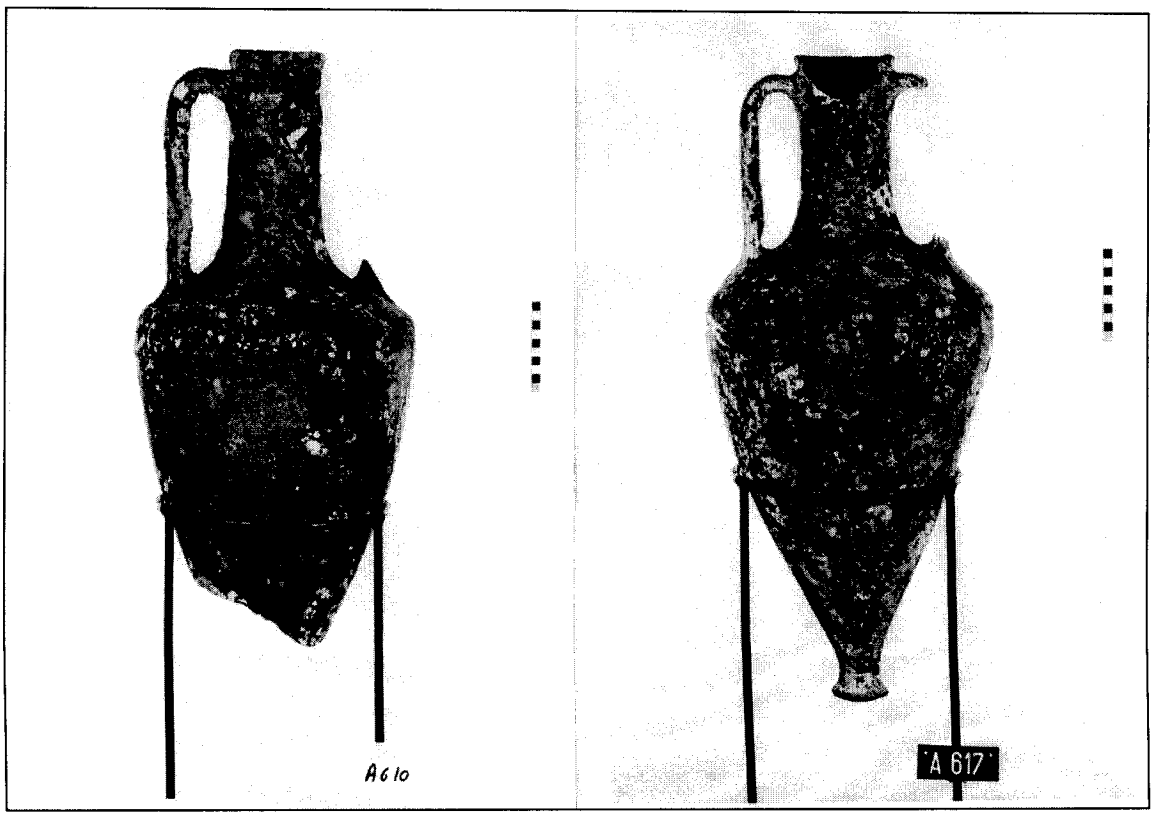
58. A 603

59. A 604

PLATE 14. Solokha II Amphoras.

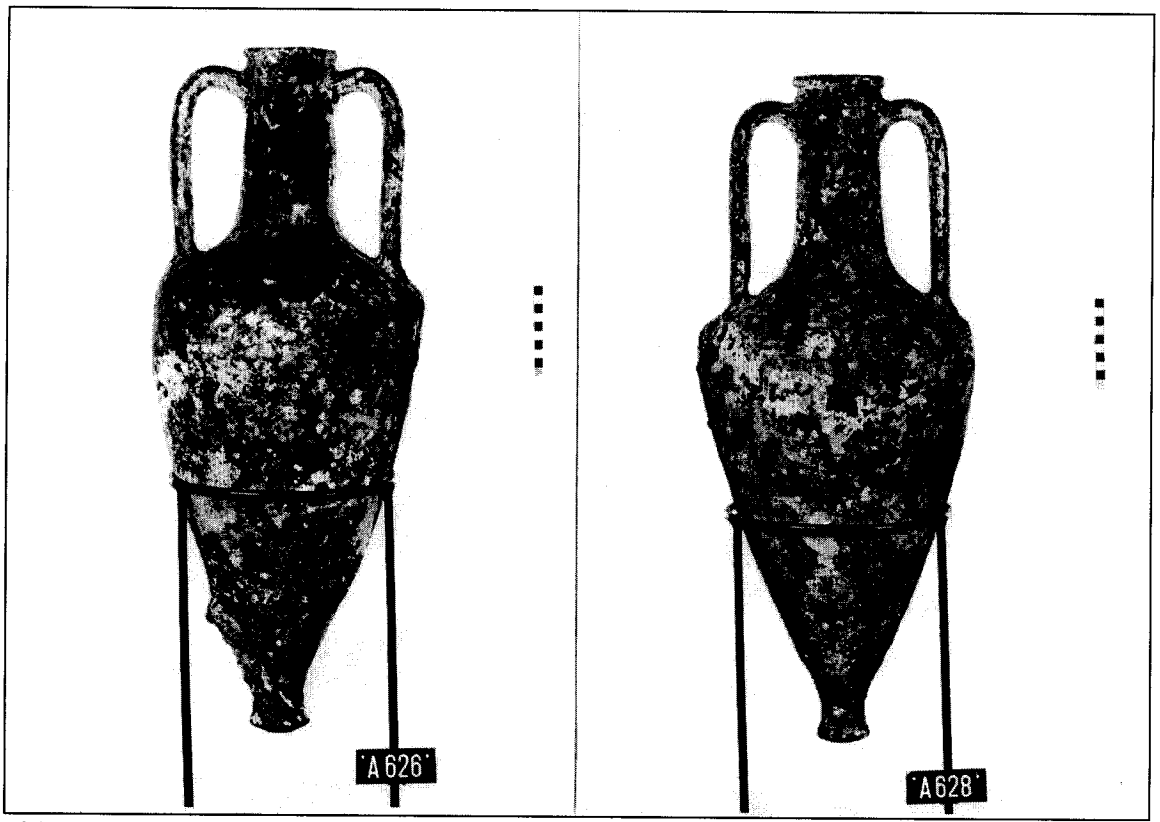


61. A 608 62. A 609



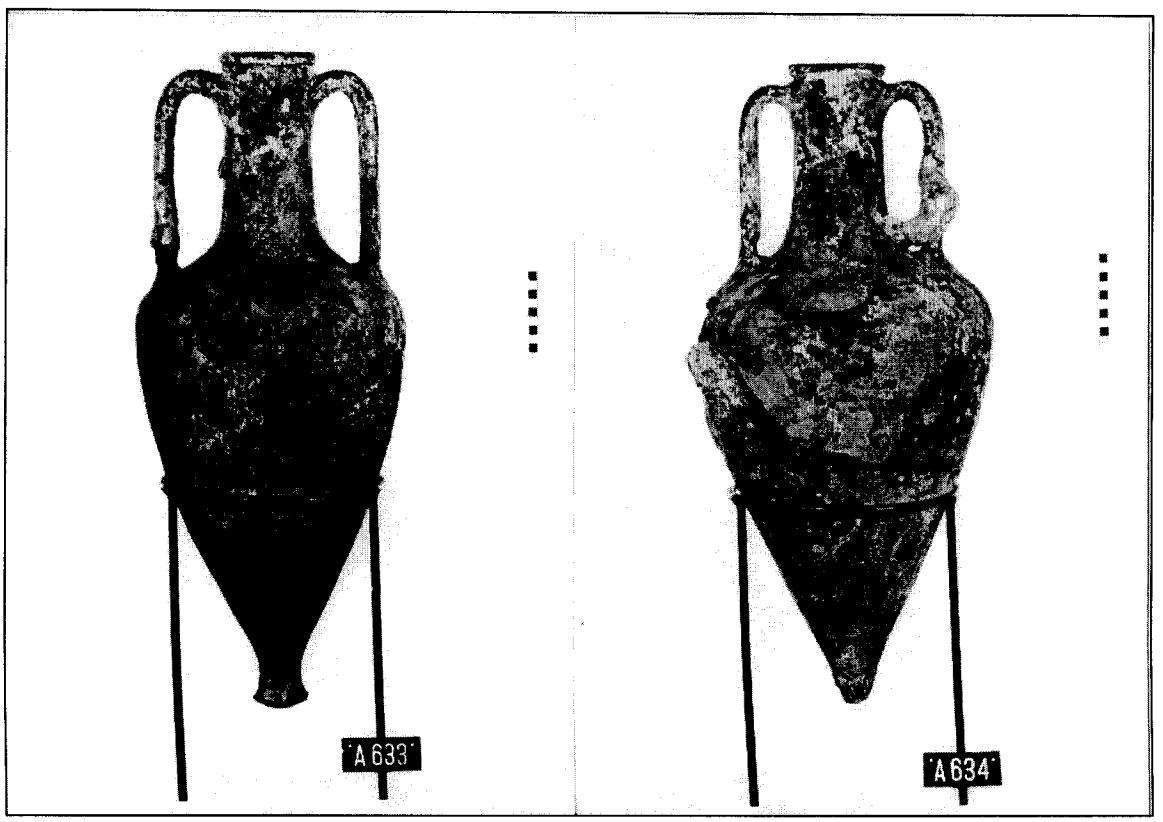
63. A 610 64. A 617

PLATE 15. Solokha II Amphoras.



65. A 626

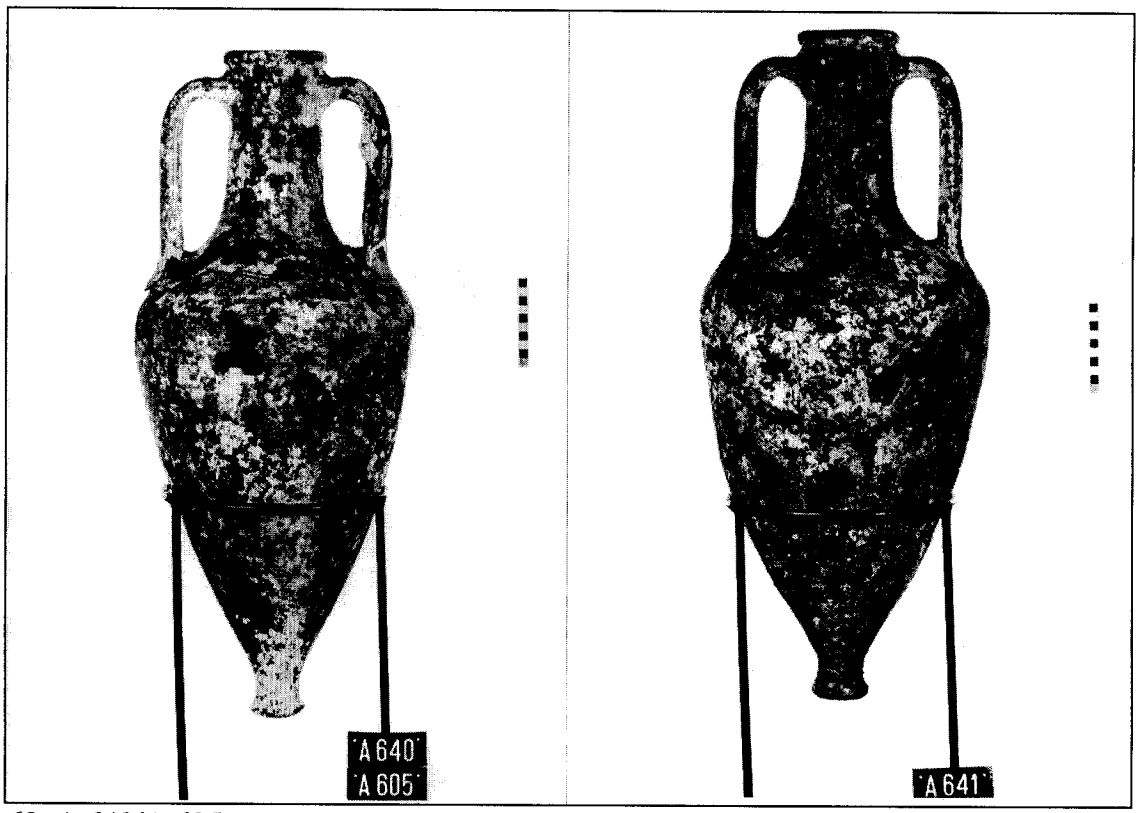
66. A 628



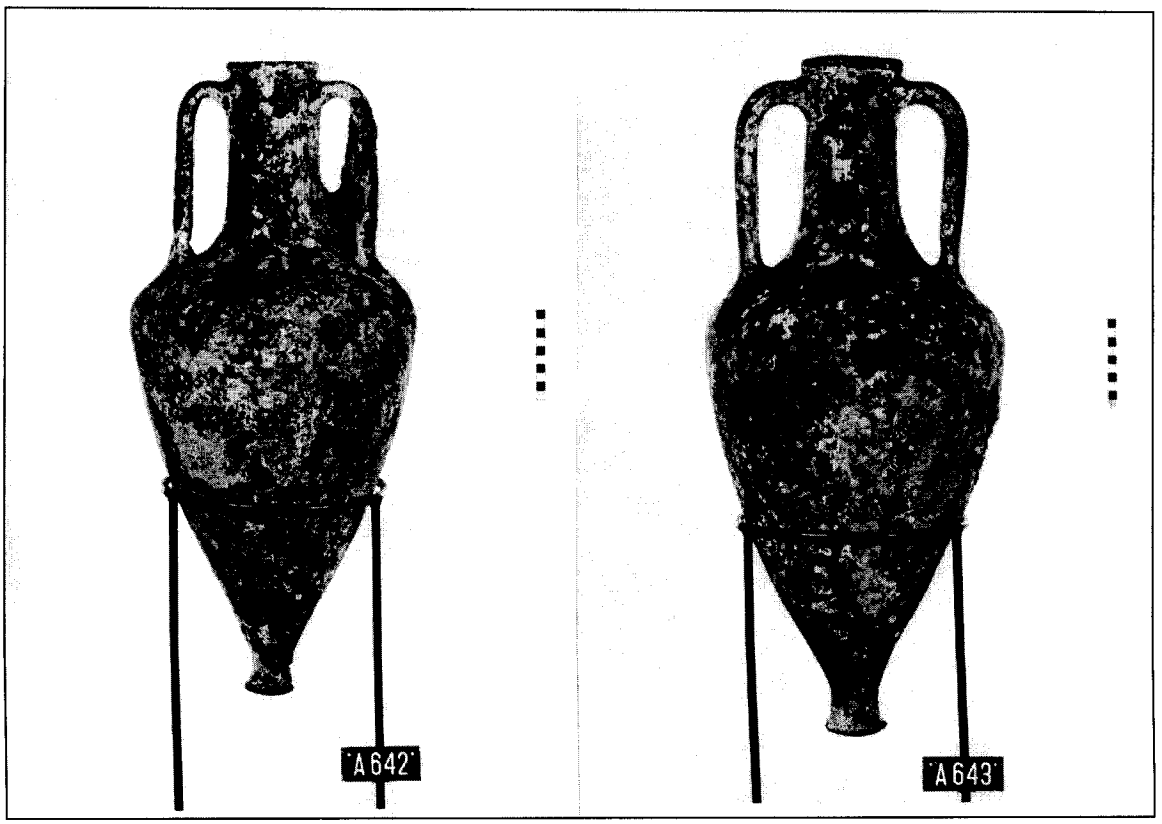
67. A 633

68. A 634

PLATE 16. Solokha II Amphoras.

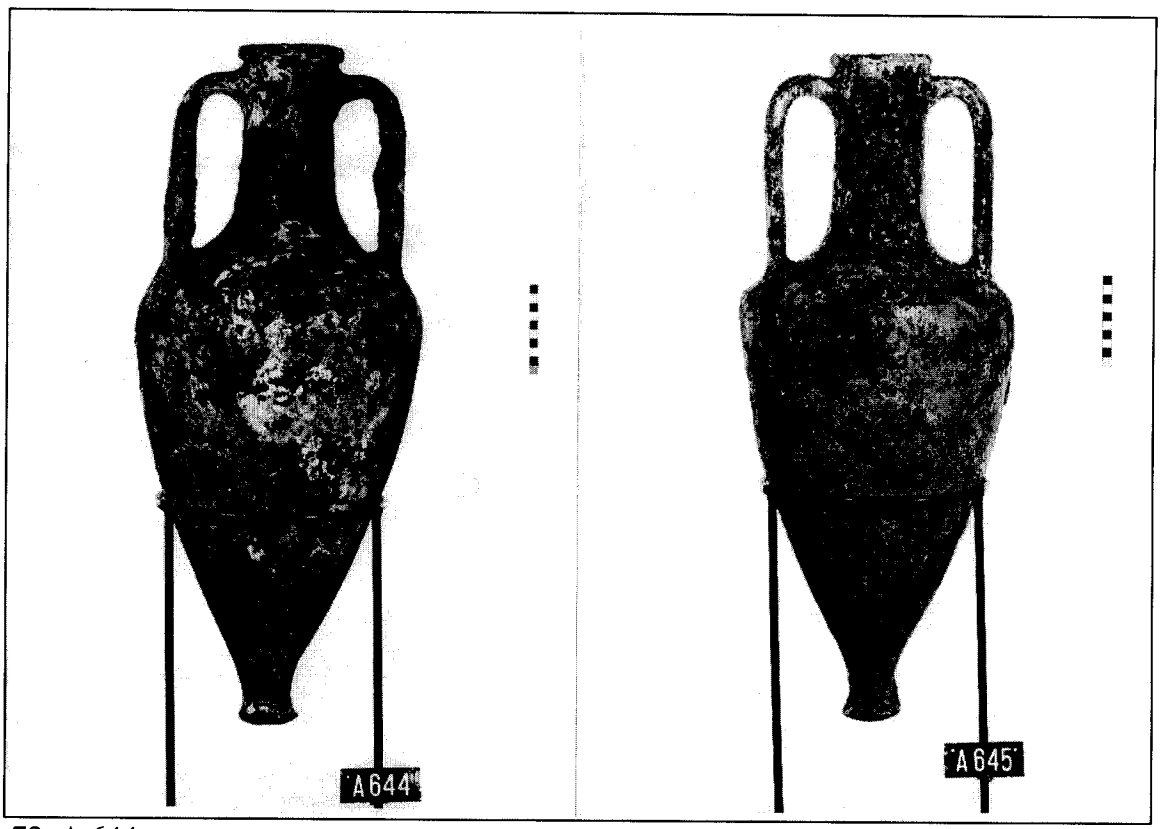


69. A 640/A 605 70. A 641



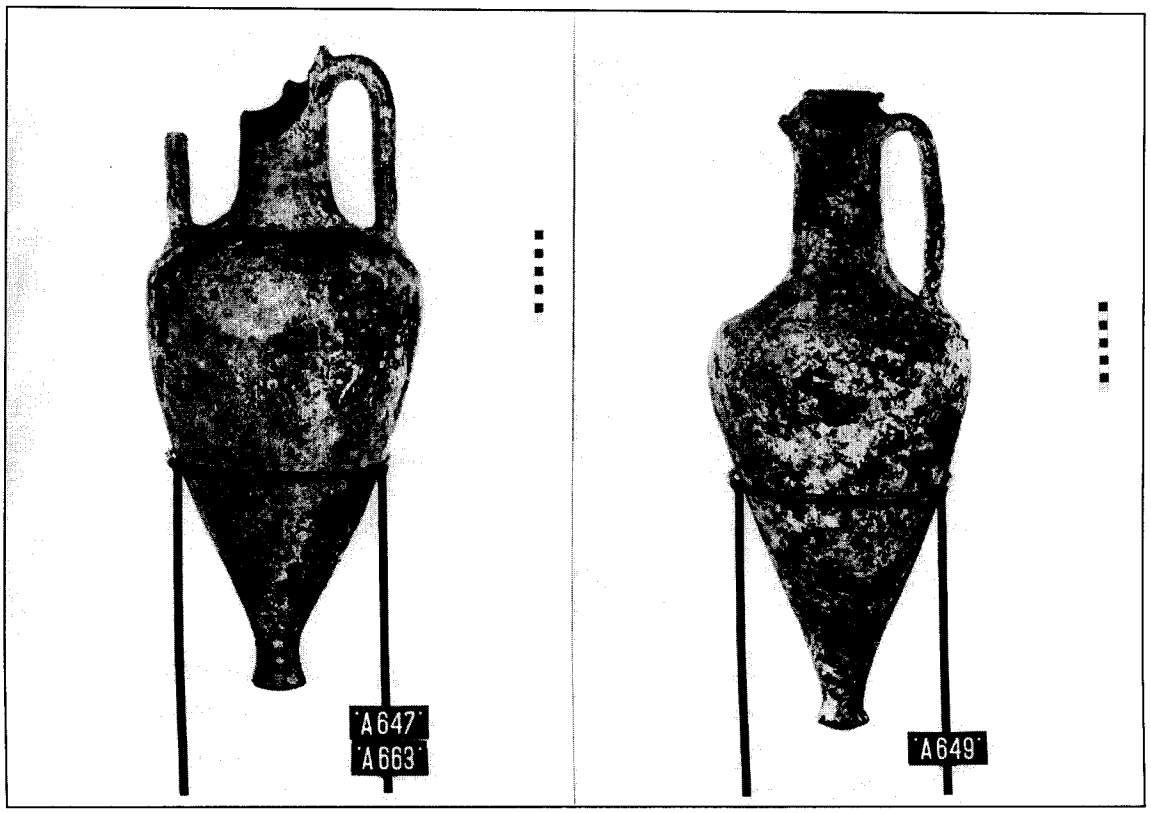
71. A 642 72. A 643

PLATE 17. Solokha II Amphoras.



73. A 644

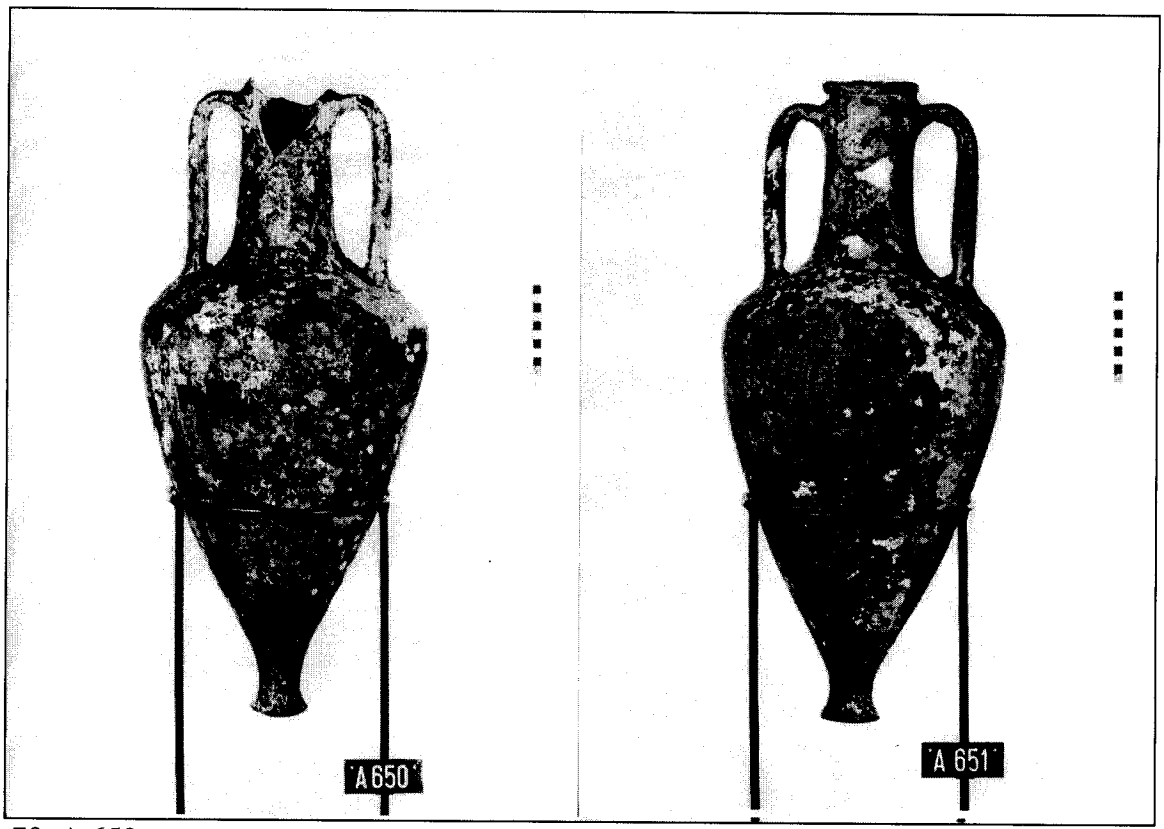
74. A 645



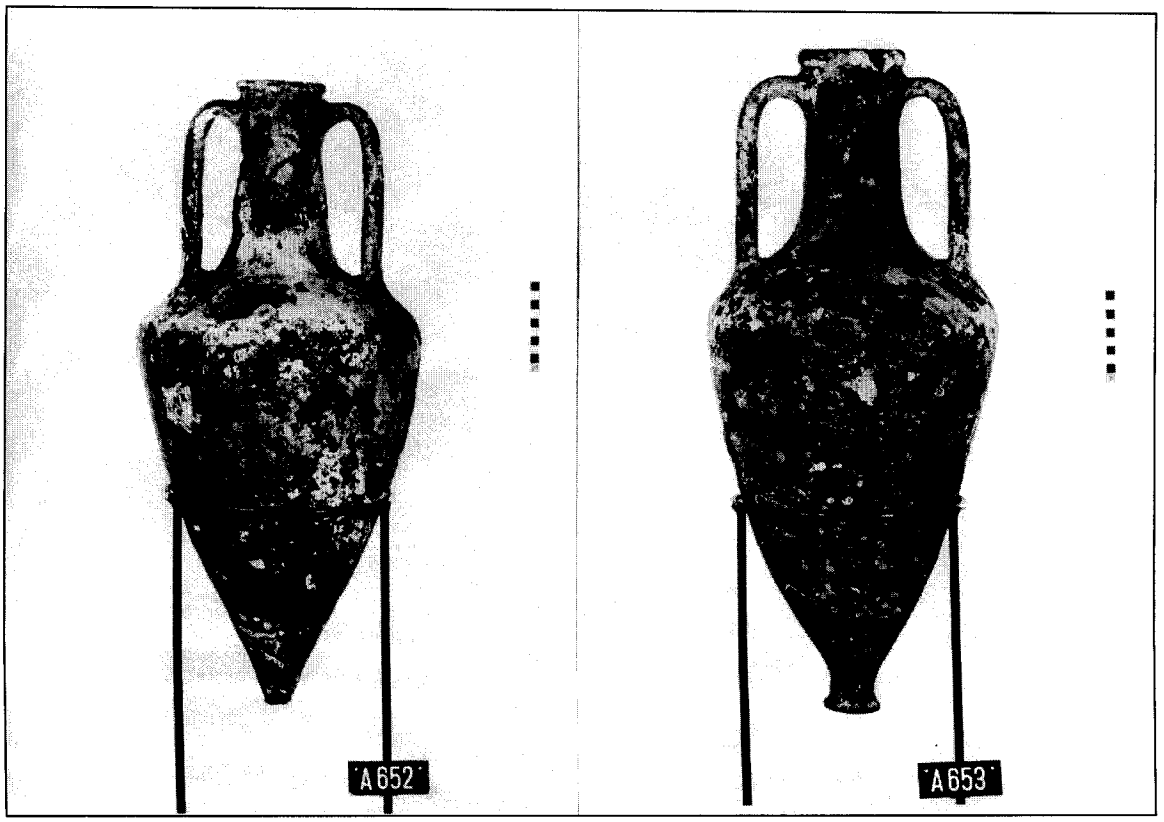
76. A 647/A 663

77. A 649

PLATE 18. Solokha II Amphoras.

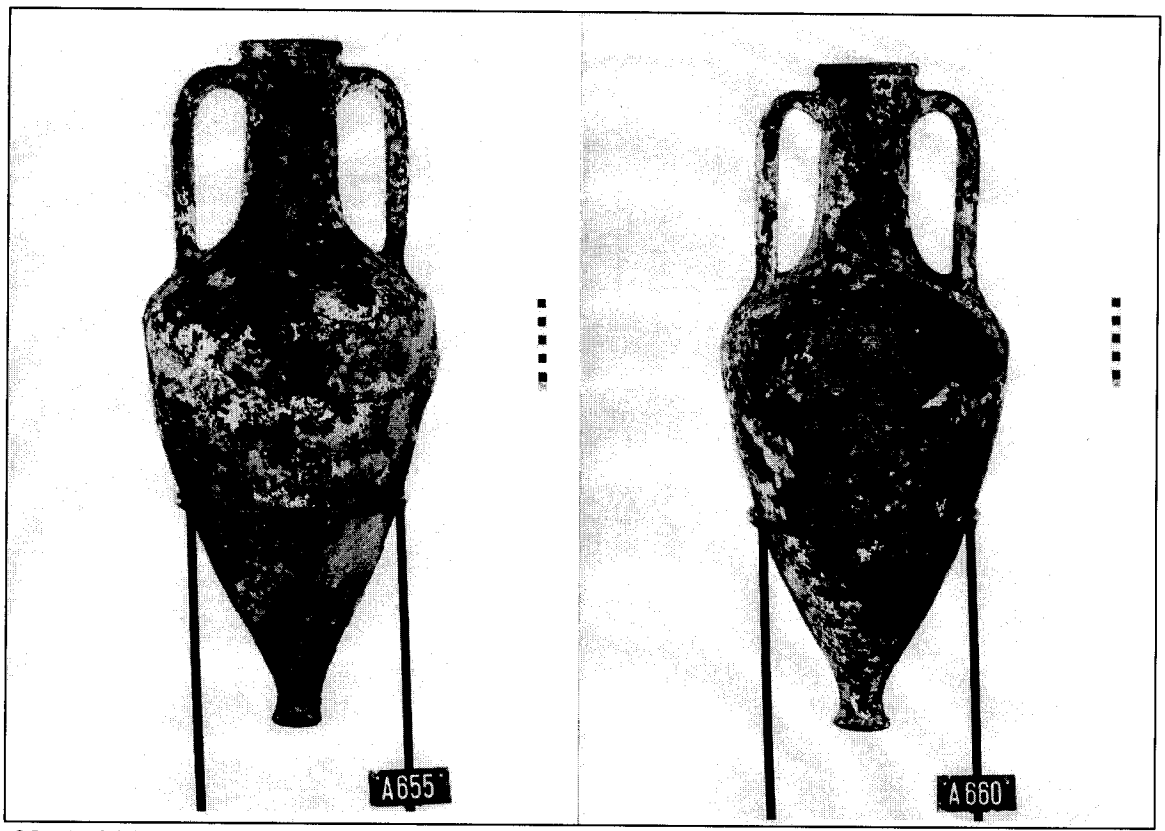


78. A 650 79. A 651



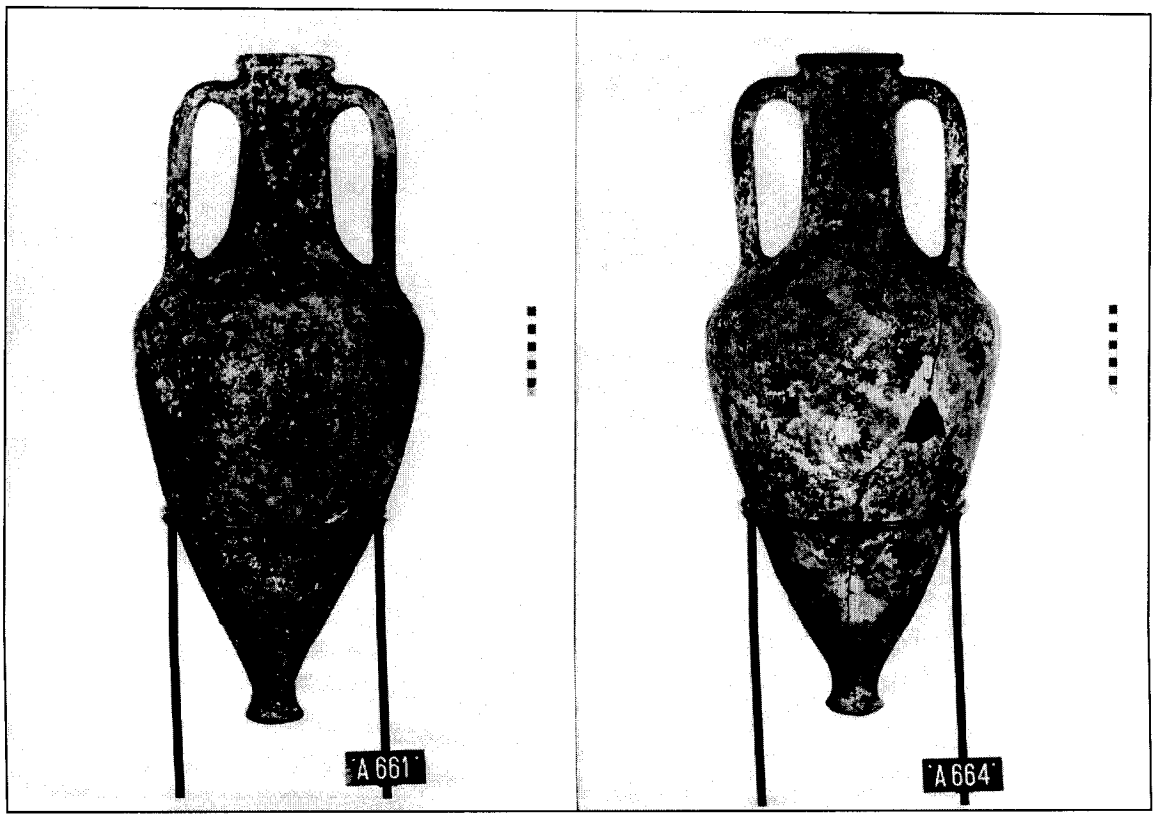
80. A 652 81. A 653

PLATE 19. Solokha II Amphoras.



82. A 655

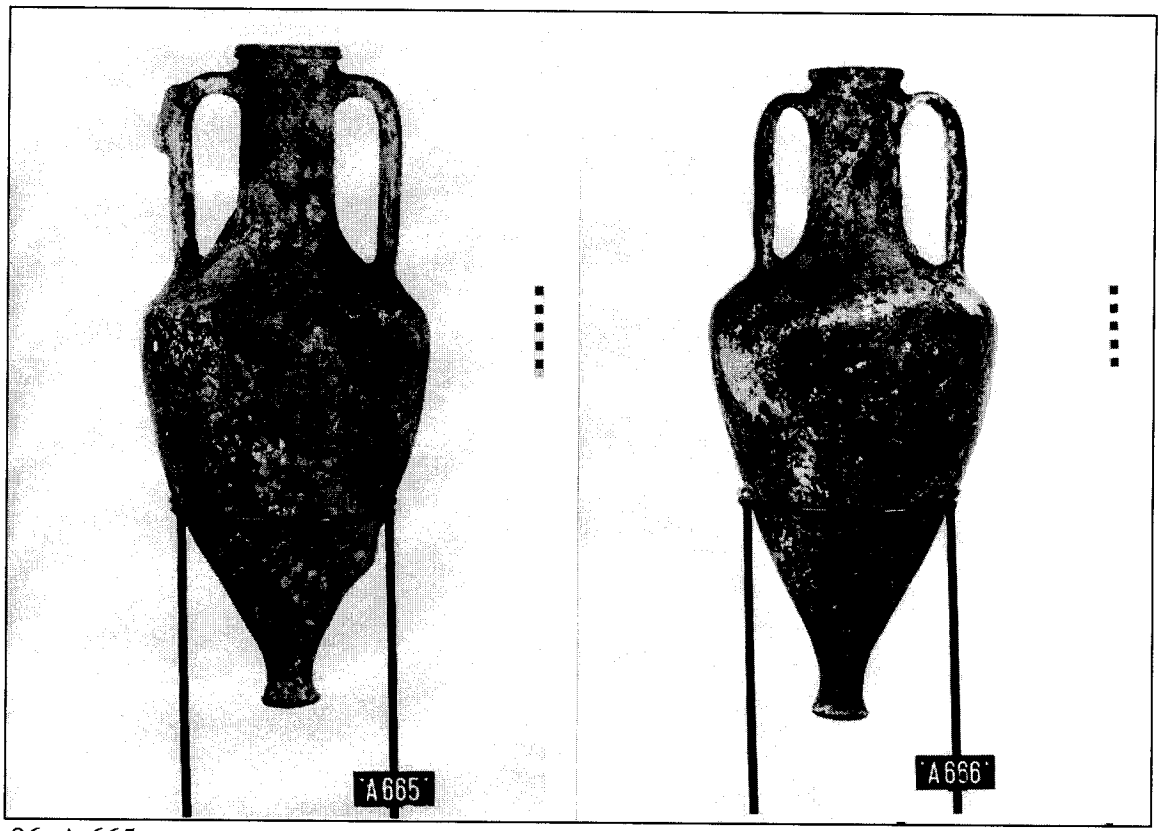
83. A 660



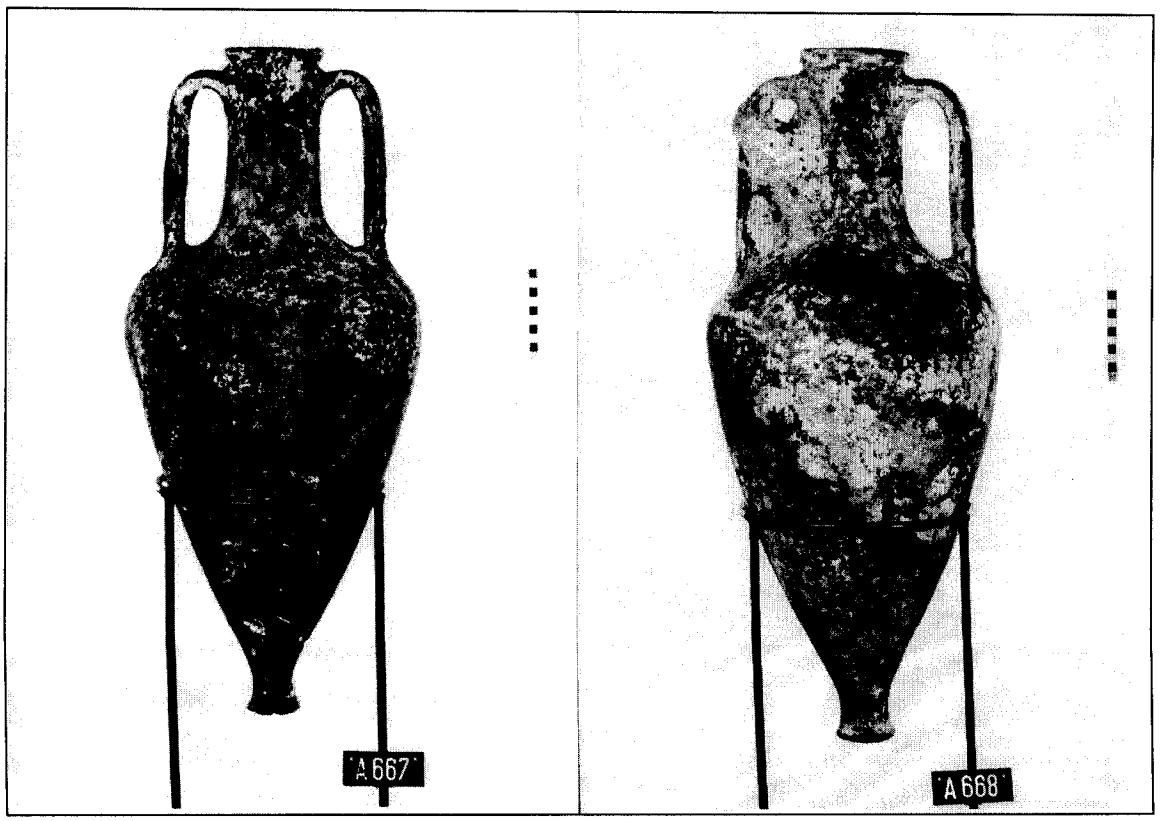
84. A 661

85. A 664

PLATE 20. Solokha II Amphoras.

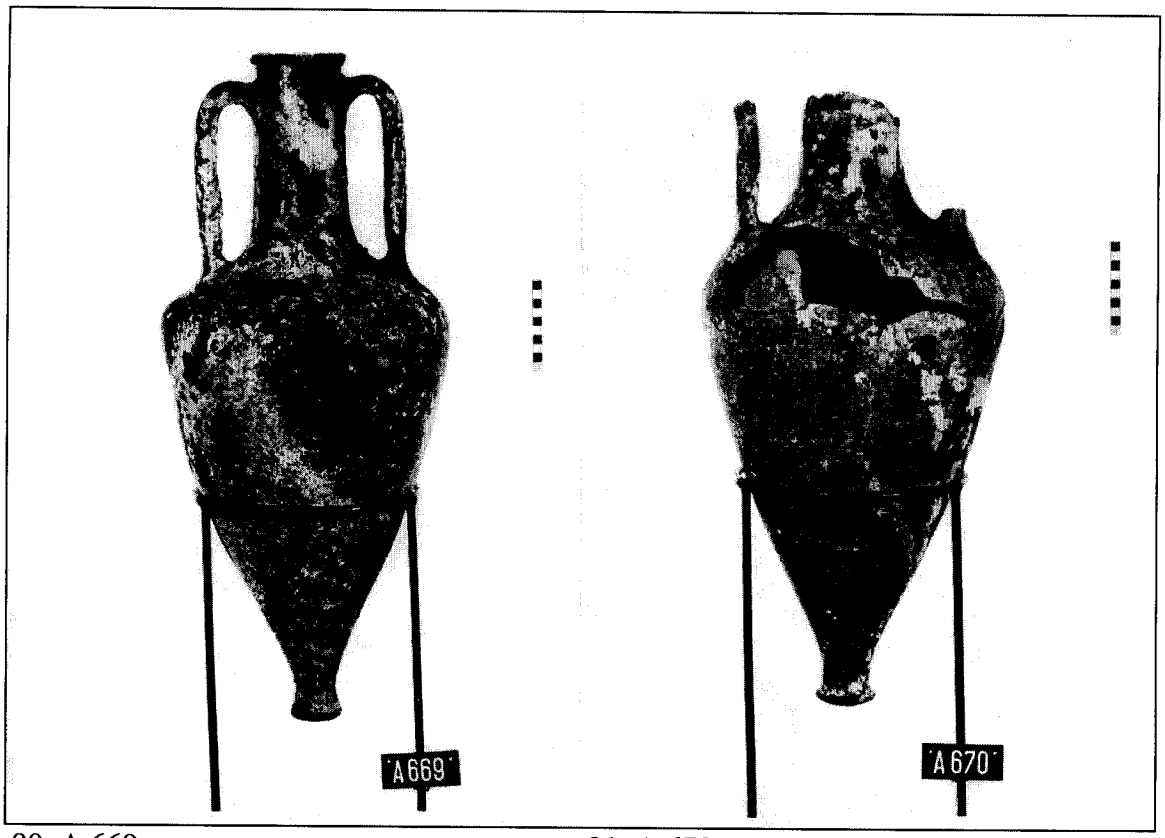


86. A 665 87. A 666

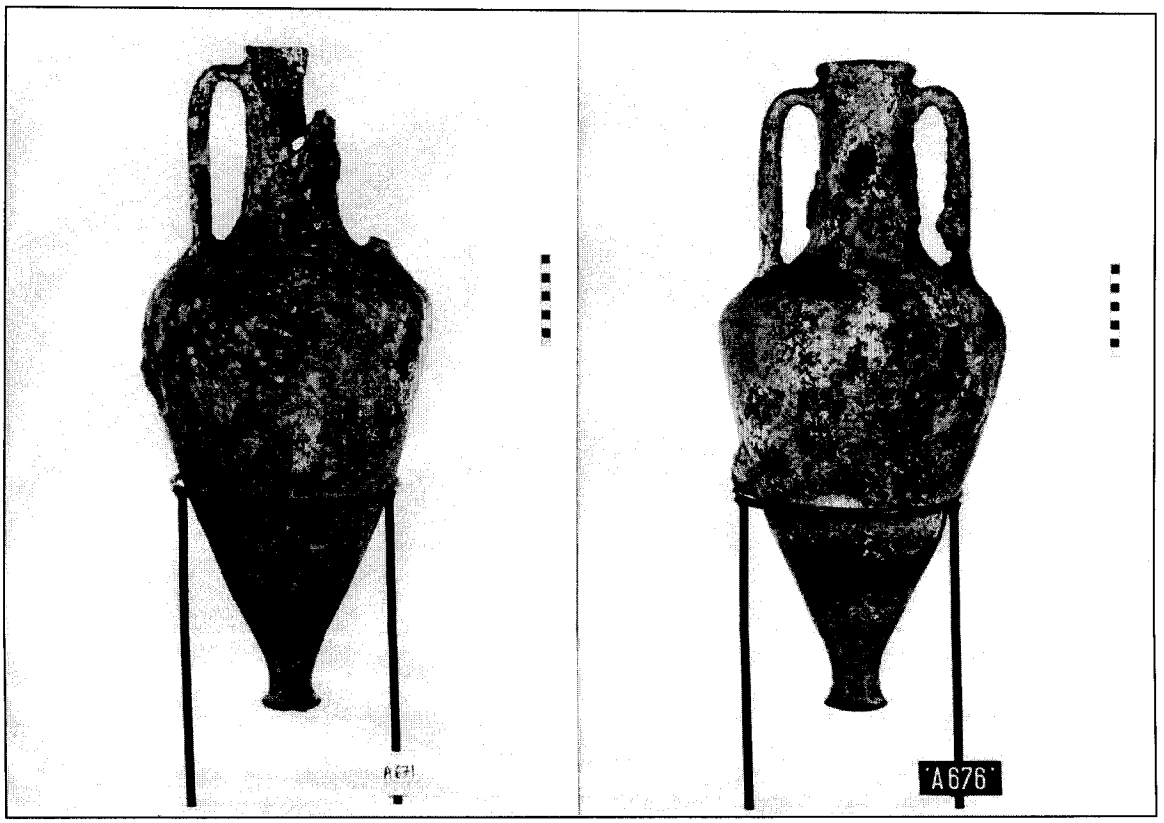


88. A 667 89. A 668

PLATE 21. Solokha II Amphoras.

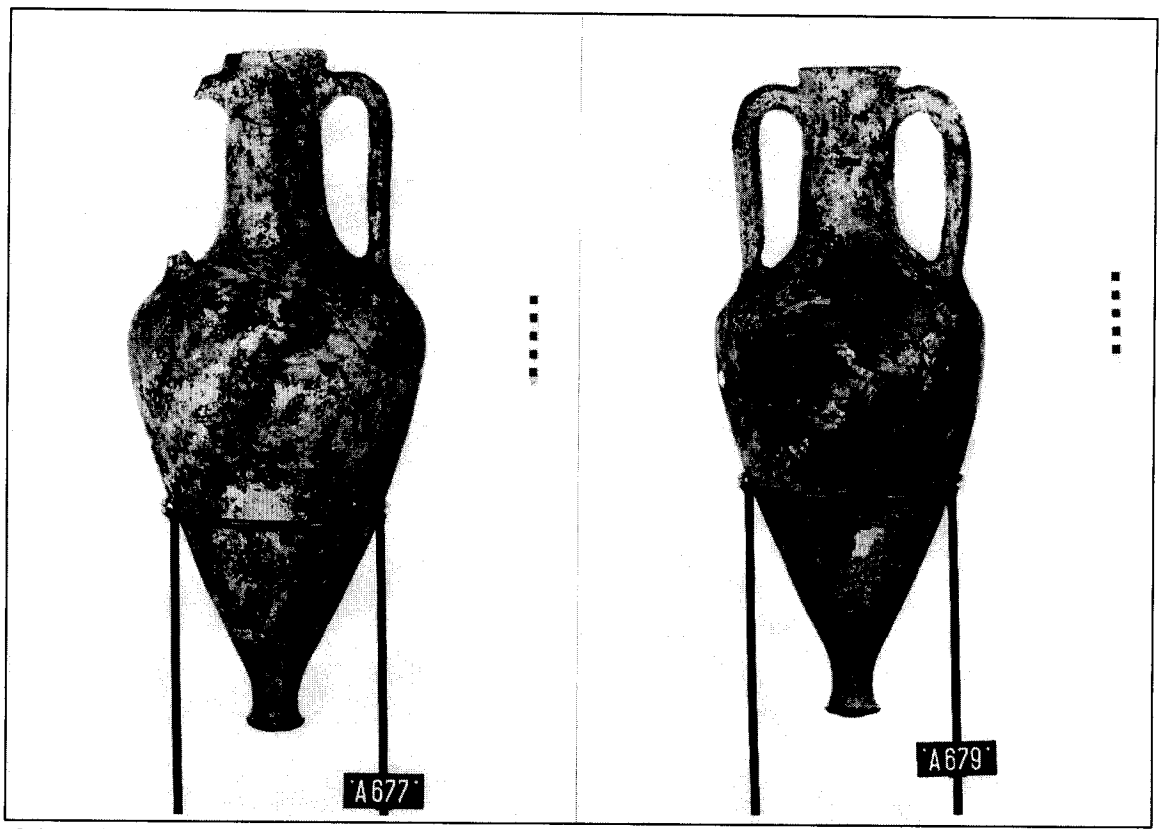


90. A 669 91. A 670

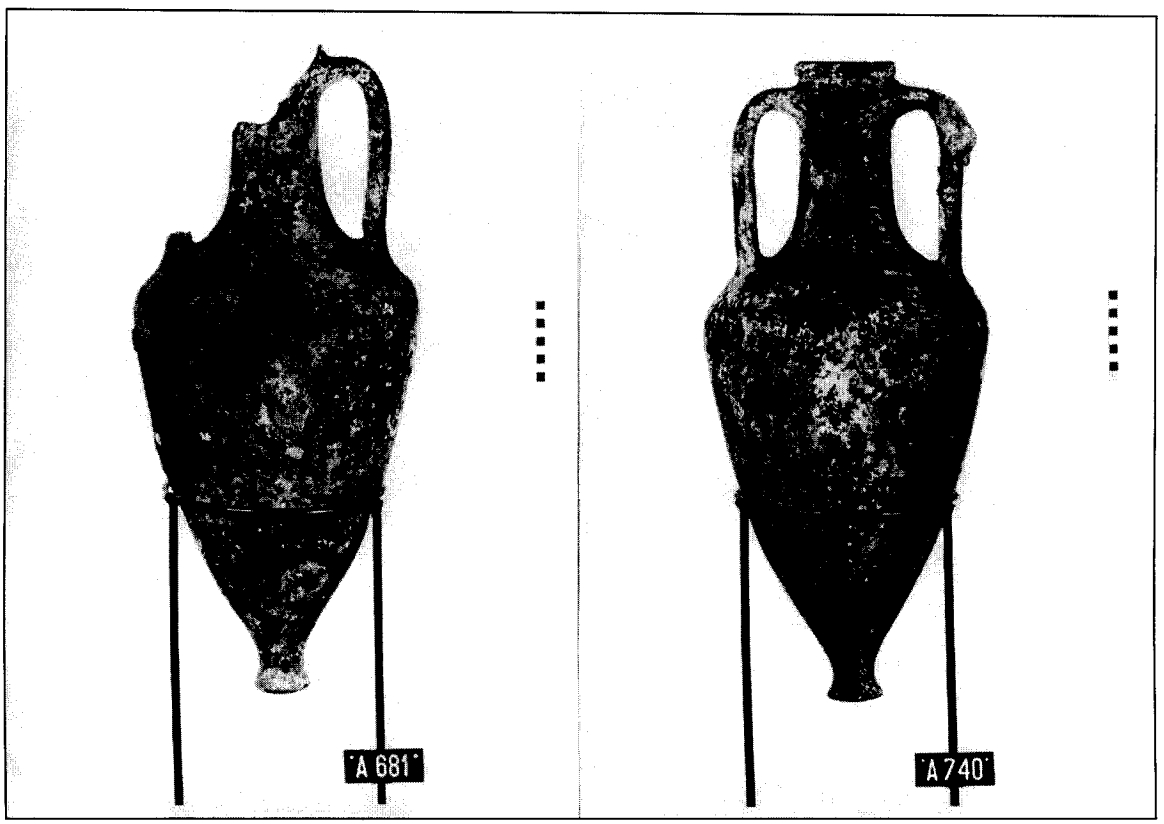


92. A 671 94. A 676

PLATE 22. Solokha II Amphoras.

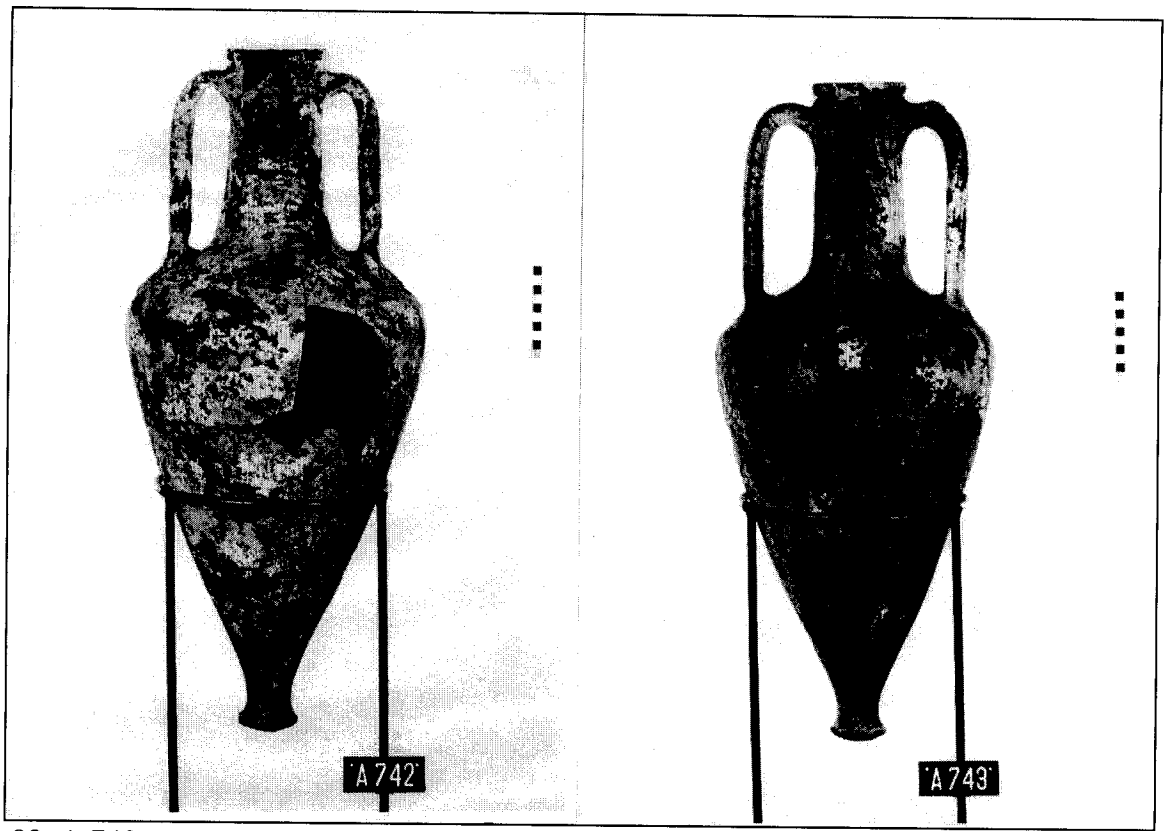


95. A 677 96. A 679

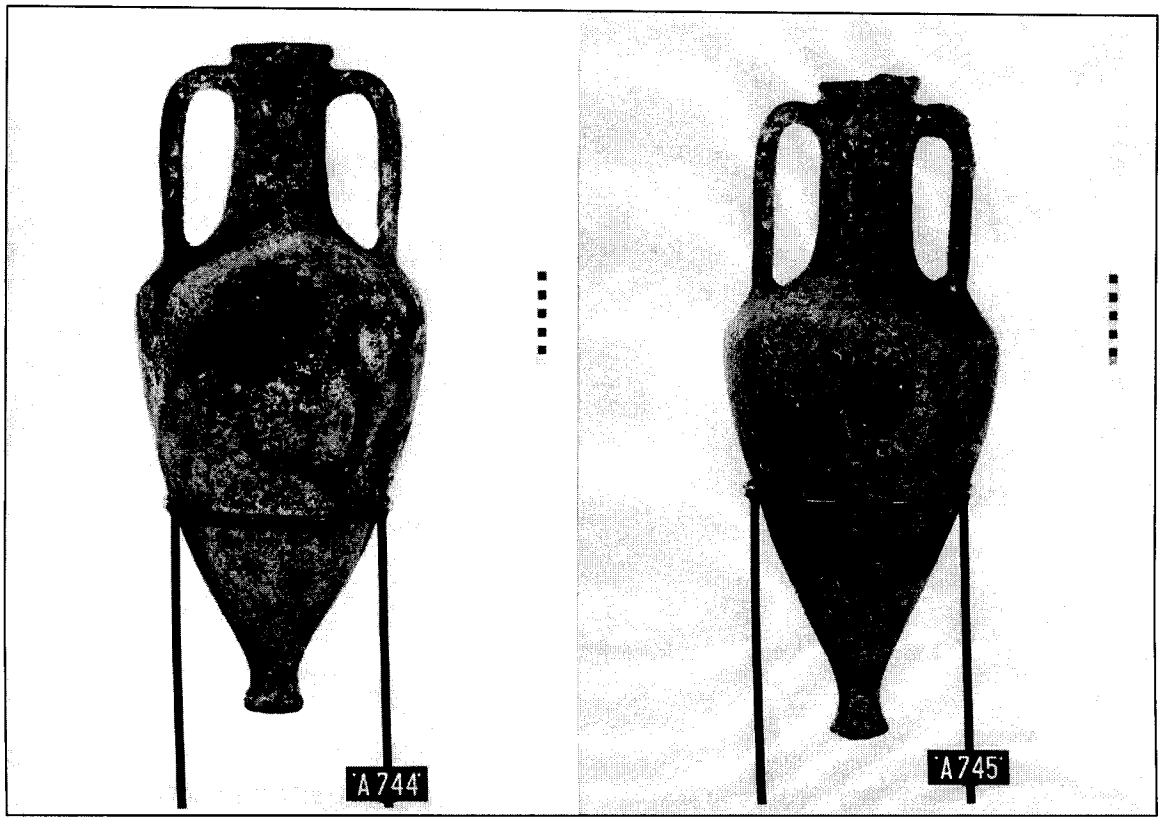


97. A 681 98. A 740

PLATE 23. Solokha II Amphoras.

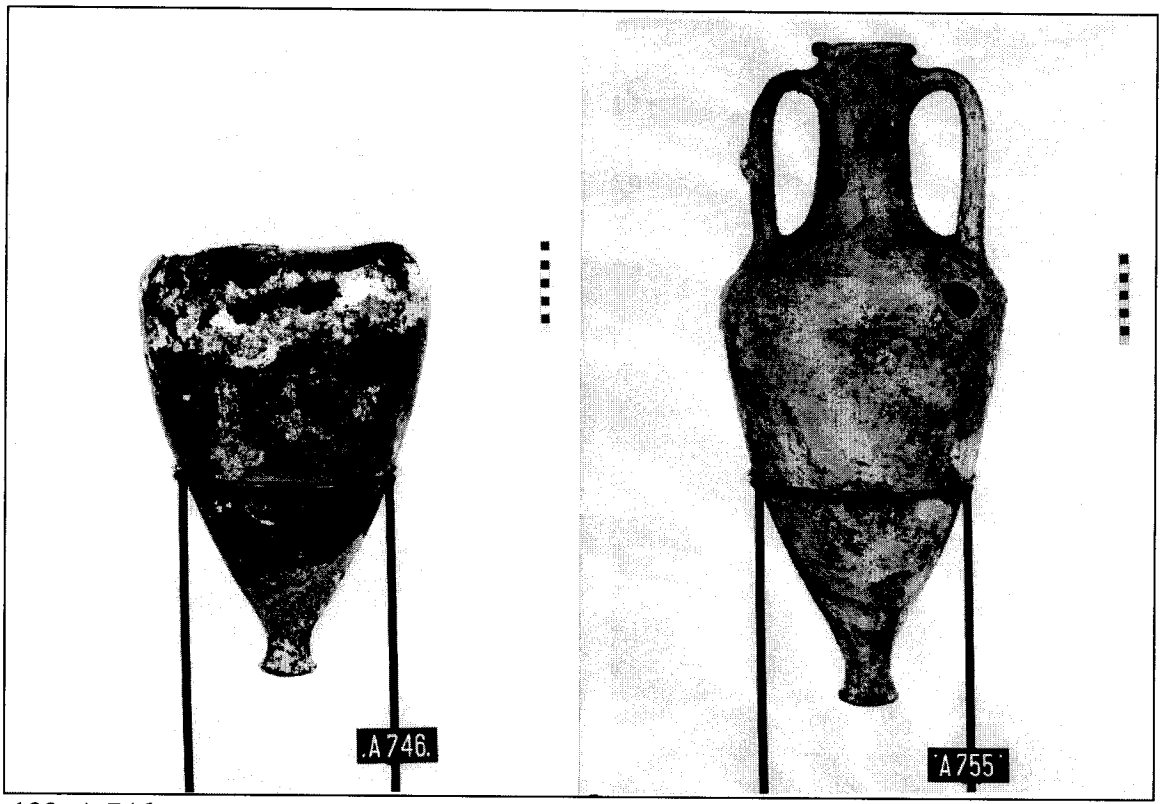


99. A 742 100. A 743



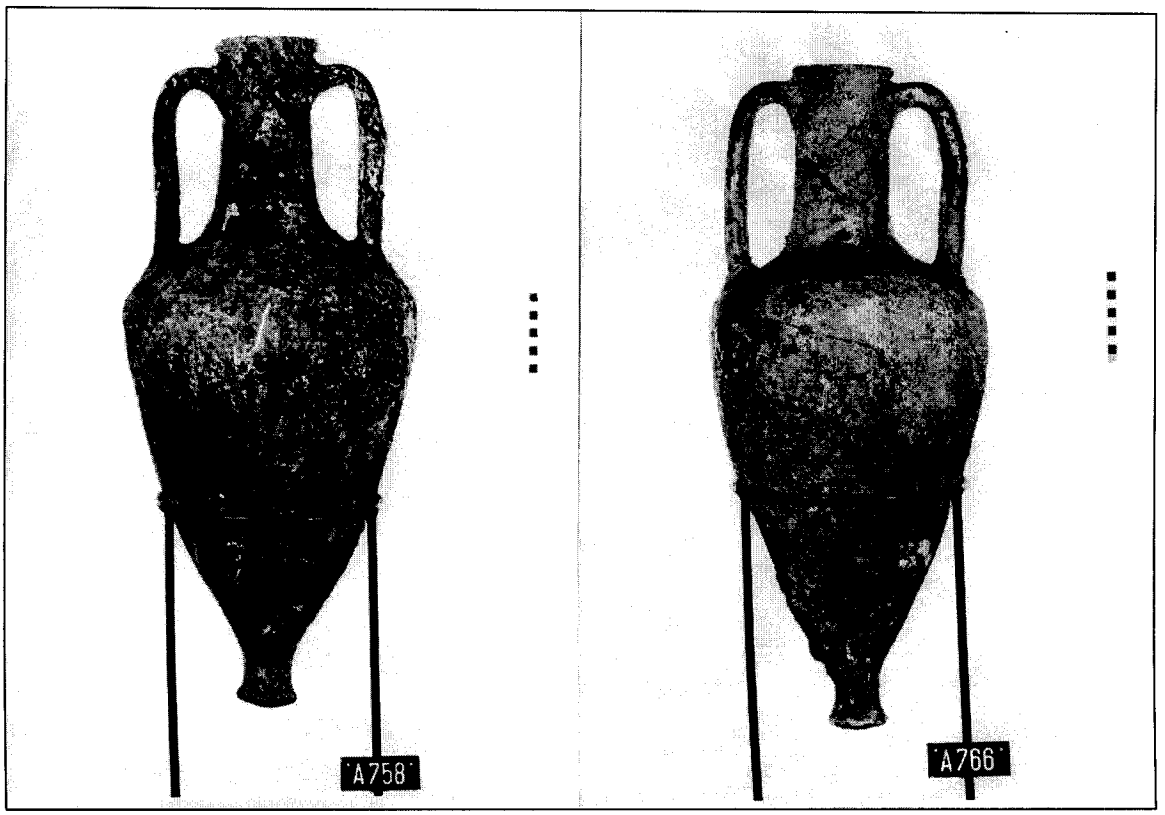
101. A 744 102. A 745

PLATE 24. Solokha II Amphoras.



103. A 746

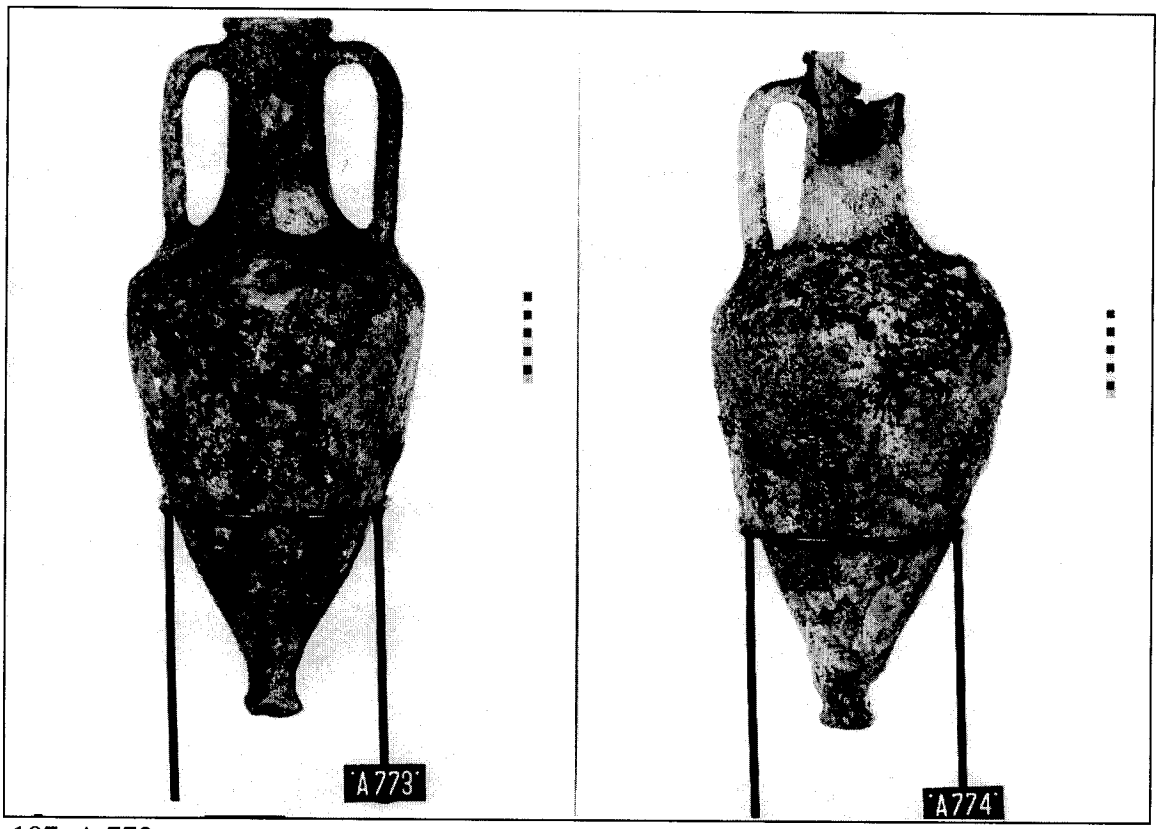
104. A 755



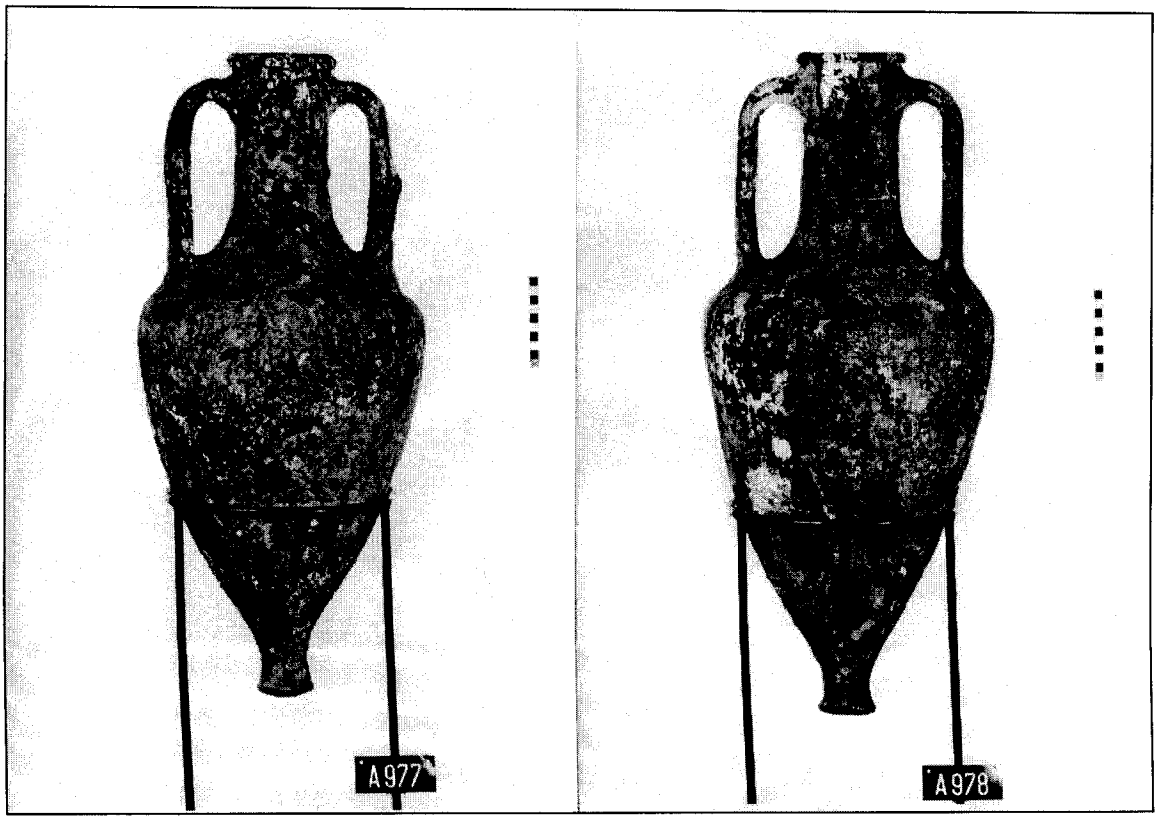
105. A 758

106. A 766

PLATE 25. Solokha II Amphoras.

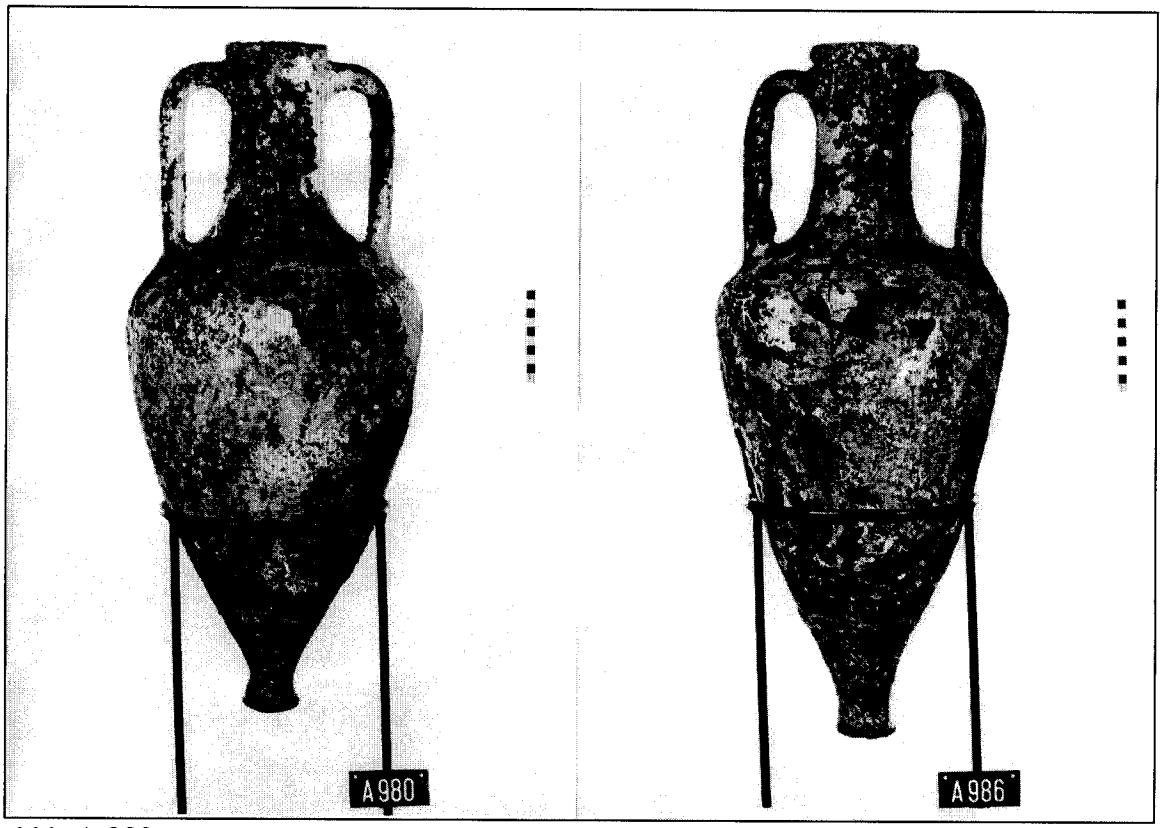


107. A 773 108. A 774



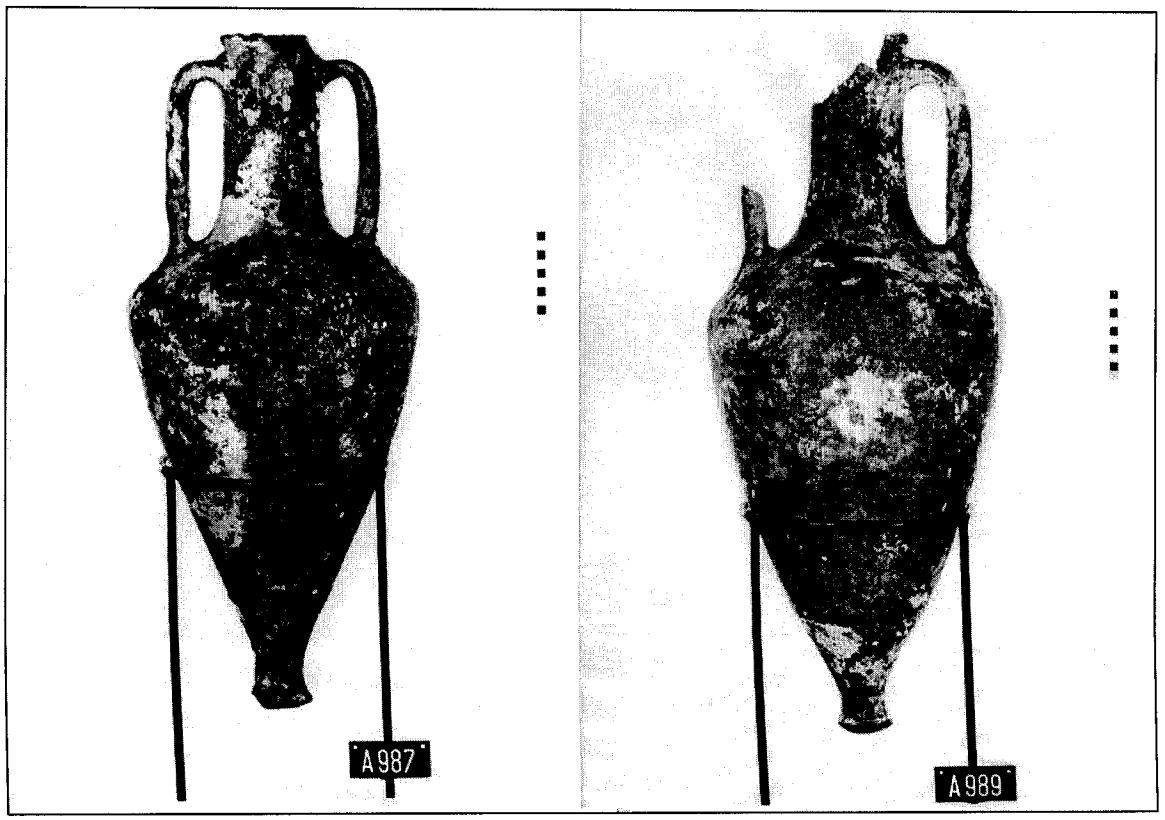
109. A 977 110. A 978

PLATE 26. Solokha II Amphoras.



111. A 980

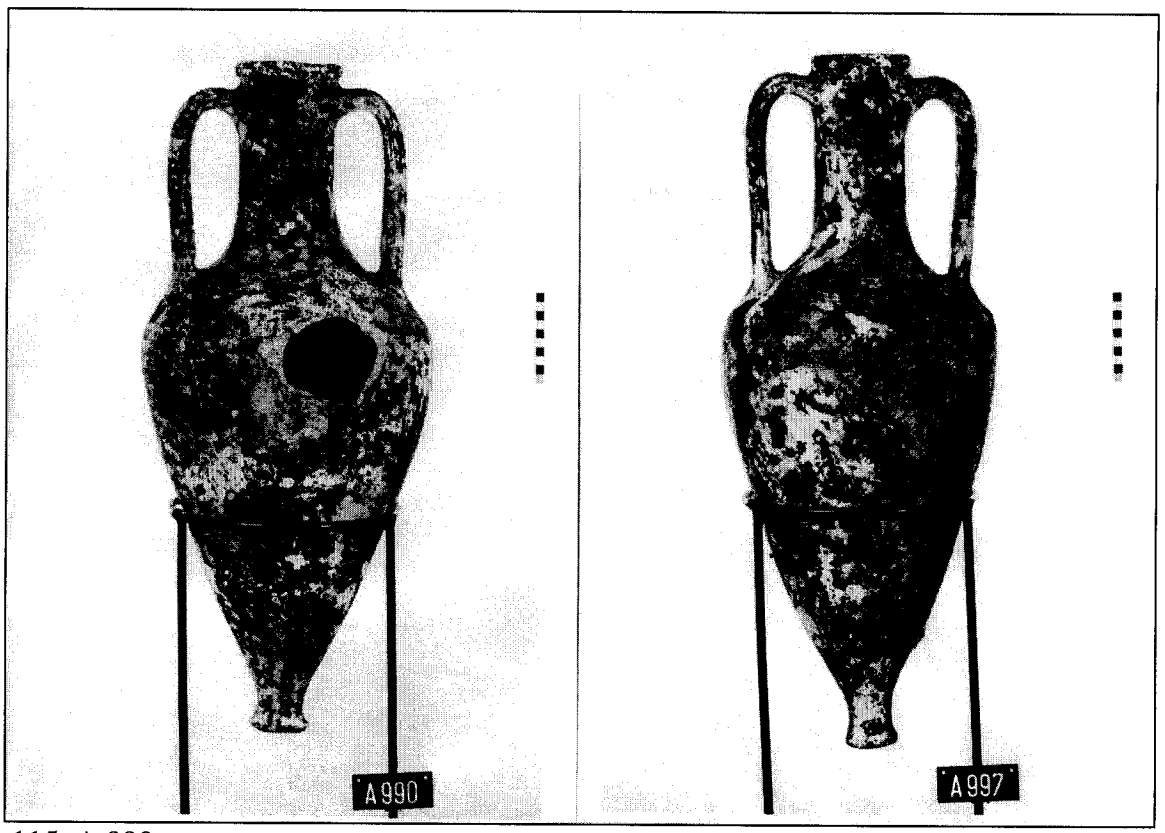
112. A 986



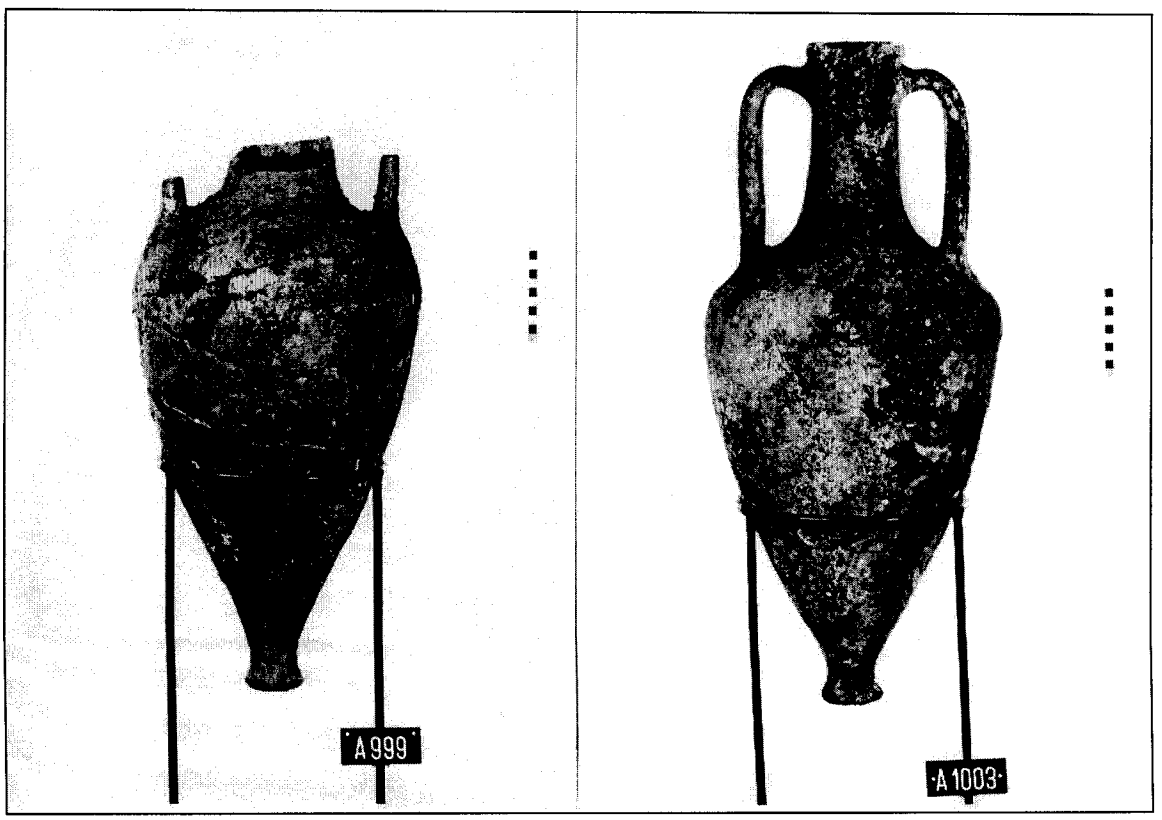
113. A 987

114. A 989

PLATE 27. Solokha II Amphoras.

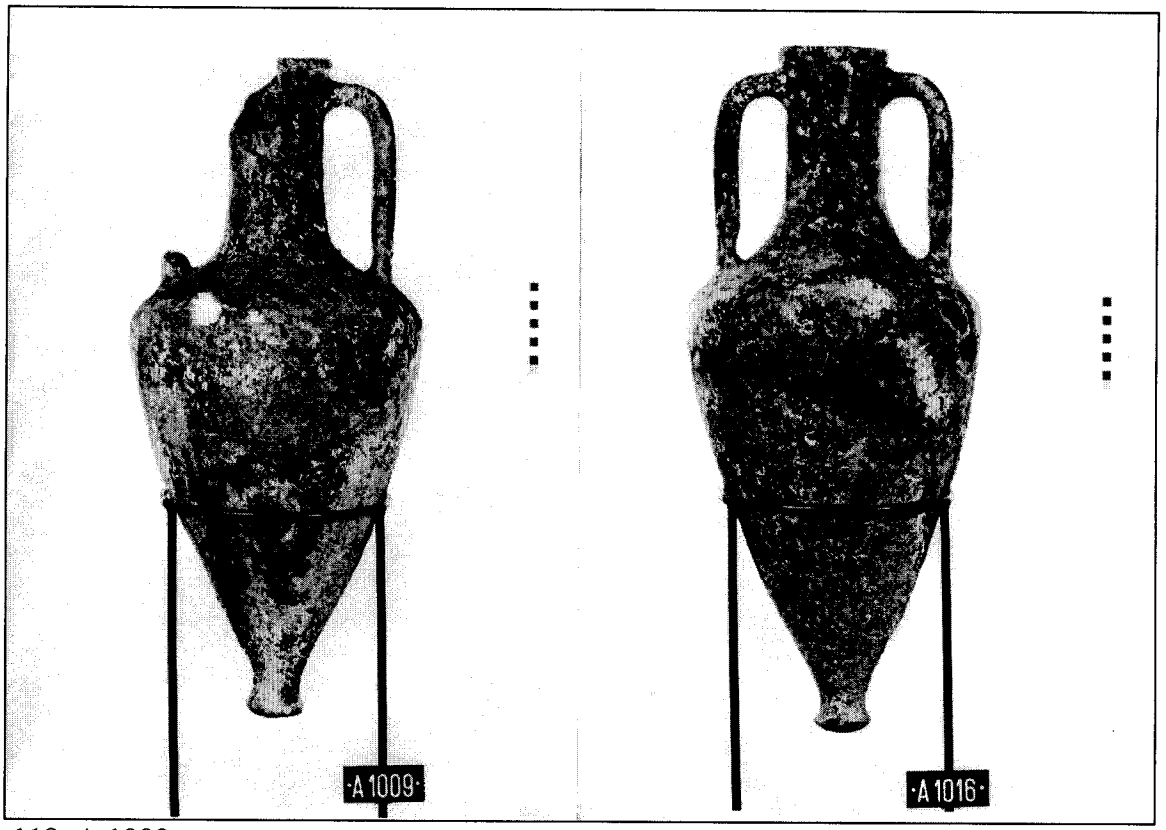


115. A 990 116. A 997

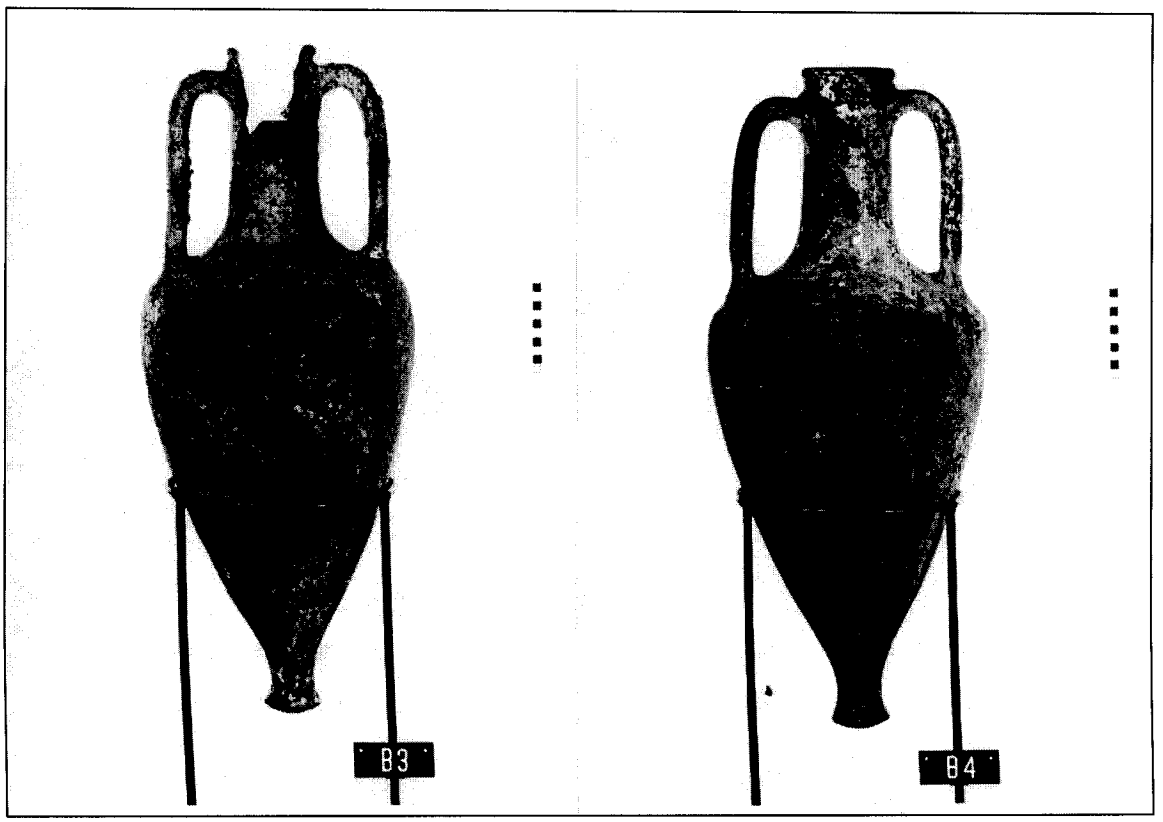


117. A 999 118. A 1003

PLATE 28. Solokha II Amphoras.

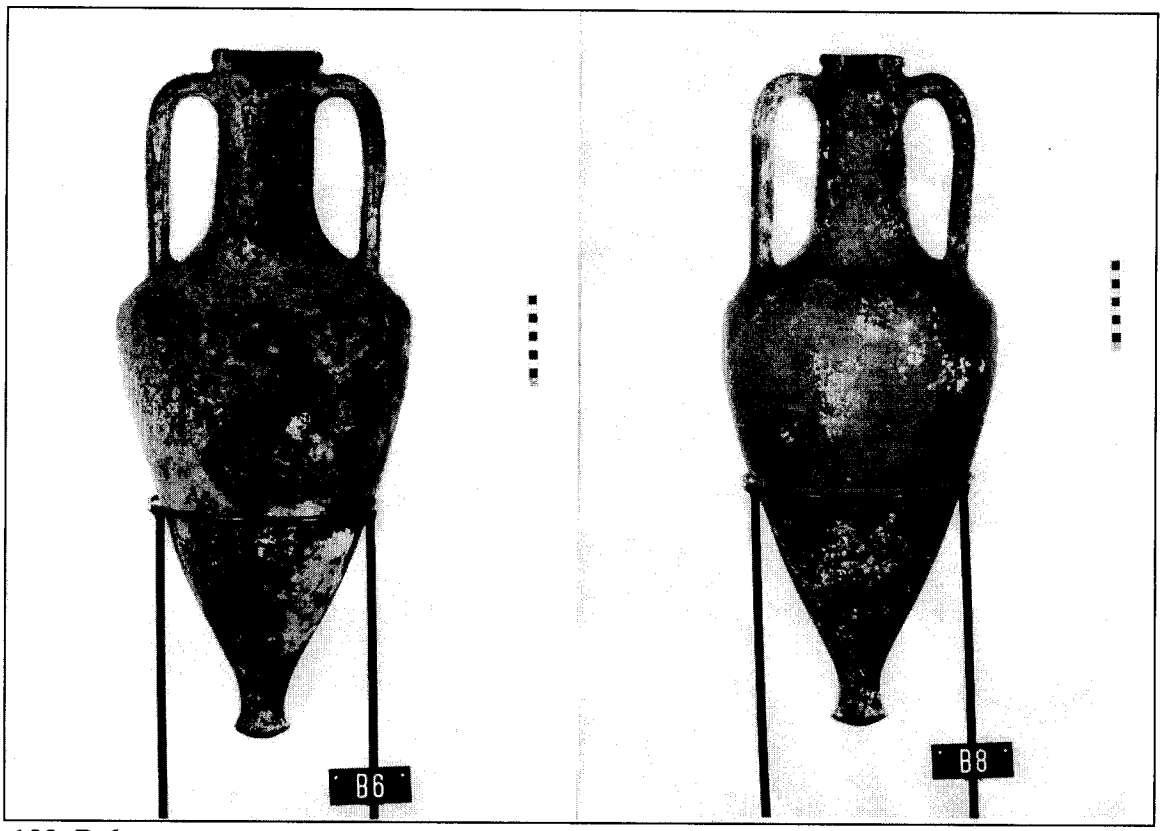


119. A 1009 120. A 1016



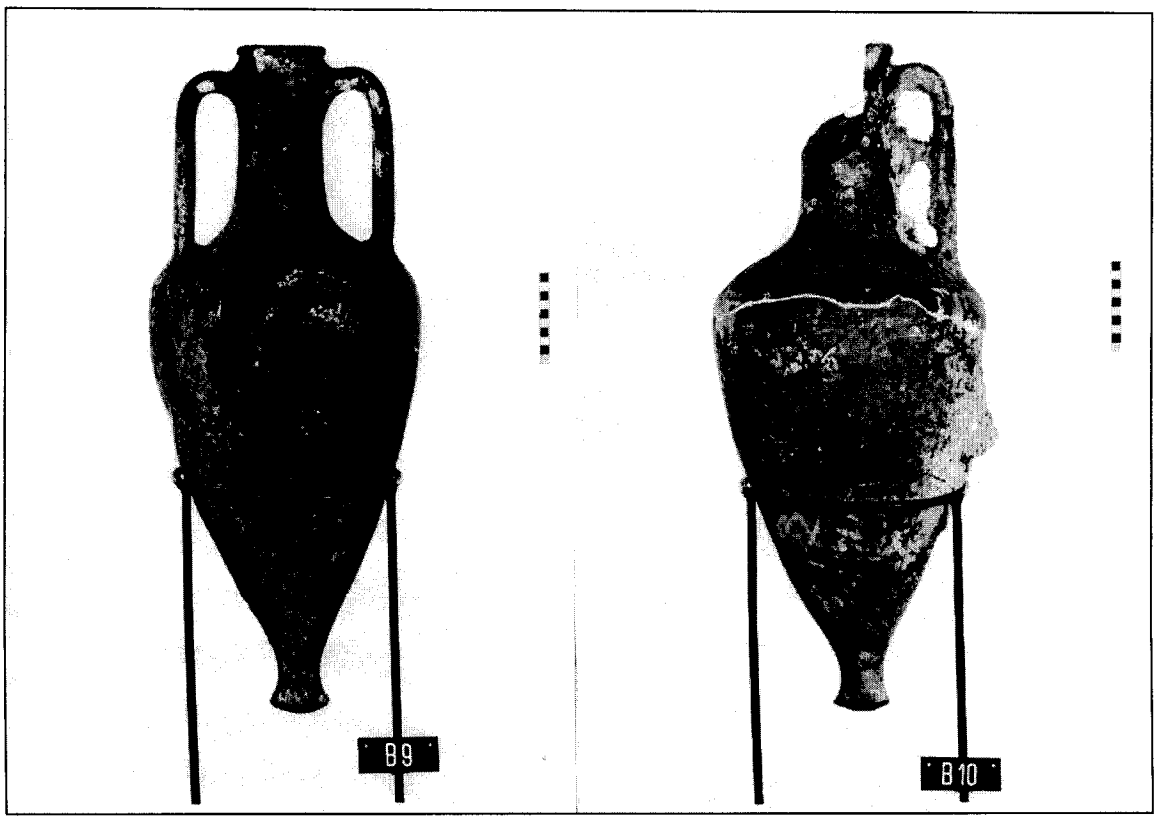
121. B 3 122. B 4

PLATE 29. Solokha II Amphoras.



123. B 6

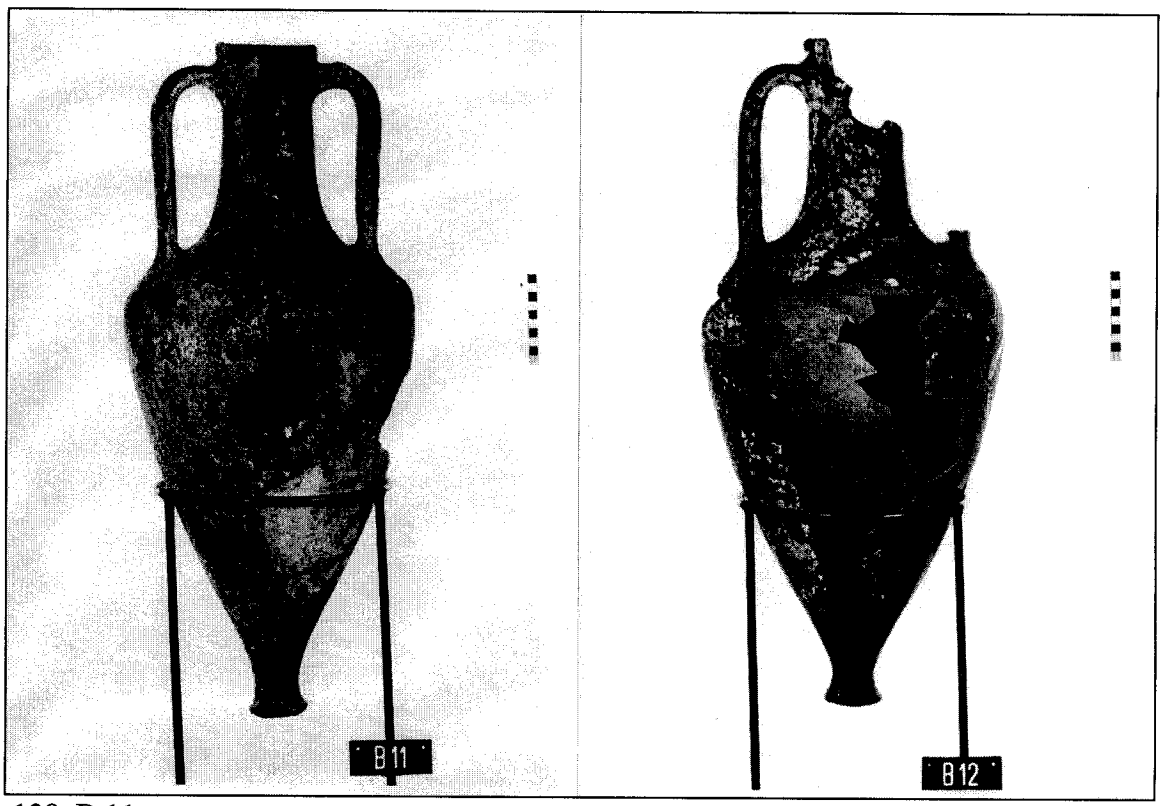
125. B 8



126. B 9

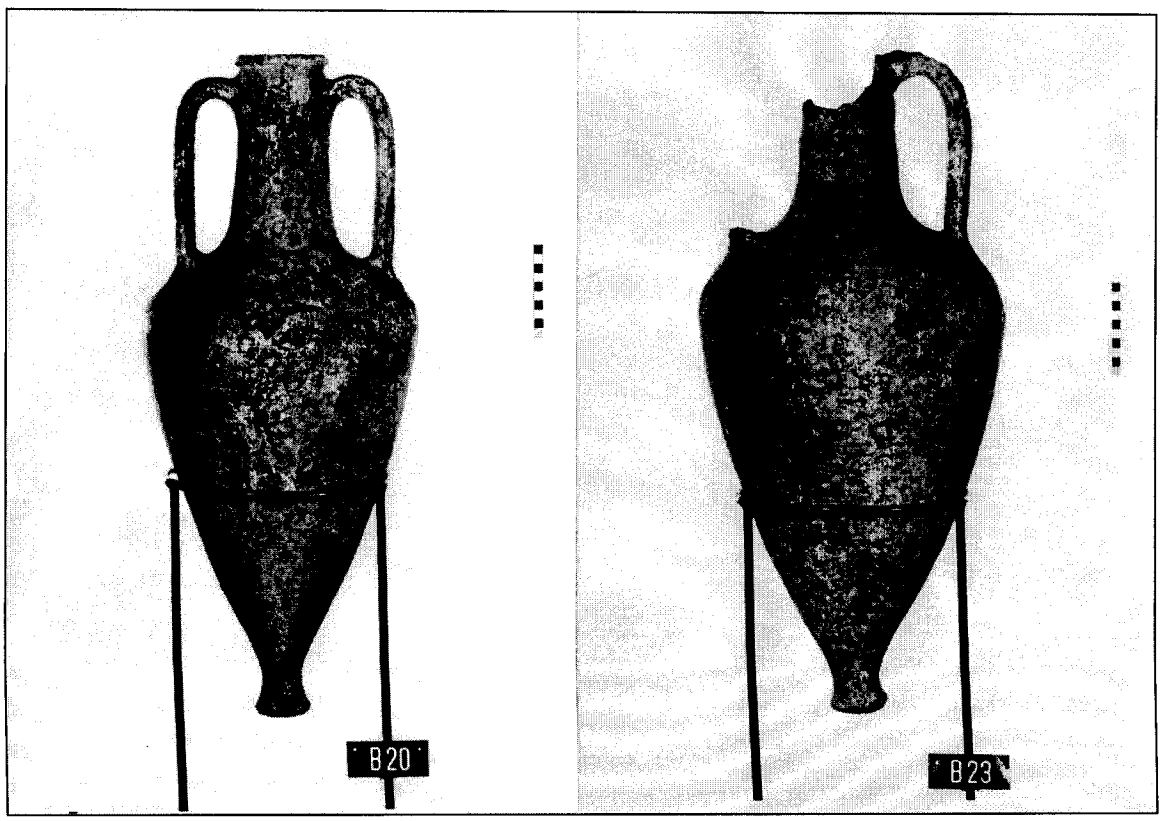
127. B 10

PLATE 30. Solokha II Amphoras.



128. B 11

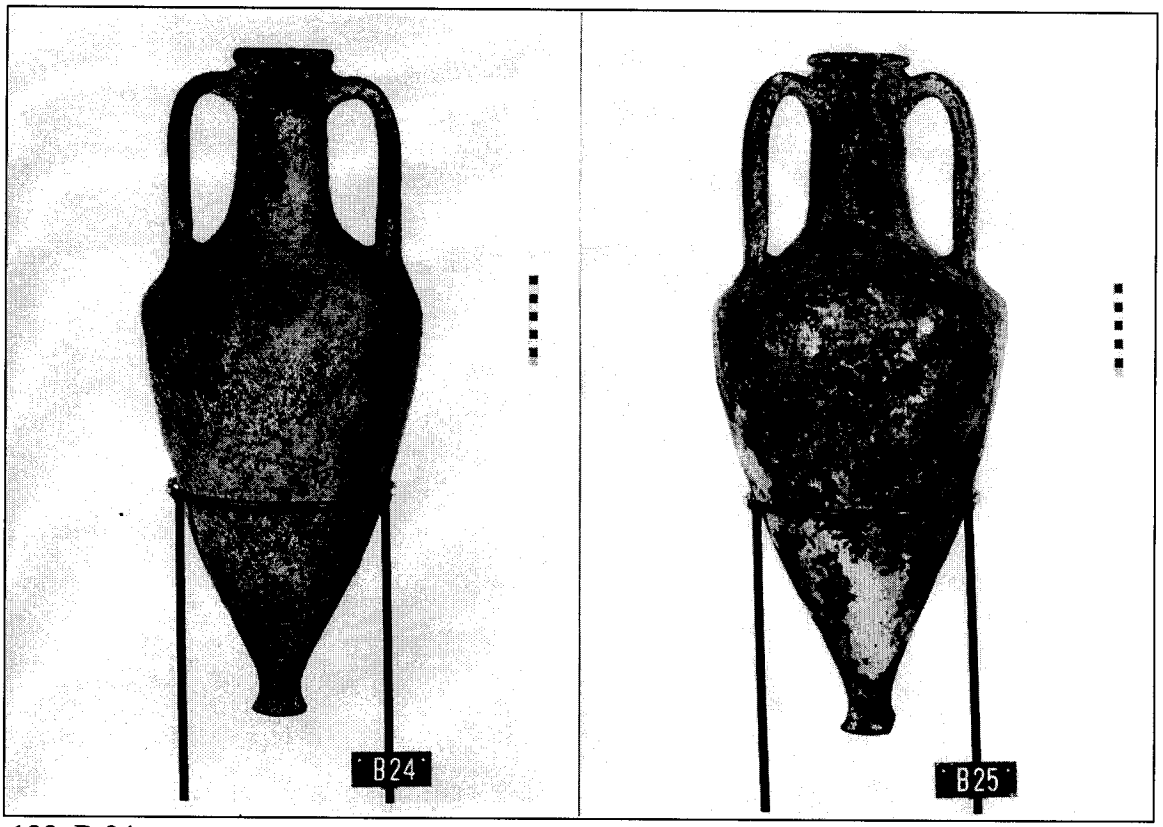
129. B 12



130. B 20

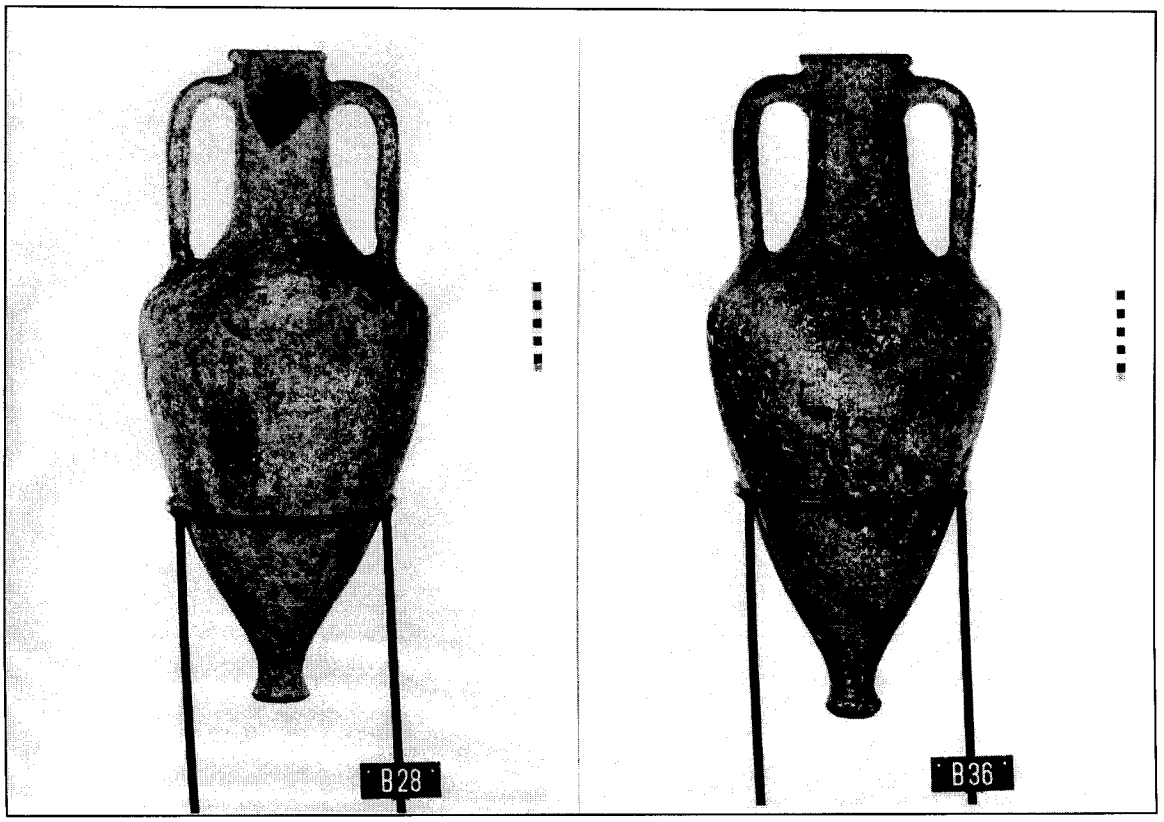
131. B 23

PLATE 31. Solokha II Amphoras.



132. B 24

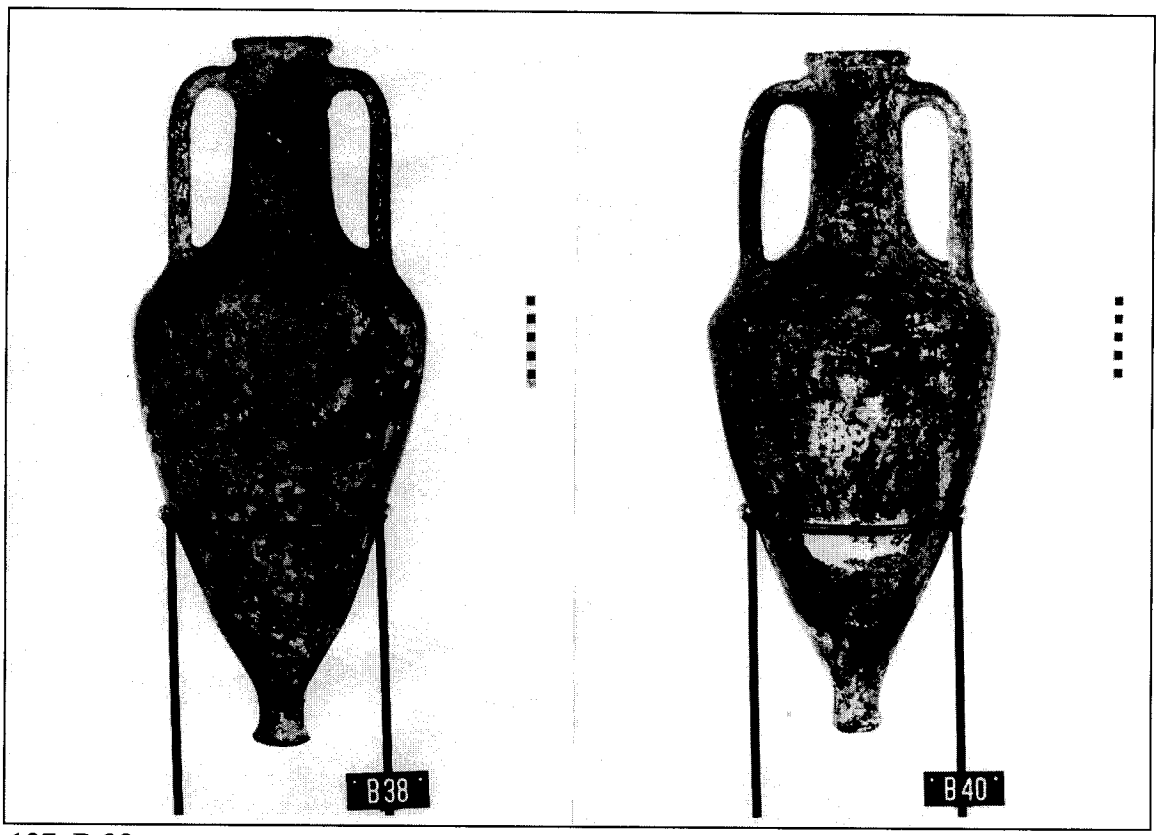
133. B 25



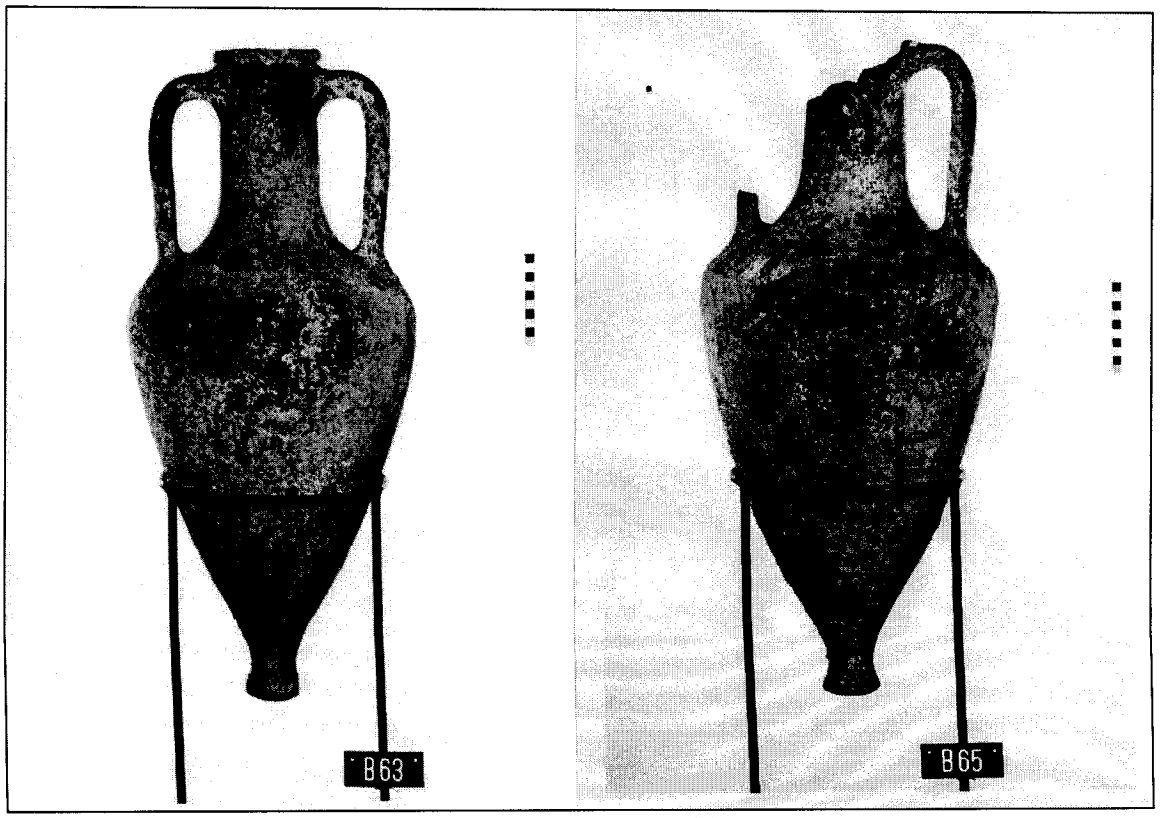
134. B 28

136. B 36

PLATE 32. Solokha II Amphoras.

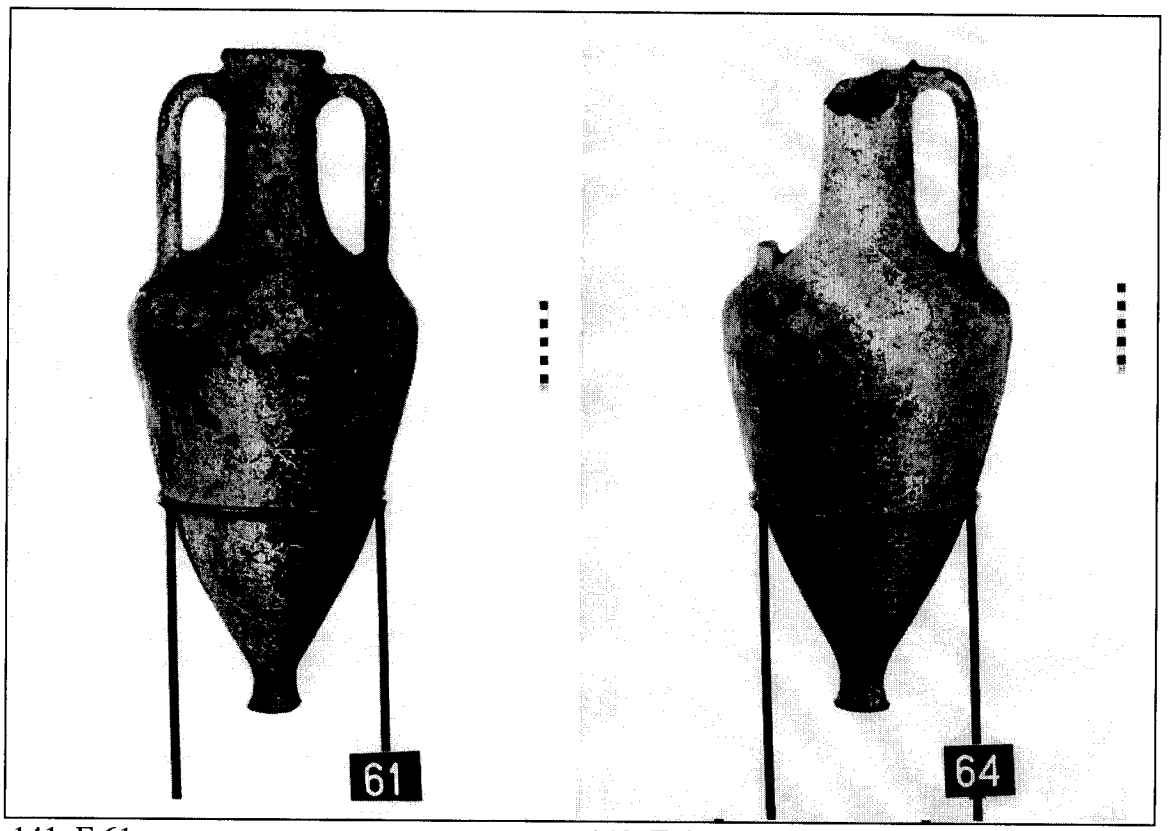


137. B 38 138. B 40



139. B 63 140. B 65

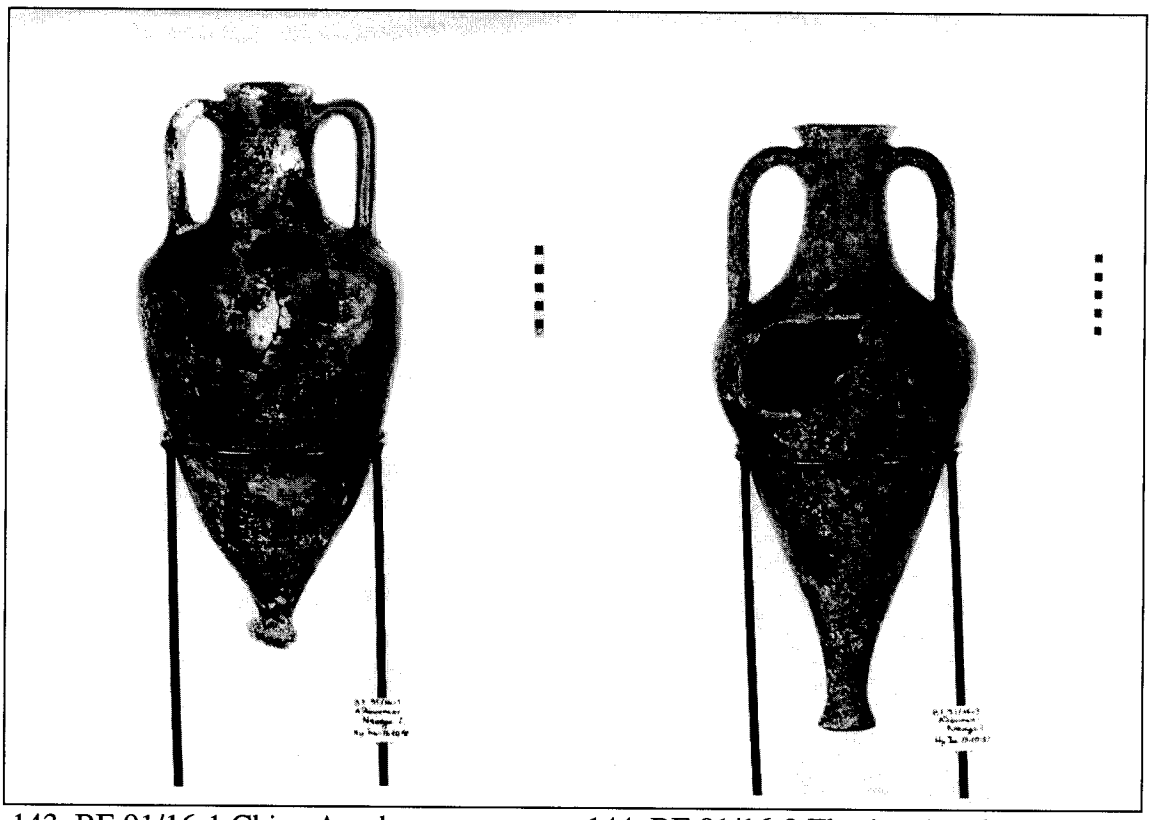
PLATE 33. Solokha II Amphoras.



141. Г 61

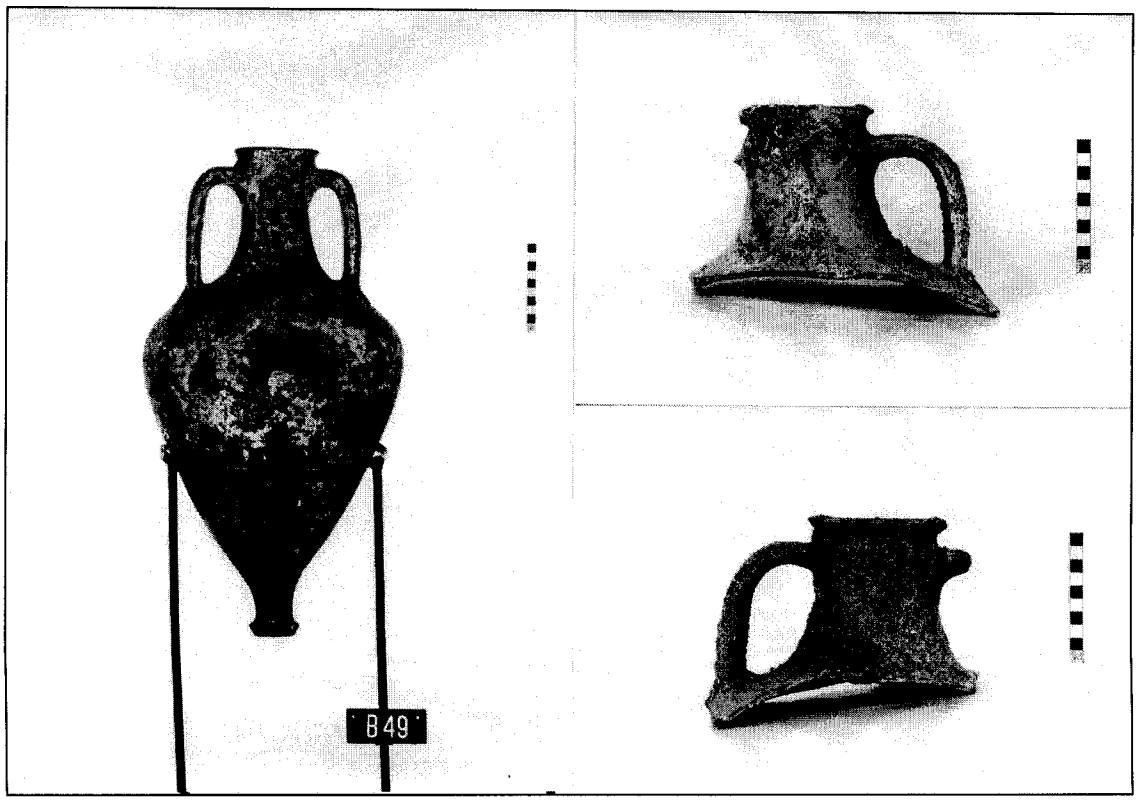
142. Г 64

PLATE 34. Solokha II Amphoras.



143. BE 91/16-1 Chian Amphora

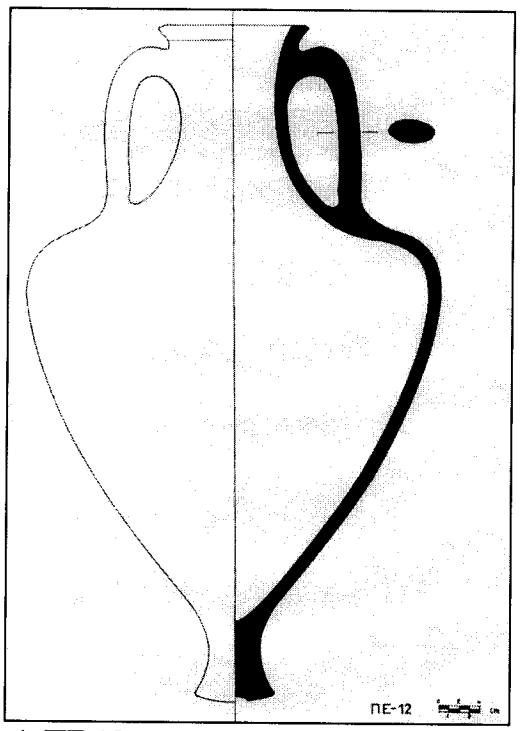
144. BE 91/16-3 Thasian Amphora



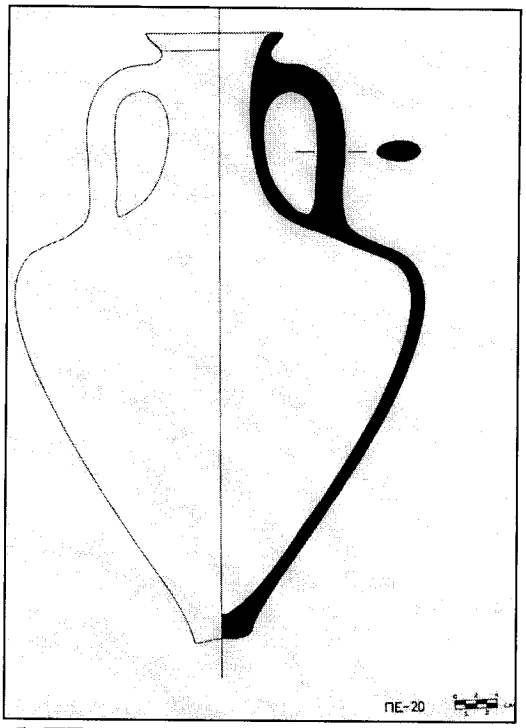
147. B 49 Unidentified (early Thasian?)

148 and 149.
Γ12 & Γ32 Unidentified (North Greek?)

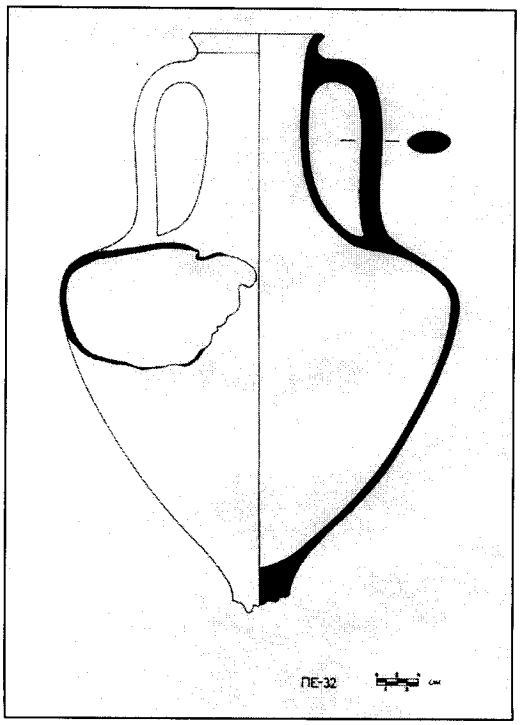
PLATE 35. Miscellaneous Amphoras.



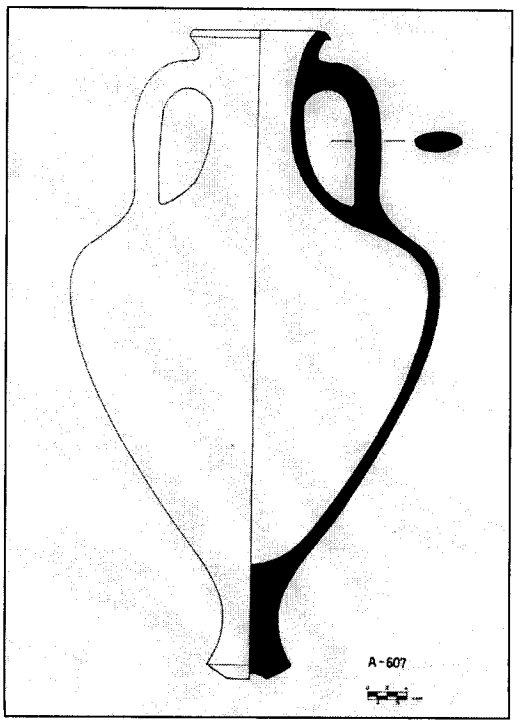
4. ΠΕ 12



5. ΠΕ 20

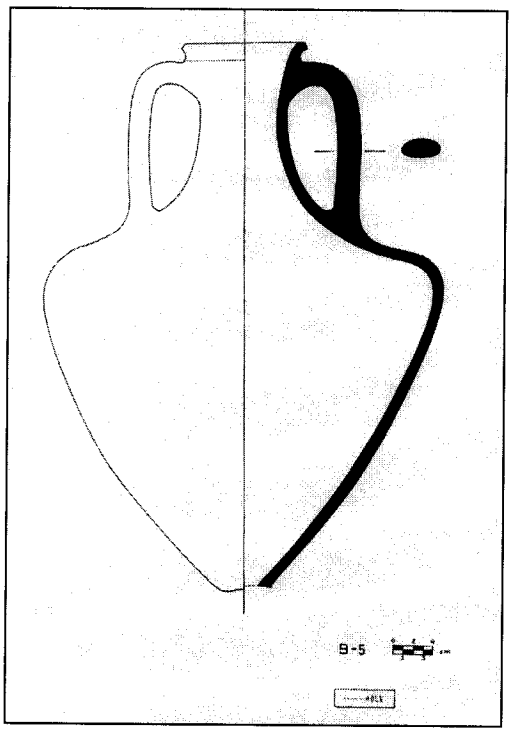


6. ΠΕ 32

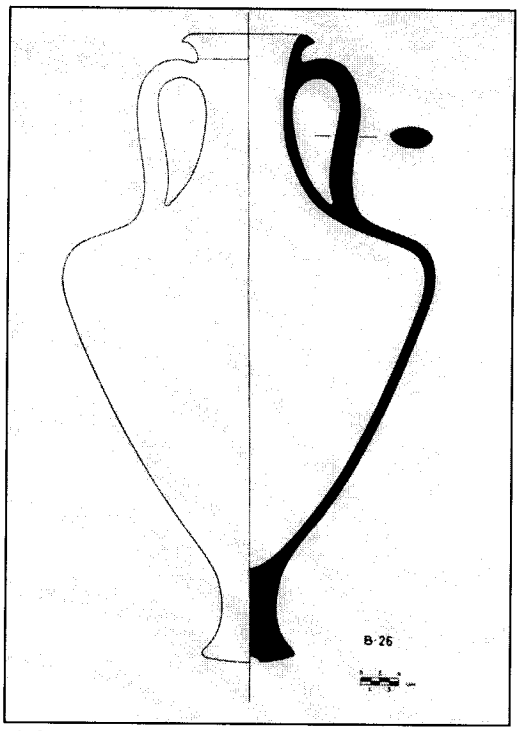


7. A 607

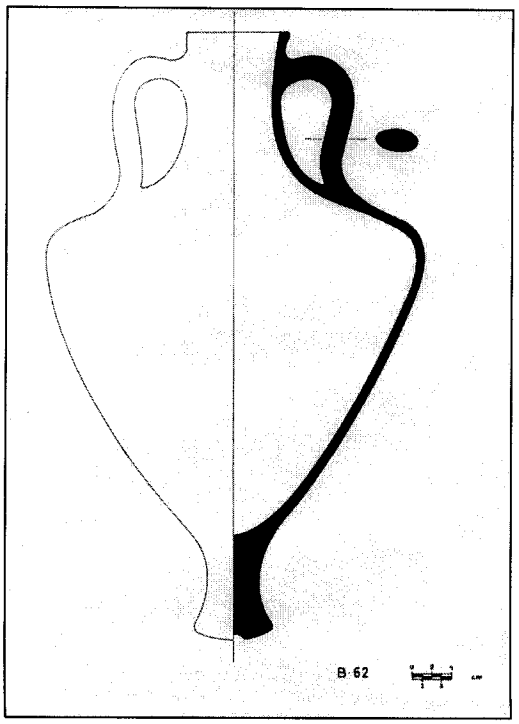
PLATE 36. Mendaian Amphoras.



34. B 5

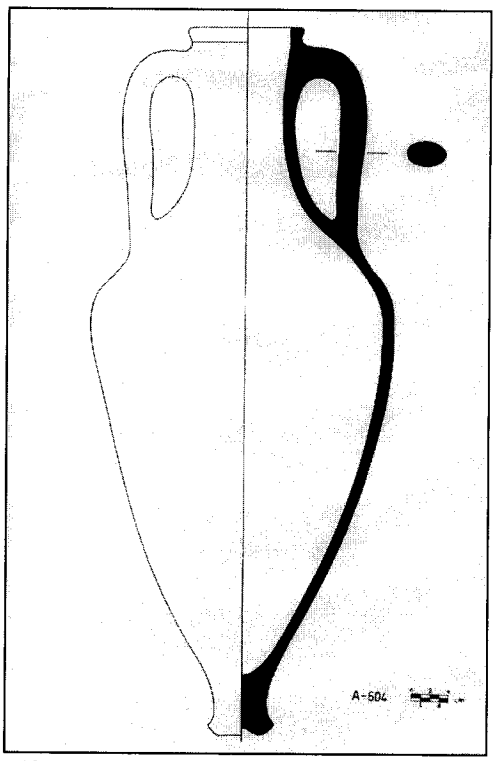


36. B 26

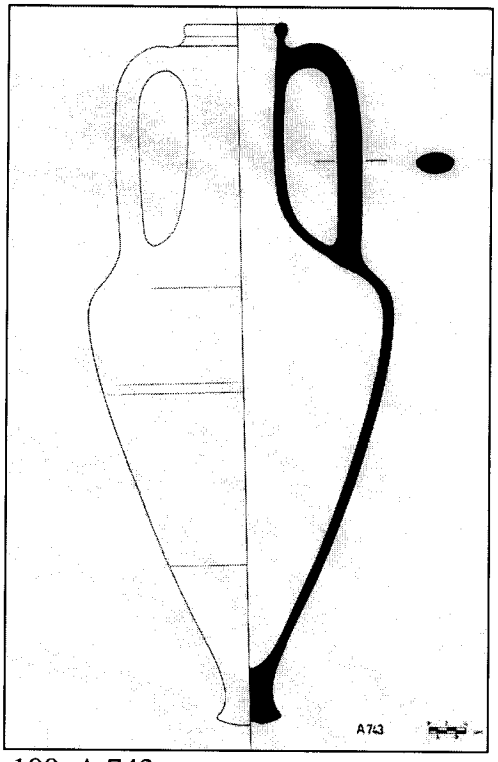


47. B 62

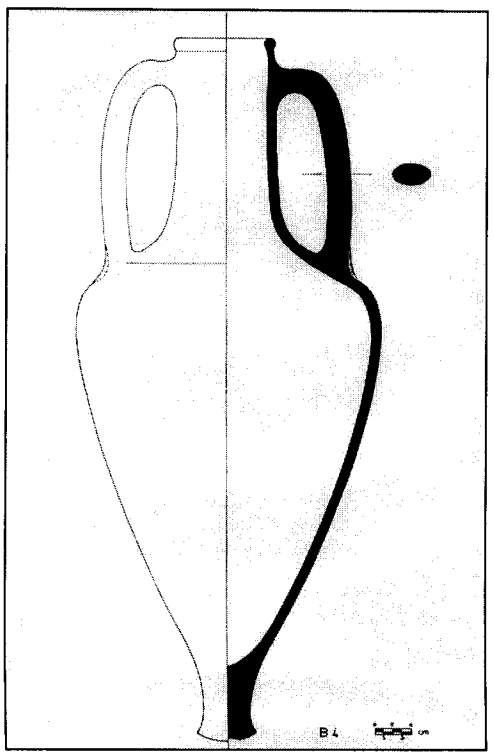
PLATE 37. Mendaian Amphoras.



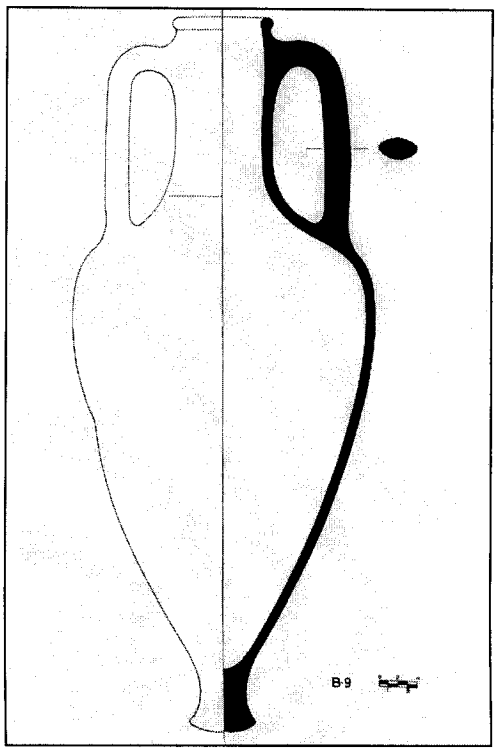
59. A 604



100. A 743

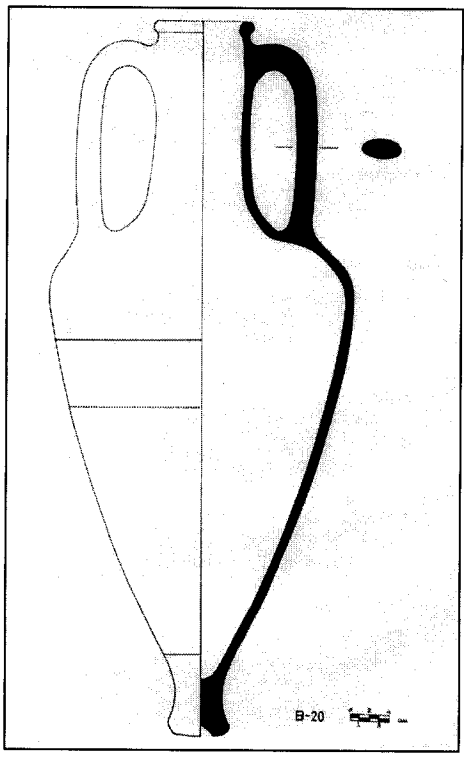


122. B 4

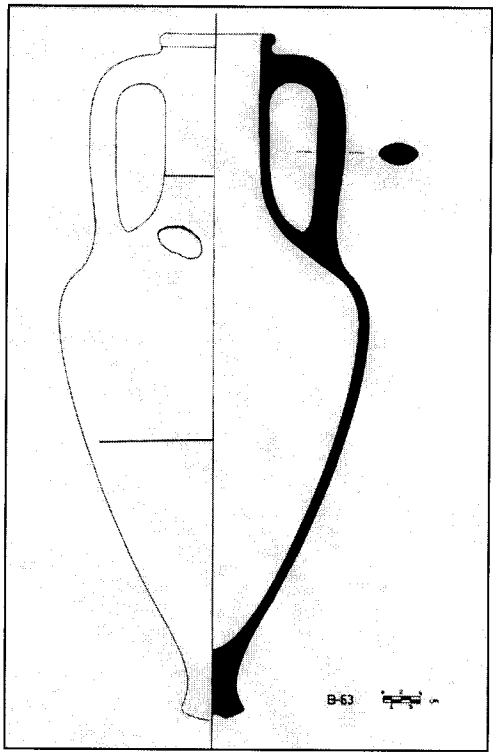


126. B 9

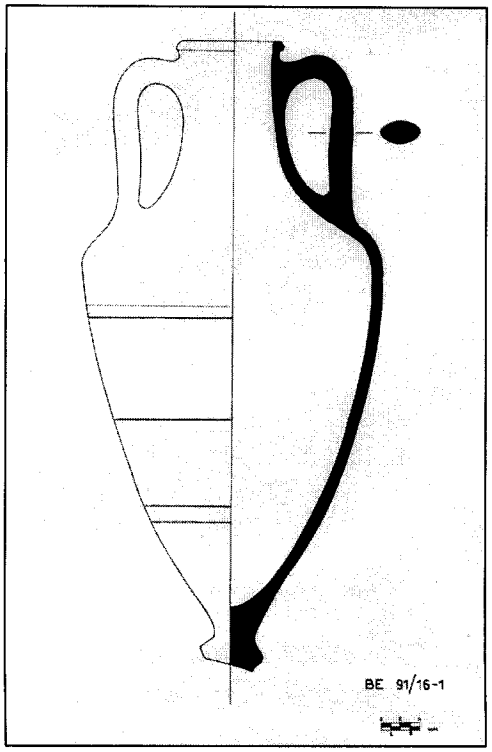
PLATE 38. Solokha II Amphoras.



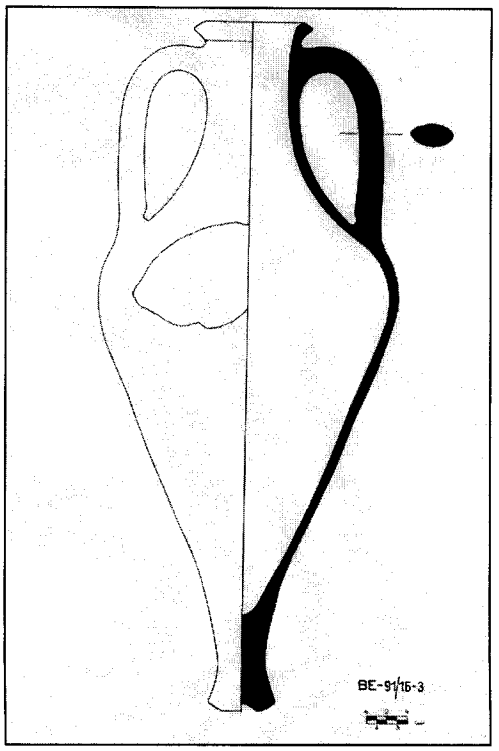
130. B 20



139. B 63

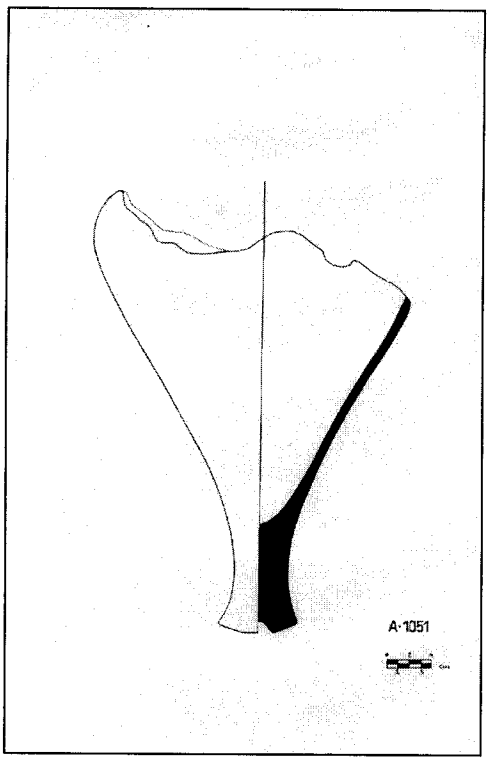


143. BE-91/16-1 Chian

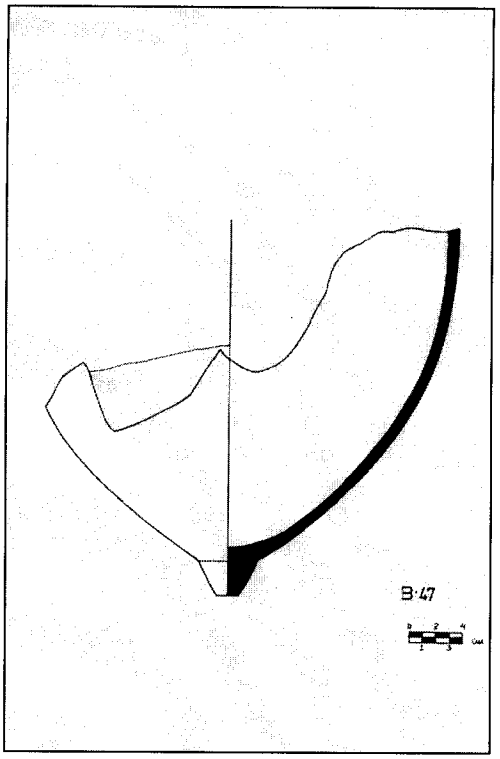


144. BE-91/3 Thasian

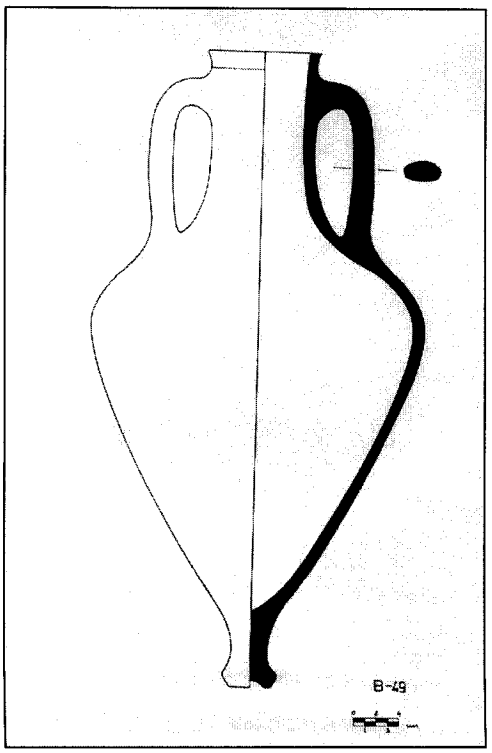
PLATE 39. Solokha II and Miscellaneous amphoras.



145. A 1051 Unidentified - N. Greek?



146. B 47 Corinthian B/Corcyraean



147. B 49 Unidentified - Thasian?

PLATE 40. Miscellaneous Amphoras.

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