THE POTTERY FROM A FIFTH CENTURY B.C. 
SHIPWRECK AT MA'AGAN MICHAEL, ISRAEL

A Thesis 
by

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ABSTRACT

The Pottery from a Fifth Century B.C. Shipwreck at Ma'agan Michael, Israel.

(May 1993)

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Between 1988 and 1990 a shipwreck tentatively dated to the 5th century B.C. was excavated off the coast of Israel at Ma'agan Michael by Dr. Elisha Linder of the Center for Maritime Studies. This study presents one category of material from the Ma'agan Michael shipwreck: the pottery. The goal of this analysis is to provide an indication of the ship's date, origin, and route, as well as insights into shipboard life and the utilization of shipboard space. The majority of wares are personal items for shipboard use such as bowls, jars, jugs, lamps, and a cooking pot. Transport amphoras of the basket handle and "Persian" storage jar types are represented only in small numbers. The pottery can be dated from approximately 425 to 400 B.C. The distribution of ceramics throughout the ship suggests two main storage areas: one in the ship's stern for the storage of food preparation and cooking vessels and one just forward of the mast step associated with the ship's water jar. A number of vessels are common types known from Persian period strata along the Levantine coast although many vessels, especially the jugs, have good Cypriot parallels. Attic and East Greek (?) wares are represented by only a few examples. The predominance of Cypriot pottery common to the southern coast from Amathus to Kition suggests a west-east route from Cyprus to any number of Phoenician settlements along the coast of Syria-Palestine.
ACKNOWLEDGMENTS

This work is the result of my participation in the shipwreck excavation at Ma'agan Michael. I owe a great deal to many individuals I was fortunate enough to have met and worked with during my stay in Israel and to several individuals in the United States who have helped see this thesis to completion. I must first thank Dr. Elisha Linder for his initial permission to work on the excavation and his continued encouragement and support throughout my research. Since first meeting him in the autumn of 1988, he has continued to impress me with his enthusiasm, energy (power walks at 4:30 a.m.), and personal interest in the well-being of those working under him. Elisha's interest, not only in the continued progress of the excavation, but also in the care and feeding of the archaeologists and volunteers did much toward achieving an exceptional level of morale throughout the excavation to its successful completion. This thesis is an example of Dr. Linder's willingness to give young students opportunities for studying primary material. I owe him a special thanks for this opportunity.

I owe a great debt to Jay Rosloff whom I first contacted regarding work on the project at Ma'agan Michael. I have gained tremendous insight into the shipwreck and its associated finds through the many conversations we had during the excavation and afterwards. Jay also played a major role in the sorting and mending of pottery in Haifa that allowed great progress in my research.

I owe a special debt to Michal Artzy who provided a major stimulus for this research and its use as my M.A. thesis. She has served as my principal on-site advisor and I have consulted her at every phase of this research from the recording of the ceramics to the presentation of the results. Her vast knowledge and experience of the archaeological sites and ceramics in the eastern Mediterranean has contributed much to this research.
Besides providing such beautiful and accurate drawings of much of the pottery, Netia Piercy has been a trusted friend and advisor during the seasons of excavation. Her varied experience of shipwreck excavations and publications has contributed much to this thesis.

I feel especially fortunate to have worked with the many people from the Center for Maritime Studies at the University of Haifa, in particular Steve Breitstein and Yossi Tur-Caspa. I have learned a great deal working with them. Their varied and extensive expertise in all aspects and conditions of excavation contributed to the smooth running of the day to day operations. Danny Syon must also be mentioned here because he usually turned up at the site with them. It was truly a great pleasure working with them all. I owe a special thank you to Yitzhak Dagan who took care of all the logistical considerations for my stay in Israel.

I have benefitted from my all too brief association with Yak Kahanov. He has set me straight on many occasions and always provided an easy going personality. I look forward to the completion of the conservation and reconstruction of the Ma'agan Michael ship which are now in his capable hands. It was also a pleasure working with Mike Udell who also contributed to this thesis by mending and sorting pottery in Haifa and offering helpful suggestions.

Fig. 2 was prepared by Jay Rosloff. Figs. 3, 5, 6, 7, 10, 11, 12, 13, 16, 17, 18, 19, 20, 38, 39, 40, 43, 44, 45, 46, 48, 51, 55, 57, 58, and 59 were drawn by Netia Piercy. Figs. 4, 8, 9, 14, 15, 21, 25 (drawing), 28, 29, 32, 41, 42, 47, 49, 50, 52, 56, 60, and 61 were drawn by Natalie Messika. Figs. 22 and 27 were photographed and printed by David Evan.

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Both George Bass and Frederick vanDoorninck, Jr. read previous drafts of this thesis and I indeed appreciate all their helpful comments and suggestions. I have benefitted greatly from the many classes with them at Texas A&M. I would especially like to thank George Bass for his patience and words of inspiration.

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I INTRODUCTION

The Phoenicians may be considered the best known seafarers of the ancient Mediterranean. But what can we really say about maritime activity in the world of the Phoenicians? Our best picture of such maritime activity in the eastern Mediterranean comes from the Hebrew prophets, and in regard to Tyre, we have the description from Ezekiel:

Tarshish trafficked with you because of your great wealth of every kind; silver, iron, tin, and lead they exchanged for your wares. Javan, Tubal, and Meshech traded with you; they exchanged the prisons of men and vessels of bronze for your merchandise. Beth-togar'amah exchanged for your wares horses, war horses, and mules. The men of Rhodes traded with you; many coastlands were your own special markets, they brought you in payment ivory tusks and ebony. Edom trafficked with you because of your abundant goods; they exchanged for your wares emeralds, purple, embroidered work, fine linen, coral, and agate. Judah and the land of Israel traded with you; they exchanged for your merchandise wheat, olives and early figs, honey, oil, and balm. Damascus trafficked with you for your abundant goods, because of your great wealth of every kind; wine of Helbon, and white wool, and wine from Uzal they exchanged for your wares; wrought iron, cassia, and calamus were bartered for your merchandise...¹

The discovery in 1985 of a first millennium B.C. shipwreck off the coast of Israel at Ma'agan Michael provided an opportunity to view first hand physical remains of such maritime activity. The Ma'agan Michael shipwreck is the first ancient hull to have been completely excavated and recovered off the coast of Israel and promises to enhance our knowledge of ship construction and seafaring in the eastern Mediterranean midway through the first millennium B.C. It is the nature of shipwreck sites to eventually raise more questions than they are able to answer, and the present case is no exception. Yet through intensive investigation of every aspect of this shipwreck site we can gain valuable insight into major aspects of maritime activity during that period in the eastern Mediterranean,

¹Ezekiel 27:12-27.
This thesis follows style and format of American Journal of Archaeology.
involving nautical technology, maritime trade, and maritime culture.

The present study deals with just one category of material from the Ma'agan Michael shipwreck: the pottery. The goal of this analysis of the ceramic vessels used on the ship is to provide an indication of the ship's date, origin, and route, as well as insights into shipboard life and the utilization of shipboard space.

THE SITE

Kibbutz Ma'agan Michael (fig. 1) is located approximately 35 kilometers south of Haifa, just a few kilometers south of Tel Dor and north of Tel Mevorakh, two sites occupied from the Bronze Age to the Hellenistic period. At the mouth of the Crocodile River (Nahal Tanninim), just south of the Ma'agan Michael beach, is the small site of Tel Tanninim (Crocodilonopolis), probably inhabited at least by the Hellenistic period. Further down the coast lies the Roman and Byzantine city of Caesarea Maritima (Hellenistic Straton's Tower). The stretch of coastline around Kibbutz Ma'agan Michael is marked by sandy beaches bordering a once-swampy coastal plain now converted into fish ponds. Just 150 meters off the Ma'agan Michael beach are three small islands, remnants of the outermost querkar ridge that parallels the present-day coastline.

In the autumn of 1985, Ami Eshel, a member of the kibbutz, noticed a pile of large stones interspersed with fragments of pottery vessels while swimming just 75 meters off the beach at Ma'agan Michael. He recognized that some of the stones were schist, a stone type not indigenous to the Israeli coast. Suspecting that he had stumbled upon a shipwreck, he reported the find to Shelley Wachsmann, then Inspector of Underwater Antiquities of the Israel Department of Antiquities, who subsequently surveyed the site.2 In the following spring, Dr. Elisha Linder, a resident of Ma'agan Michael, and Dr. Avner Raban, both of the Center for Maritime Studies at the University of Haifa, conducted another survey. Both

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Fig. 1. Location of shipwreck.
investigations concentrated on the midships area. Wachsmann explored the southern area and Raban and Linder examined the northern perimeter. These initial investigations revealed a well-preserved wooden hull built in the typical mortise-and-tenon construction tradition with frames attached to planks with clenched iron nails. Pottery consisted mostly of basket jar fragments and large pithos sherds. A nearly complete lamp with pinched wick nozzle (#67) was also found. The pottery suggested a date for the shipwreck of the 5th century B.C. 3

In 1987, Linder obtained an excavation permit from the Israel Department of Antiquities as principal investigator. Jay Rosloff, then working with the Institute of Nautical Archaeology, was invited to join the project as field director and hull specialist. To determine the extent of the shipwreck, further surveys were conducted in the fall of 1987 and spring of 1988. One test trench was excavated across the inshore portion of the ballast pile revealing more basket jar fragments, a layer of dunnage, and two wooden stakes with sections of rope. In an offshore test trench into what was later designated rooms 1 and 2 of the hull, a variety of objects was discovered: fragments of a large bowl with ring base (#18 =MM66/88-1027 4) came from room 1; a mortaria (#11 =MM66/87-003), a cooking pot (#68 =MM66/87-010), jug fragments (#49 =MM66/87-004, #51 =MM66/87-006), and a tin bar ingot came from room 2. The presence of a cooking pot and various jugs and bowls in the offshore end of the ship, probably personal or galley items, identified that end as the stern, the traditional location for such goods. 5

THE EXCAVATION

Systematic excavation of the Ma'agan Michael wreck began in the fall of 1988, and consecutive three-month seasons continued through the autumn of 1989. 6 The excavation

3Linder (supra n. 2).
4The excavation registration number consists of the following elements: MM = Ma'agan Michael; 66 = site number from the Israel Department of Antiquities; 87/88/89 = year of excavation.
was generously funded by Sir Anthony Jacobs of London, a Friend of the University of Haifa. Housing for the volunteers from abroad and meals for the entire crew were provided by the members of Kibbutz Ma'agan Michael. The excavation staff consisted of Elisha Linder, principal investigator; Jay Rosloff, field director; Yitzhak Dagan, administrator; Michal Artzy, pottery specialist; Mike Udell, assistant field director; Yak Kahanov, research assistant; Yossi Tur-Caspa, geotechnician; Steve Breitstein, chief diving officer and operations director; Netia Piercy, artist; Danny Syon, photographer; Eve Black, excavation secretary; Jerry Lyon, recording assistant; and Shelley Wachsmann, Department of Antiquities.\(^7\)

The shipwreck lay perpendicular to the beach in roughly two meters of water and was covered by as much as one and one-half meters of sand. These two conditions created obvious problems and constraints: the slightest waves jostled divers, making careful excavation difficult and many times impossible. Large and small water-powered dredges were used to clear and excavate the site, but, as trenches were being dug, the sand continually crept back, defeating our seemingly futile attempts. To combat the effects of the surf zone, a deep horseshoe-shaped trench was dug well outside the known wreck perimeter. The outer face of this trench was covered with some 1300 sandbags to create a stable wall. The exhaust from the dredges was deposited outside the trench, thus raising the height of the outer wall. Unseasonable storms that first autumn forced us to abandon the site many times for several days. When we were able to return, our trenches were usually filled in. Also, as the westerly winds picked up in the afternoons, we were often forced to cover the site quickly and end the excavation day early. This environment forced us to adapt a strategy of opening small sections of the ship and mapping and removing any objects from them. At the end of each day the area was covered with sandbags to protect and mark the excavated areas.

\(^7\)The excavation team also included archaeology students Lucy Blue, Michael Halpern, Rachel Crausz, Sam Turner, Tami Shabi, Na'ama Bahat, and Sigal Namer; volunteer divers from abroad, Judy Sheuer, Anna Nichols, Christopher Cambell, and Anthony Abry; and volunteer divers Avraham Chasidim, Shimon Rothenberg, and Oren Linder, among others, from Kibbutz Ma'agan Michael.
of the hull. In this way we expected to empty the hull of its contents and then dismantle and remove it to holding tanks on shore.

Eight datum poles situated around the site were used for triangulating artifacts. Significant artifacts such as complete ceramic vessels and diagnostic sherds and ship timbers were triangulated and plotted on a 1:10 scale plan. For other fragmented objects and ballast stones, we relied primarily on the ship's internal structure to record their location. Each room (area between adjoining frames) was excavated, and its contents were labeled with the number assigned to that area. These areas could be further divided into north and south (port and starboard) sections, which were divided by a stringer which ran along the longitudinal axis of the hull and locked into notches in the frames. Utilization of the ship's structure allowed us to place objects not triangulated into areas of roughly one square meter. Because of the high energy of the surf zone, it was assumed that the location of many of the objects, especially in the upper part of the wreck, could not necessarily reflect their original places of deposition. This hypothesis was supported by the discovery of many well-worn pottery sherds and an abundance of late Roman or Byzantine pottery sherds and coins mixed with wreck material in the ballast pile.

THE HULL

The entire length of the ship's gently rockered keel was preserved along with the bottom of both posts. Much of the port side of the hull had been torn away, probably shortly after the ship foundered on its starboard side. Because of its position, the starboard side was preserved well past the turn of bilge to as much as 1.5 meters above the bottom of the keel. After a preliminary study of the hull remains, Jay Roslof reconstructed the vessel to a length of 13 to 15 meters with a beam of about 4 meters.8 The hull had a typical "wine-glass" shape like that of the Kyrenia ship of the 4th century B.C. In the fashion typical of ancient ships, planks were carved to shape and edge fastened with mortise-and-tenon joints. The

8Linder (supra n. 2).
plank ends were lashed to an inner stem and stern post. The framing pattern demonstrated a technique so far unique to the Eastern Mediterranean. Frames are composed of floors with futtocks scarped along the same axis and secured with three tree nails prior to their placement in the hull. These "made" frames were positioned about every 75 centimeters and were secured to planks with clenched iron nails. The excavators numbered the frames consecutively from the west to east. Running over the top of the frames along the vessel's longitudinal axis was a stringer which supported vertical stanchions. These stanchions, placed every 1.1 meters, suggest the presence of deck beams, although no deck or deck planking was identified. A large mast step was positioned just forward of midships, suggesting a single, square-sail rig. Several sections of rope, ranging from 1 to 3 centimeters in diameter, were found throughout the ship and just off both the stern and bow. The overall condition of the hull suggested that it was almost new when it wrecked. Rosloff noted that there was no evidence of rot in the dunnage or bilges; the bottom of the keel was not worn by scraping or damaged by marine wood-boring organisms; external timbers, especially the waterline wale was not abraded; and many of the internal timbers still had sections of bark on them.  

THE FINDS

Full scale excavation of the offshore section of the ship began in the area of the initial test trench of the Linder and Rosloff survey (see site plan, fig. 2). Excavation of room 2 revealed two small bowls (#1 = MM66/88-1020 and #3 = MM66/88-1037) and a fragmented bowl with two handles similar in shape to Attic bolsals (#14 = MM66/88-1921). A broken and corroded iron strigil was also found in the same area.

Just forward of frame 2, a jug with trefoil mouth (#57 = MM66/88-1024) was found resting on the stringer. In the northern forward section of this room a basket with two black-glazed salt cellars (#72 = MM66/88-1069 and #73 = MM66/88-1070) was unearthed and a

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9Rosloff (supra n. 6) 4.
The
Ma'agan
Michael Ship c.400 BCE
Center for Maritime Studies, 1989
Fig. 2. Site plan.
tiny juglet (#56 = MM66/88-1071) was found nearby. Other finds from this area included a base fragment of an as yet unidentified type of storage jar (#48 = MM66/88-1026), a double-ribbed handle (#64 = MM66/88-1130), and another small bowl (#4 = MM66/88-1076), resting on frame 3.

In room 4, we discovered several wooden and ceramic artifacts under and mixed with large ballast stones. A wooden mallet with broken handle was found just to the south. Other wooden objects included a wooden heart- or leaf-shaped box with three circular cavities and a pivoting lid, and two carved pallets whose shapes resemble the body of a violin. One of these pallets contained a greenish clayey material thought to be some kind of cosmetic. The ceramics from the forward area of room 4 consisted of three intact jugs (#50 = MM66/88-1025, #60 = MM66/88-1146, and #62 = MM66/88-1147), two fragmented but nearly complete jugs (#59 = MM66/88-1148 and #53 = MM66/88-1141), and a jug fragment with raised handle which matched a fragment found in 1987 (#49 = MM66/88-1153 & MM66/87-004). Other finds from this area included amphora fragments with painted stylized tree decoration (#19 = MM66/88-1174 and #20 = MM66/88-1175), a fragmented jar with a dripped cross-hatch decoration (#21 = MM66/88-1121), a small bowl (#6 = MM66/88-1149), and another fragment from an as-yet unidentified type of jar (#46 = MM66/88-1307).

Toward the end of the 1988 autumn season, we reached room 5. Two bowls with horizontal handles reminiscent of Greek skyphoi (#16 = MM66/88-1202 and #17 = MM66/88-1204) and another jug fragment which matched one from the 1987 survey (#51 = MM66/88-1220 & MM66/87-006) were found in the southern section of the room. The top of a globular jar (#47 = MM66/88-1176) and a small bowl similar to the small bowls from rooms 2, 3, and 4 (#2 = MM66/88-1186) came from the northern section of the room. In the northern forward area of room 5, we were only able to expose and briefly examine several wooden tools, when storms forced us to close the excavation for the season. Further investigation of this area in the following spring revealed several wooden tool handles, bow drills, a carpenter's square, and a whetstone. The iron tools which originally fit into the
wooden handles had been reduced to a single amorphous concretion: an X-ray of this concretion revealed them to be awls, adzes, and chisels. Also within this concretion were hundreds of spare tenons and treenails, either left over from the initial construction of the hull or intended for shipboard repairs. The concretion also yielded a dome-shaped weight, probably of iron, which unfortunately was corroded beyond recovery.

Forward of room 5 few objects were found until we reached midships. In this area of the ship, we found mostly densely-spaced ballast stones and occasional traces of basket jars. Only a sherd of a small bowl (#7 = MM66/89-1510) and a base fragment of a dipper juglet (#63 = MM66/89-1613) were uncovered in room 6. Room 7, the small space between half-frame 6 and frame 7, contained two handles of vessels that resemble Greek kantharoi (#74 = MM66/89-1507 and #75 = MM66/89-1576) and a small bowl (#5 = MM66/89-1502) resting on the southern arm of frame 7. The single artifact from room 8 was a rim sherd of a black-slipped jug with wide neck (#61 = MM66/88-1615).

The ship's mast step rested between frames 9 and 12.\textsuperscript{10} Associated with the mast step were several wooden bits, stakes and lengths of rope. Small bowl #9 (= MM66/88-1890) was found resting in the main socket of the mast step. Worn fragments of a jar with red slip (#22 = MM66/88-1918) were found north of the mast step. Just forward of the mast step, in the south side of room 13, several pithos fragments (#70 = MM66/90-013) were found. In the same area we discovered an impression in the bilge sediment covering the planking which appeared to match the pithos base found just forward of this area. Several more ceramic vessels were found nearby. Small bowl #10 (= MM66/89-1919) and a pinched nozzle lamp with raised base (#66 = MM66/89-2107) were found to the north. Also forward of the mast step, a section of matting protected one small bowl (#8 = MM66/89-1858) and a small cup-shaped bowl with horizontal button handles (#15 = MM66/88-1930) was discovered nearby. Just below these vessels, two mortaria (#12 = MM66/89-1859 and #13 = MM66/89-1909)

\textsuperscript{10}Only a single half-frame, frame 10, was found between frames 9 and 12. There was no frame 11; the number was skipped because the director expected to find another half-frame forward of frame 10 which did not materialize (J. Rosloff, pers. comm., 1990).
were uncovered in their original, stacked position. In the same area, another jug with raised handle (#54 =MM66/89-1857) was unearthed. The only ceramic vessel found forward of this was a fragmentary black-glazed bowl (#71 =MM66/89-1750) from the northern tip of frame 14.

At the bottom of the ship, between the ballast and hull planking a layer of dunnage was encountered. The dunnage consisted of twigs and branches and wood chips, on top of which was often a thin layer of plain-weave matting. Seeds and other food items, such as olive pits, grape seeds, and fig seeds, were found in the bottom of the hull. On one occasion, a cluster of fig seeds still adhered to what was possibly a fragment of their original container. Besides these seeds, two distinct spills of a grain later identified as barley were noticed in the forward and aft sections of the hull.

An imposing pile of ballast stones was removed from the central portion of the wreck. The largest concentration of ballast stones occurred between rooms 4 and 12. In rooms 4 and 5 we found ceramic vessels and tools below the ballast stones, suggesting that they had shifted from some area forward. Since very few artifacts were discovered between frames 5 and 12, we may assume that the ballast pile was originally stored there. Ballast stones were also found spilled out of both sides of the midships area.

A total of approximately 12 tons of ballast stones were recovered from the wreck. Seven stone types have been identified. Of these, the two or three dominant types may not be indigenous to the Levantine or North African coast.

Most of the basket-jar fragments were found mixed with ballast stones throughout the entire midships and forward areas of the ship. Several sherds were found spilling out of the south side of the hull between rooms 8 and 17. A fragment of a lamp with shaved base (#68 =MM66/88-1161) was also found outside the hull in the northwestern section of the trench. Another important discovery was made just under the starboard/south side of the bow. Excavation of this area revealed a wooden one-armed hook anchor with lead-filled wooden stock.
CATALOGUE OF POTTERY

Vessels in the catalogue that follows are arranged roughly from open to closed shapes, with miscellaneous shapes (lamps, cooking pot, and pithos) following. The Black-Glazed and Greek pottery is treated separately. Fabric, slip, and paint colors have been recorded with the Munsell Soil Color Charts.11 The Munsell verbal color description is given, followed by the color numerical code. I must caution the reader that the recorded colors may not reflect the original fabric or paint color as much staining has probably occurred after deposition. The first line of each vessel entry includes an arbitrarily assigned catalogue number, followed by the excavation registration number and brief provenance guide. The provenance of each vessel is given according to either the room number within the hull or general location outside the hull (see fig.2). This designation is intended to help locate objects on the accompanying plan.

11Munsell Soil Color Charts (Baltimore 1971).
II BOWLS

Three basic types of bowls were found spread rather evenly throughout the ship from the stern to midships: small bowls, mortaria, and bowls with horizontal handles. Most of the bowls (8) are small forms with flat bases and inverted rims. Two other small bowls have unique profiles with flat bases. The three mortaria are all of the ring base variety. The bowls with horizontal handles include a bolsal-shaped form, a cup-shaped form, two skyphos-shaped forms, and one large, deep bowl. This generic designation is used to avoid any implication of Greek origin for which there is presently no proof.

SMALL BOWLS

1. Plain Bowl (fig. 3). MM66/88-1020. Rm. 2,S.
   Max. h. 2.6 cm; max. diam. 7.0 cm; base diam. 2.4 cm.
   Complete. Medium coarse fabric with black, gray, and white inclusions (<1 mm -.5 mm): light olive-gray (5Y 6.5/2) color, perhaps only stained gray from deposition: traces of brown-tan residue on inner and outside surface, possibly oil staining(?). Flat base (cutting marks); slight carination at in-turning rim.

2. Plain Bowl (fig. 4). MM66/88-1186. Rm. 6,N.
   Max. h. 2.9 cm; max. diam. 7.1 cm; base diam. 2.5 cm.
   Complete. Light brownish gray (2.5Y 6/2) fabric; black, grey, and white inclusions(<1mm), tan inclusions visible inside(2mm); light gray (5YR 6/1) slip outside; some dark brown residue inside and on base (cf. #1). Shape like that of #1.
Fig. 3. Small bowl #1 (scale 1:2).

Fig. 4. Small bowl #2 (scale 1:2).
3. **Plain Bowl (fig. 5).**

   MM66/88-1037. Rm. 2.S.

Max. h. 3.5 cm; max. diam. 10.55 cm; base diam. 4.8 cm; fabric th. 0.3 cm.

Base and wall fragment. Light gray (5Y 6/1) fabric; black and white inclusions; pink (7.5YR 8/4) slip, mostly stained dark gray now. Slightly raised, flat base; shallow body; slightly in-turning rim.

4. **Plain Bowl (fig. 6).**

   MM66/88-1076. Rm. 3.N.

Max. h. 4.5 cm; max. diam. 11.9 cm; base diam. 5.0 cm; fabric th. 0.7 cm.

Complete. Light gray (10YR 7/1) fabric; white and black, and a few tan and red inclusions(<.5mm, few 1mm); light gray (5Y 6/1) slip on interior and exterior. Shape like that of #3 but rim more inverted; rough base; wheel ridges inside and outside; smooth interior with dried smoothing mark at very bottom.

5. **Plain Bowl (fig. 7).**

   MM66/89-1502. Rm. 7,S.

Max. h. 3.8 cm; max. diam. 11.0 cm; base diam. 5.9 cm; fabric th. 0.7 cm.

Complete. White (10YR 8/2) fabric; black inclusions (<1mm); white (7.5YR 8/0) slip inside and outside. Shape like that of #3; rough base; smoothing marks on exterior.

6. **Plain Bowl (fig. 8).**

   MM66/88-1149. Rm. 4, N.

Max. h. 4.7 cm; max. diam. 11.6 cm; base diam. 3.9 cm; fabric th. 0.7 cm.

Complete. Light gray-white (5Y 7.5/1) fabric, perhaps stained grey; black and white inclusions (<2-1mm); gray (10YR 6/1) slip on exterior. Shape is similar to above but with a slightly deeper body and small raised base; lightly in-turning rim. Smooth interior; rough base with bits of excess clay; fine turning marks and dried smoothing marks on outside; wide ridge below rim.

7. **Plain Bowl (fig. 9).**

   MM66/89-1510. Rm. 6,S.
Fig. 5. Small bowl #3 (scale 1:2).

Fig. 6. Small bowl #4 (scale 1:2).

Fig. 7. Small bowl #5 (scale 1:2).
Fig. 8. Small bowl #6 (scale 1:2).

Fig. 9. Small bowl #7 (scale 1:2).

Fig. 10. Small bowl #8 (scale 1:2).
Max. diam.(est.) 11.5 cm; max. pres. h. 4.1 cm; fabric th. 0.65 cm.

Rim-wall fragment. White to very pale brown (10YR 8/2.5) fabric; black and gray inclusions(<1mm); white (2.5Y 8/2) slip preserved inside and some outside. Shape like that of #6, with rim turning insightly more.

8. Plain Bowl (fig. 10). MM66/89-1858. Rm. 13.S.

Max. h. 5.3 cm; max. diam. 11.2 cm; base diam. 4.5 cm; fabric th. 0.5 cm.

Complete. Light gray (5Y 6/1) fabric; white and dark gray inclusions(most .5mm, few 1mm); interior covered with brown residue, maybe only wet smoothing. Deeper bowl with slightly concave raised base; in-turning rim, and light wheel ridges on outer surface. Cutting marks on base, dried smoothing marks.

These small bowls are distinguished by their raised, flat bases and inverted rims. They can be further divided into four sub-types: a) #1 and #2, which are similar in their small size, small base diameter relative to the body, and slight bevel on the outside of the rim; b) #3, #4, and #5, which are distinguished by a relatively wide base and shallow body; c) #6 and #7, which have a higher raised base with a rather small diameter relative to body size and a slightly deeper body; and d) #8, which is a form similar to type b but with a much deeper body.

E. Stern includes this bowl type in his small bowl type A1 and notes examples from 'Akko, Shiqmona, 'Atlit, Tel Mevorakh, Gezer, Ramat Rahel, Lachish, En-Gedi, Tell Jemmeh, and Sheikh Ibrahim. Most of these examples are larger than the Ma'agan Michael bowls, although a bowl from the Persian period cemetery at 'Atlit is very similar to our bowl #8. Johns notes that bowls of this type were common at 'Atlit, although in a red ware with a buff slip and sometimes with horizontal bands of red. Examples from Shiqmona and

13C.N. Johns, "Excavations at 'Atlit (1930-1931), the Southeastern Cemetery," QDAP 2 (1933) 51,
sherds from stratum IV and V at Tel Mevorakh are most like our sub-type c (#6 and #7). These bowls with a high disk base were very common along the coast in the 4th century B.C. and are said to be local imitations of Attic black-glazed bowls. A lone example from level 2 at Tel Keisan is most like our sub-type b (#3 and #4).

The type seems to be more common in Cyprus. Several examples are known from the late Cypro-Archaic and early Cypro-Classical (500-450 B.C.) Kommissarioio sanctuary in Limassol where they presumably served as cultic vessels. This assemblage of Plain White VI ware provides a striking parallel to the Ma'agan Michael bowls as they also present similar subtle variations. Hundreds of small bowls were also discovered in the temple of Astarte at Tamassos, where they presumably served a similar function. Examples also come from Amathus (most like our #8), Marion, Vouni, and the Classical city site at Kiton-Bamboula (most like our type b [#3 and #5]).

This bowl type is dated by E. Stern roughly from the end of the sixth to the fourth century B.C. According to Swedish Cyprus Expedition classification, these bowls may be of either Plain White VI or Plain White VII ware. Karageorghis designates the bowls from the Limassol sanctuary Plain White VI and dates them to about 500 B.C. From this we may conclude only that the bowl type found at Ma'agan Michael may date primarily from the 5th to 4th centuries B.C.

fig.:j

15E. Stern, *The Excavations of Tel Mevorakh. I. The Hellenistic, Persian, and Israelite Strata*. Qedem 9 (Jerusalem 1978) fig.4:2,3,4.
16Stern (supra n. 15) 30.
18V. Karageorghis, *Two Cypriot Sanctuaries of the End of the Cypro-Archaic Period* (Rome 1977) fig. 16 and 17, pl. 23.
9. Bowl (fig. 11). MM66/89-1890. Rm. 11,M.

Max. h. 5.4 cm; max. diam. 12.0 cm; base diam. 5.4 cm; fabric th. 0.4 cm.

Restored; small wall fragment missing. Medium-fine, pink (7.5YR 8/4) fabric; black, gray, and white inclusions(<0.5mm, few 1mm); dark brown residue or slip inside and outside. Spreading disk base; conical lower body rising to thin, vertical walls; straight rim, beveled inside. Light wheel grooves on exterior of walls.

This shape does not appear to be common, although a few similar bowls have been found at Marion, Cyprus where they are designated Plain White V and VI.24 Bowls of this type designated Plain White VI were also found in the assemblage from the "Komissariatio" sanctuary near Limassol.25 Accordingly, the bowl would date from the 5th century B.C.

10. Bowl (fig. 12). MM66/89-1919. Rm. 13,N.

Max. h. 10.9 cm; max. diam. 16.7 cm; base diam. 6.5 cm; fabric th. 0.5 cm.

Base and wall section. Medium, gray (5Y 5.5/1) fabric; black, white, tan inclusions(1mm); pink (7.5YR 8/4) slip outside and more gray inside. Deep bowl, with high, vertical walls that turn in very slightly at rim. Two small lumps of clay adhering to surface near base.

The closest parallel for this shape is Stern's small bowl type A2. Stern notes that the type is not common and was restricted mainly to Persian period sites along the coast: examples come from Tel Abu Hawam, Tell Mevorakh, Lachish, Tell Jemmeh, and En-Gedi.26 Unfortunately, these examples are only vaguely similar to our bowl 10. It should be noted that the fabric and construction of bowl 10 are very similar to those of the Ma'agan Michael jugs with raised handles and spreading disk bases (see Chapter IV below).

24Gjerstad et al.(supra n. 21) pl.51: tomb 39:42 (Plain White VI); pl. 71:tomb 66:2 (Plain White V).
25Karageorghis (supra n. 18) fig. 16: especially 64, also 63, 66, 70.
26For references, see Stern (supra n. 12) 94.
Fig. 11. Misc. small bowl #9 (scale 1:2).

Fig. 12. Misc. small bowl #10 (scale 1:2).
MORTARIA

11. Mortarium (fig. 13).  MM66/87-003. Rm. 2.

Max. h. 9.5 cm; max. diam. 32 cm; base diam. 16.5 cm; fabric th. 0.8 cm, at base 0.4 cm.
Complete; small part of base broken. White (5Y 8/2) fabric; black and buff-red inclusions (1mm, few .5mm); light gray (5Y 7/1) slip inside. High, spreading ring base; smooth sides with faint wheel ridges; slight carination below thick rim. Body warped.

12. Mortarium (fig. 14).  MM66/89-1859. Rm. 13,S.

Max. h. 9.9 cm; max. diam. 32.3 cm; base diam. 16.1 cm; fabric th. 1.2 cm.
Complete. Light olive gray (5Y 6/2) fabric; many black, gray, and white inclusions(<1mm); light yellowish-tan (10YR 6/3) slip or residue on interior, very thick inside bottom of bowl and cracked like dried mud. High, spreading ring base; rippled outer surface (5 ridges); thickened rim. Body warped.


Max. h. 8.4 cm; max. diam. 34.6 cm; base diam. 13.7 cm; fabric th. 0.8 cm.
Restored complete except ring base. Light olive gray (5Y 6/2) fabric, orange core; black, white, few brown inclusions(1mm); light gray (5Y 7/1.5) slip. Lightly rippled outer surface; thickened rim. Original ring base, broken and shaved, probably for continued use as a flat-based vessel.

These three vessels represent perhaps the most common pottery type in the Levant during the Persian period. These large and heavy bowls with thick rims and high ring bases, called mortaria, mortiers, or cuvettes (bowl, basin),\(^ {27}\) are found in almost every site in

\(^ {27}\) M. Yon, Dictionnaire illustré multilingue de la céramique du Proche Orient ancien (Lyon 1981).
Palestine containing Persian-period strata. Because of their frequency in these strata, they were for some time called "Persian bowls."

The distribution of mortaria with ring bases, as represented on the Ma'agan Michael shipwreck, is restricted to Palestine and Cyprus. In Palestine, these vessels have been found from Tell Abu Hawam and Tell Keisan in the north to Tell el-Hesi in the south. The examples from Cyprus have only recently been added to our corpus. The principal finds come from Kition-Bamboula and Amathus, although fragments which may be from ring-based mortaria have been found at Idalion and Ayios Philon. A nearly complete mortarium with ring base was also recovered off the coast of Hala Sultan Tekke in Cape Kiti, although not identified as such by the investigators.

Mortaria may vary in the shape of their rims and the treatment of their high ring bases. They may have either smooth or rippled exterior walls, treatments seemingly without chronological significance as both variations are often found together, as on the Ma'agan Michael shipwreck. It may be significant that the mortaria identified from Cyprus have rippled exteriors, although we still lack sufficient quantities to allow generalizations. Mortaria are often warped like two of the vessels from Ma'agan Michael. Experimental replication and xeroradiography of these vessels from Tell el-Hesi suggested that they were made by placing clay over a convex mold and later finished on a wheel whereby the thickened rims were either folded or pinched out and the exterior grooves and ring bases.

28See Stern (supra n. 12) 98 and references, where he states it has no parallels in neighboring lands. To these must be added more recent publications: Tell Keisan, Briend and Humbert (supra n. 18); Tel Michal, L. Singer-Avitz, "Local Pottery of the Persian Period (Strata XI–VI)," Ch. 9 in Z. Herzog et al. Excavations at Tel Michal (Tel Aviv 1989) 115-44; Tell el-Hesi, W.J. Bennett, Jr. and J.A. Blakely, Tell el-Hesi Stratum V: The Persian Period (Excavation Reports of the American Schools of Oriental Research: Tell el-Hesi 3, Winona Lake, Ind. 1989).

29Salles (supra n. 23) fig. 28; nos. 233-241.
31V. Karageorghis, "Excavations in the Necropolis of Idalion," RDAC (1964) pl. 2: no. 16.
34see Briend and Humbert (supra n. 17) pl. 12.
were added. This manufacturing technique may explain the vessel’s warping and rough exterior. It also explains the relative uniformity of size of these vessels. J.-F. Salles has noted that more than 63% of the mortaria published from Palestine have diameters between 30 and 33cm and heights of 9-12 cm. Blakely and Bennett reaffirm this, noting that the mortaria from Tell el-Hesi are about 30 cm in diameter, 8 to 10 cm in height, and have base diameters of about 15 cm.

There is still debate about the origin of mortaria. E. Stern suggested that the mortaria with ring base was a local, i.e. Palestinian, development of an earlier flat-based variety which originated in northern Syria or Anatolia. The earliest examples of mortaria with flat bases are found at least before the end of the 8th century B.C. at Tarsus, Mersin, Marion, and Salamis/Celakova. The wider distribution of the flat-based mortaria, then, includes Cyprus, where it is designated Plain White V, and the eastern Mediterranean coast from Egypt to Anatolia, and dates primarily from the 7th and 6th centuries B.C., whereas the mortaria with ring bases did not appear in Palestine until the 6th century B.C., or slightly earlier and did not reach their greatest distribution until the 5th and 4th centuries B.C. This interpretation was followed by S. Gitin in his dissertation on the ceramics from Tell Gezer, although more recently, Salles has noted examples with ring bases at Hazor and Lachish from the 6th century, from Period VIII (7th-6th century) at Samaria, and a ring base fragment from level 5 at Tell Taanach dated from 700 to 650 B.C. Even earlier examples

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37Blakely and Bennett (supra n. 35) 59.
38Stern (supra n. 12) 97-8.
40J. Garstang, Prehistoric Mersin (Oxford 1953) 98-100, 107, 123, 126.
43Salles (supra n. 36) 203.
from earliest excavations of Tell el-Hesi and Lachish are dated by association with Greek pottery to the 8th century, and Salles notes an unpublished report of mortaria with ring bases from level 2 at Ashdod which is dated to the end of the 8th century B.C.\textsuperscript{44} To Salles, these examples suggest that the mortaria with ring bases were known at least through all of the 6th century and may have appeared from the end of the 7th century B.C. Although there is some discussion of the dating of Period VIII at Samaria\textsuperscript{45} and stratigraphic data from such early excavations as at Tell el-Hesi and Lachish may not be reliable,\textsuperscript{46} it is suggested that the two variant mortaria co-existed and that one may not necessarily have evolved from the other.

Source determination analysis of mortaria from the Persian period stratum at Tell el-Hesi has suggested a possible origin for these vessels. Of the 16 mortaria fragments from the four substrata of level V submitted for neutron activation analysis, 14 were most like clay from the Dura-Europos region in northeastern Syria, 1 was identified with Lebanese clay deposits, and 1 with a Cypriot source.\textsuperscript{47} A non-Palestinian source determination for the Tell el-Hesi mortaria was also suggested by petrological and heavy mineral analysis. Based on this, it is suggested that the mortaria were not produced in Palestine but were imported from Syria or southwestern Anatolia along maritime routes.\textsuperscript{48} Although Blakely and Bennett admit that their sampling strategy was "somewhat haphazard" so that there is little indication of how representative these sherds are of the whole, the identification of a Syrian source is especially problematic since mortaria with ring bases have not been found outside of Palestine proper and Cyprus. This, of course, may be due to the paucity of archaeological investigation carried out in Syria, and we can only await further research for a solution to this problem. Although no definite origin for the mortaria with ring bases has been identified, we can only note that they were most common in Palestine and to a lesser extent

\textsuperscript{44}Salles (supra n. 36) 203.
\textsuperscript{45}See Stern (supra n. 12) 30: one theory distinguishes two phases in stratum VIII, one from the 7th and other from the 6th-5th; another theory sees stratum all in Persian period, Stern prefers the date of 6th-5th century B.C.
\textsuperscript{46}See discussion in Stern (supra n. 12) -Tell el-Hesi: 20-21; Lachish: 41-44.
\textsuperscript{47}Bennett and Blakely (supra n. 28) 198-200.
\textsuperscript{48}Blakely and Bennett (supra n. 35) 59.
on the southern coast of Cyprus.

In conjunction with the recent excavations at Tell el-Hesi, Blakely and Bennett conducted an investigation into the use of mortaria. They suggest that the term itself was first used by J.G. Duncan in relation to the Greek use of mortars as grinding vessels and was only later attributed a generic sense of "large drab bowl." Salles prefers a more generic term, *cuvette*, because it does not imply any specific use for which, he says, there is little evidence. Instead, Salles attempts to apply the relatively uniform size and volume of mortaria to the Neo-Babylonian or Persian *isarron*, a measure for grain or flour. This possible usage as a measuring vessel, reflected in the size and stability of the large vessels and their discovery largely in agricultural areas and along maritime commercial networks, is also suggested by Oren, who encountered the flat based variety at Tel Migdol. The research at Tell el-Hesi, however, seems to indicate the use of mortaria for grinding grain, as the designation itself would suggest. Blakely and Bennett note that mortaria were usually found in domestic buildings along with other kitchen ware; they note that one mortarium from Lachish was found under an oven and mortaria were found in association with pits, ovens, and ash at Tel Michal. They also note that many mortaria have been found associated with grinding stones or pestles, for example at Bethel, Megiddo, and possibly Tell el-Hesi, and that examples from Tell el-Hesi and Tell Ta'anach were heavily abraded, some even ground all the way through. Because mortaria are found primarily in military or administrative sites of the Persian period, they suggest that mortaria were the military

49Blakely and Bennett (supra n. 35) 51.
50Salles (supra n. 36) 199.
51Salles (supra n. 36) 208-9.
53Blakely and Bennett (supra n. 35) 54.
56Bennett and Blakely (supra n. 28) 201.
57For references, see Bennett and Blakely (supra n. 28) 201 and Blakely and Bennett (supra n. 35) 54-5.
issue grinding bowls of the Persian army. The source determination analysis and volcanic content of the fabric temper suggest that ceramic mortaria were imported from a basalt rich area, such as Syria. The mortaria were more efficient to import because they are relatively light and easy to stack compared to their standard basalt mortar counterpart. Whereas Blakely and Bennett link the importation of mortaria with activity of the Persian army, they also suggest that the vessels were eventually available to civilian markets.\textsuperscript{58}

This leaves us with the matter of dating these vessels. In Palestine, mortaria with ring bases are most common in the 5th and early 4th centuries B.C., whereas examples from Cyprus, especially Kition-Bamboula, date from the 4th century B.C. At Tel Michal the type is not encountered after 350 B.C.\textsuperscript{59} and at Shiqmona the latest examples are dated to the end of the 4th century.\textsuperscript{60} At Tell Keisan mortaria were found in level 2b which was dated by the excavators to 380-312 B.C. However, the context of the mortaria in pits or fragmented layers\textsuperscript{61} makes precise dating difficult, and Singer-Avitz argues that level 2b should be placed in the Persian period.\textsuperscript{62} Blakely and Bennett see the disappearance of mortaria in Palestine as a result of the Egyptian revolt and conquest of southern Palestine around 400 B.C.\textsuperscript{63} On Cyprus, mortaria with ring bases are not encountered after 300 B.C.: at Kition, for example, the type disappears with the destruction of the city in 312 B.C.\textsuperscript{64}

**BOWLS WITH HORIZONTAL HANDLES**

14. Bolsal-shaped bowl (fig. 16). MM66/88-1021. Rm. 2.S.

Max. h. 5.7 cm; max. diam. 12.2 cm, base diam. 6.9 cm; fabric th. 0.4 cm.

Restored; profile complete, fragment of rim and wall missing.

Medium-fine, soft, very pale brown (10YR 7/4) fabric; light gray (5Y 6.5/1) slip(?) on

\textsuperscript{58}Blakely and Bennett (supra n. 35) 60-2.
\textsuperscript{59}Singer-Avitz (supra n. 28) 139.
\textsuperscript{60}Elgavish (supra n. 14) 60.2
\textsuperscript{61}Briend and Humbert (supra n. 17) 102.
\textsuperscript{62}Singer-Avitz (supra n. 28) 116.
\textsuperscript{63}Blakely and Bennett (supra n. 35) p. 60-2.
\textsuperscript{64}Salles (supra n. 36) 204.
Fig. 16. Bolsal-shaped bowl #14 (scale 1:2).

Fig. 17. Small skyphos-shaped bowl #15 (scale 1:2).
exterior; very dark gray (2.5Y 3/0) lustrous paint inside. Decoration: very dark gray bands at rim and below handle zone, traces of paint on handles connecting two bands. Vertical walls turn in to ring base; two horizontal handles attached just below rim.

No direct parallel for this bowl has been found, but its shape is similar to that of the 5th-century B.C. Attic bolsal usually found in black-glazed ware. The decoration of simple black bands and painted handles is similar to that found on banded one-handlers from the Athenian Agora and is reminiscent of Archaic and Classical period "Ionian" bowls found throughout the eastern Mediterranean.

15. Small skyphos-shaped bowl (fig. 17). MM66/89-1930. Rm. 13,S.

Max. h. 6.8 cm; max. diam. 11.0 cm; base diam. 3.3 cm.

Complete. Pale brown (10YR 6/3), rather coarse fabric; black, gray and white inclusions(<2mm); reddish brown-red (2.5YR 5/5) slip inside and outside with wide, irregular encircling band at rim of reddish-brown (5YR 4/3) slip/paint. Traces of brown paint on handles. Small concave disk base with omphalos in center; conical lower body flaring to vertical upper walls; two horizontal "small ring" handles. Light finger ridges inside and outside.

Similar treatment of the handles may be seen on a small Plain White VI(?) bowl from Amathus.

16. Skyphos-shaped bowl (fig. 18). MM66/88-1202. Rm. 5, S.

Max. h. 11.0cm; max. diam. 16.7cm; base diam. 6.6cm; fabric th. 0.7cm.

Restored complete. Pink to reddish-yellow (5YR 7/5) fabric; black, gray, white

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66Sparks and Talcott (supra n. 65) fig. 8: 726-741.
67E. Dray and J. duPlat-Taylor, "Tsambres and Aphendrika, Two Classical and Hellenistic Cemeteries," RDAC. (1951) fig. 37; Johns (supra n. 13) fig. 88; Stern (supra n. 12) fig. 10:6-9; W.E. Rast, Taanach I: Studies in the Iron Age Pottery (Mass. 1975) fig. 84:6; Jaffa Museum no.315, Reg.No. 80Y/62/J.
68Nicolaou (supra n. 20) fig. 5:2, pl. 45:2.
Fig. 18. Skyphos-shaped bowl #16 (scale 1:2).

Fig. 19. Skyphos-shaped bowl #17 (scale 1:2).
inclusions(1mm); red (2.5YR 5/6) slip on interior and exterior. Exterior decoration: thin, white-painted vertical zig-zag pattern encircling rim and white band below over wide brown (7.5YR 4/2) band; interior decoration: wide, brown band at rim, thin bands below. Concave raised disk base; curving walls; lightly in-turned rim; two horizontal handles at rim. Interior finger ridging.

The shape of this bowl is most similar to those of Attic black-glazed skyphoi from the 5th century B.C.\textsuperscript{69} As for the decoration, it is only vaguely similar to decoration on well-known miniature Corinthian kotylai.\textsuperscript{70} Our decoration is much cruder, perhaps an imitation. A Late Corinthian bowl skyphos form Olynthus, dated to the late 6th century, is of similar shape with more elaborate decoration.\textsuperscript{71}

17. Skyphos-shaped bowl (fig. 19). MM66/88-1204. Rm. 5, S.

Max. h. 9.4cm; max. diam. 15.5cm base diam. 8.6cm; fabric th. 0.5cm.

Restored complete. Light gray (2.5Y 7/2) fabric; white and few dark gray inclusions(<=0.5mm); brown (7.5YR 4/2) slip on interior and exterior, partially blackened. Ring base; slightly bent walls with wheel ridging; two horizontal handles at vertical rim.

I have found no direct parallels for this vessel. Vaguely similar bowls with handles come from stratum 3 at Ashdod\textsuperscript{72} and the Persian-period fortress north of Ashdod.\textsuperscript{73} In Israel, it has become customary to designate as foreign any bowl with horizontal handles. Many of these are said to be East Greek imports.\textsuperscript{74}

\textsuperscript{69}Sparks and Talcott (supra n. 65) pl. 17.357, which is only slightly smaller and dated to 500-480 B.C.
\textsuperscript{70}See A.N. Stillwell, Corinth XVI: The Potter's Quarter (Princeton 1948) pl. 67: 1688, 1689, etc.; also at Lindos: C. Blinkenburg and K.F. Kinch Lindos, Fouilles de l'Acropole 1902-1914 (Berlin 1931) pl. 34: 2594, 2595.
\textsuperscript{71}D.M. Robinson, Excavations at Olynthus XIII (Baltimore 1950) pl. 6.
\textsuperscript{73}J. Porath, "A Fortress of the Persian Period," 'Atiqot 7 (Hebrew Series) (1974) fig.5:10.
\textsuperscript{74}Stem (supra n. 12) 99.
18. Large bowl/krater (fig. 20). MM66/88-1027. Rm. 1,N.

Max. h. 14.8cm; max. diam. 30.8cm; base diam. 11.1cm; fabric th. 0.65cm.

Restored complete less one handle sherd. Medium-coarse, pink (7.5YR 7/4) fabric; black and white inclusions(<1-2mm); light gray-white (2.5Y 7.5/2) slip inside and outside; very dark grayish-brown (10YR 3/2) residue inside (oil? Cf.#1). Flaring ring base; conical body with carination below out-turning rim. Smoothing marks in varying directions on interior; light wheel ridges on exterior.

This large bowl from Ma'agan Michael is similar to a fragmented bowl from the late Cypro-Archaic sanctuary at Limassol.75

75 Karageorghis (supra n. 18) fig. 17:121.
Fig. 20. Large bowl or krater #18 (scale 1:2).
III AMPHORAS AND JARS

Five different jar types were recovered from the ship although not in great quantities. These include two decorated side-handle amphoras, two small decorated jars, a large decorated jar, nine basket-handle jars, and "Persian" storage-jar fragments. Also categorized as jars are three vessel fragments which are too fragmentary to distinguish with certainty.

STORAGE JARS


Max. pres. h. 25.8 cm; body diam. 26.1 cm; base diam. 10.4 cm; fabric th. 0.6 cm. Restored incomplete; missing neck and rim. Reddish-yellow (5YR 7/6) fabric; white and gray inclusions(<1.5mm); reddish-brown (2.5YR 4/4) slip. Low ring base; depressed ovoid body; horizontal loop handles at shoulders/maximum diameter. Decoration consists of wide, white-painted bands on red slip above shoulder and below handle zone. Three stylized palm-tree designs in white paint fill shoulder zone between these bands with half branches on either side of handles.


Rim diam. 15.4 cm; base diam.(est.) 11 cm; max. pres. h. ?; fabric th. 0.6 cm. Restored large body sherd, one handle, base fragment, complete rim. Pale brown (10YR 6/3) fabric; reddish-brown (5YR 5/3) slip; white (10YR 8/2) slip on rim; brown (7.5YR 4/2) paint highlighting motif in thin white paint. Slightly flaring neck with everted thickened rim. Decoration consists of white band on interior rim and narrow bands of brown, white and tan on exterior neck. Shoulder zone decoration similar to #19 above with added
Fig. 21. Side-handled amphora #19 (scale 1:2).
Fig. 22. Side-handled amphora #20.
application of brown bands.

Similar amphoras with horizontal handles in Bichrome Red ware are quite common on Cyprus. Good parallels for the Ma'agan Michael vessels are known from Amathus,76 Limassol,77 Kornos,78 and Kition.79 The decoration on all of them consists of encircling bands in black, brown, or white paint on the neck and shoulder and below the handle zone. The handles are usually decorated with long, dagger-like brush strokes in white paint projecting from either side. In the handle zone or panel between the two banded areas appear three or sometimes four stylized trees or plants in white paint on either side of the vessel. Loulloupis notes that the degeneration or blackening of the slip due to over-firing, as on our amphora #19, is common on Bichrome Red wares.80

The vessels noted above are all Bichrome Red (II) V, which, according to Gjerstad's typology, have distinctly biconical bodies and angular necks widening to the mouth.81 Amphoras of type VI usually have a more ovoid, depressed body, and type VII amphoras have slimmer bodies and angular shoulders with taller and narrower necks. Therefore, amphora #19 may be designated Bichrome Red III(VI). The other, more fragmented amphora and neck from Ma'agan Michael, #20, appears to be more biconical and may be Bichrome Red II(V) or III(VI). Unfortunately, we are not able to attach the neck fragment to the preserved body sherd #20, but it appears to flare out as in type V examples.

The same decoration utilizing the stylized tree or plant motif is also found on Bichrome V and VI amphoras from Kition (Aghios Giorgios) that are now housed in the

76E. Gjerstad, Swedish Cyprus Expedition IV:2 (Stockholm 1948) fig. 55:5 = CVA British Museum 2, pl. 17:10.
77Smaller version: Limassol District Archaeological Museum L.M.T.231/LMER 84(92).
80Loulloupis (supra n. 78) 163.
Larnaca Museum\textsuperscript{82} and dated to the 4th century B.C.\textsuperscript{83} It is also observed on fragments of White Painted VI and VII amphoras from Kition-Bamboula.\textsuperscript{84} This motif appears to have been so popular that it was used on imitation Cypriot amphoras in Greece. Three similar amphoras were found in a context of 375-330 B.C. in the Athenian Agora.\textsuperscript{85} Several fragments and two nearly complete vessels were reported from the forum area at Corinth, dated to the second quarter of the 4th century B.C.\textsuperscript{86} Two vessels with similar decoration from Thera (Sella), dated to the 5th century B.C., are called Cypriot amphoras although they may be Greek imitations.\textsuperscript{87} Two amphoras with "conventionalized flowers or buds, opening upwards" are reported from a pre-Persian level at Olynthus, i.e. from the last half of the 6th to the beginning of the 5th century.\textsuperscript{88} Talcott points out that the pre-Persian levels at Olynthus were severely disturbed and suggests that they belong to a later period.\textsuperscript{89} Regardless of the dating problems, Robinson notes that the vessel type is best represented in Cyprus, and refers to identically shaped vessels from Amathus and the treatment of the decoration, which is typical of floral designs in the style of Amathus.\textsuperscript{90} These examples from outside of Cyprus typically have a light-colored slip with decoration in dark paint, often in black and red. Williams noted a difference between Cypriot and imitation Cypriot fabrics, stressing that the Cypriot fabric was coarser and not fired as hard.\textsuperscript{91}

The shape does not appear frequently in Palestine. An amphora of unknown provenance with the same stylized tree motif, now in the Hecht Museum at the University of

\begin{thebibliography}{99}
\bibitem{82} Karageorghis, "Chronique des fouilles à Chypre en 1978," \textbf{BCH} 103 (1979) fig. 38.
\bibitem{84} Salles (supra n. 23) fig. 24: 163, 165.
\bibitem{85} Sparks and Talcott (supra n. 65) pl. 63: 1484, 1485, 1486.
\bibitem{87} G. Daux, "Chronique des fouilles et découvertes archéologiques en Grèce en 1966," \textbf{BCH} 91 (1967) 761, fig. 7.
\bibitem{88} D.M. Robinson, \textit{Excavations at Olynthus} Pt. V (Baltimore 1933) pl. 32/33: P52, pl. 39:72.
\bibitem{89} Sparks and Talcott (supra n. 65) 191, nt. 26.
\bibitem{90} Robinson (supra n. 88) 57-8.
\bibitem{91} Williams 1969 (supra n. 86) 58, nt. 25.
\end{thebibliography}
Haifa, is dated to the 4th century B.C. and said to be Cypriot. Two Cypriot White Painted V
amphoras with only encircling bands preserved are reported from level 3 (450-380 B.C.) at
Tell Keisan.92 An imported plain buff amphora with horizontal handles from stratum VIII
(430-400 B.C.) at Tel Michal appears to be much like Cypriot type VII amphoras.93

Although the vessel shape and motif are known throughout the eastern
Mediterranean, the Ma'agan Michael examples are most like the Cypro-Archaic and Cypro-
Classical Bichrome Red amphoras known particularly well in the Amathus region.


Max. pres. h. of body 17.5 cm; max. diam.(est.) 26.8 cm; rim diam.(est.) 13 cm; neck
h. 6.0 cm; base diam. 9.0 cm; fabric th. ??

Restored lower body profile with base and neck fragment. Light gray (5Y6/1) fabric; black
and mica inclusions. Decoration: dark brown (10YR 3/3) slip dripped down exterior in
diagonal and cross-hatch pattern.

This closed vase or jar may be of similar shape to amphoras #19 and #20. No trace
of handles suggests that it is merely a closed vessel with spreading ring base, nearly vertical,
slightly flaring neck and thickened rim. A similar decoration is noted on a much earlier
Bichrome IV jar from Marion.94

22. Jar (fig. 24). MM66/88-1918. Rm. 11, N.

Rim diam. (est.) 10 cm; neck h. (est.) 6 cm; base diam. (est.) 8 cm; fabric th. 0.45
cm.

Sherds from body, neck, and base. Hard, finely levigated pink (7.5YR 7/4) fabric; red
(2.5YR 5/6) paint/slip outside and 2cm down neck. Many sherds are worn and stained gray/
blue gray; exterior surface is very pitted, often in encircling lines. Closed vase; no handles
evident; probably shape similar to #21 above.

92Briend and Humbert (supra n. 17) pl. 19:1,2.
93Singer-Avitz (supra n. 28) fig. 9:7:4.
94Gjerstad (supra n. 76) fig. 31:9.

Max. diam.(est.) 48 cm; fabric th. 0.7-1.0 cm.

Body sherds from maximum diameter of a large globular jar.
Medium coarse to coarse, light reddish brown (5YR 6/4) fabric with many white, light gray, and black inclusions; pale yellow (5Y 7/3) slip. One sherd from above the maximum diameter is dented on the outside with a resulting crack on the interior surface, perhaps a result of mishandling prior to or during firing. One sherd contains a cut hole 3.3 cm in diameter which is bordered by two small drilled holes 0.6 cm in diameter. The interior and exterior surfaces of this area are covered with remains of a brown mud-like substance and a rust-colored residue. The material was not analyzed, but it appears to be some sort of sealant used to patch the cut hole. The drilled holes surrounding the cut hole were perhaps used for tying on a patch. A basket-handle jar fragment from Salamis tomb 59 shows a similar treatment with drilled holes along the broken edge, in this case repaired for use in a burial. As for the Ma'agan Michael vessel, the hole was probably cut near the top of the vessel in order that contents, perhaps wine, could be removed by tipping the jar without opening the sealed lid.

The decoration consists of 3 series of encircling bands utilizing two colors: olive-gray (5Y 4/2); (originally black?) and light reddish brown (5YR 6/3) paint. Various short vertical and curving strokes of gray paint appear over the bands apparently applied at random: they include what appear to be flora motifs. Similar decoration appears on large jars or pithoi of Cypro-Classical date from Amathus.

BASKET JARS

From sherds strewn over the midships and forward areas of the shipwreck site, we are

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96Gjerstad (supra n. 76) fig. 52:5,13.
Fig. 25. Large storage jar #23.
able to identify at least nine individual basket jars in various states of preservation. Three primary sub-types may be defined:

Type 1 (#24) has a roughly biconical profile with sloped shoulder and a maximum diameter reached near the top half of the body; the loop handles are shorter and do not reach far above the rim.

Type 2 (#25-#29) has a straighter profile, although slightly biconical, with rounded shoulders and a maximum diameter reached near mid-height; the type varies in size and shape of the rim from a straight and neckless rim to an everted rim with short neck; each of the jars of this type has similarly shaped handle loops.

Type 3 (#30,#31, and #32?) has a more rounded, globular profile with rounded shoulders and a maximum diameter at the shoulder or handle-attachment zone. Jars #30 and #31 are identical; the shape of the handle loop is roughly triangular. Jar #32 is assigned to the type because of the similarly shaped handle loop.


Max. pres. h. 45cm; max. diam. 39.5cm; rim diam. (est.) 14cm; handle h. 9cm; fabric th. 0.9cm.
Restored; complete profile to below mid-height. Pale yellow (5Y 7/3) fabric with many medium to large white, gray, and brown inclusions. Biconical body with maximum diameter above mid-height at angular shoulder then narrowing towards base; collar ledge at base of rather short neck with flaring-out rim; loop handles, oval in section, on sloping shoulder rising above rim; deep finger depressions under handle attachments.

25. Type 2 (fig. 27). MM66/88-1184.

Max. h. ; max. diam. ; rim diam. 11.0cm; handle h. 16.5cm. Restored, patched complete. Dark gray (10YR 4/1) fabric; light reddish-brown to pink (5YR 6.5/4) slip outside; very pale brown (10YR 7/4) slip inside. Wide, rounded shoulder; two high loop
Fig. 26. Basket jar #24.
Fig. 27. Basket jar #25.
handles, oval in section, rising above rim. Roughly cylindrical upper body widening towards middle; concial lower half tapering to rather long, pointed base. No neck; depressed collar at base of short, flat rim with encircling groove on outer edge.

26. Type 2 (fig. 28). MM66/89-1645.

Max. pres. h. 74.5 cm; max. diam. 37.7 cm; rim diam.(est.) 13 cm; handle h. 14.1 cm; fabric th. 1.0 cm.

Restored; complete profile less toe. Light gray (5Y 6.5/1) fabric; very pale brown (10YR 7/3) slip (similar to that on #25). Shape like that of #25; more pronounced collar ridge at base of very short neck with everted rim; two high loop handles, oval in section, angled slightly inward. Small finger depressions under handle attachment.

27. Type 2 (fig. 30). MM66/89-1622.

Rim diam.(est.) 11 cm; handle h. 16.5 cm; fabric th. 0.9 cm.

Nearly complete top of jar: shoulder, rim, and handles. Gray (10YR5/1) fabric; reddish yellow (5YR 7/6) slip outside; light yellowish brown (2.5YR 6/4) slip inside. Rounded shoulder as above; recessed collar at base of neck similar to #25; short neck with everted rim similar to #26; high loop handles, oval in section. Small finger depressions under handle attachment.

28. Type 2 (fig. 29). MM66/89-2727.

Max. pres. h. 65.5 cm; max. diam. 39.0 cm; rim diam.(est.) 15 cm; handle h. 11.7 cm; fabric th. 1.0 cm.

Restored; complete profile to above base. Light gray (5Y 6/1) fabric; light gray (2.5Y 7/2) slip outside; light yellowish brown (2.5Y 6/4) slip inside. Shape similar to #27 but more biconical; plain straight rim; two loop handles, roughly circular in section, rising above rim but shorter than #25 and #26 and angled slightly outward. Cord or string impressions at
Fig. 28. Basket jar #26 (scale 1:5).
Fig. 29. Basket jar #28 (scale 1:5).
Fig. 30. Basket jar #27.

Fig. 31. Basket jar #29.
maximum diameter; diagonal incisions on lower, conical section of jar.

29. Type 2 (fig. 31). MM66/89-1718.

   Rim diam.(est.) 12 cm; handle h. 11.6 cm; fabric th. 1.0 cm.

   Profile of shoulder, mouth and handle. Light brownish gray (10YR 6/2) fabric; pink (5YR 7.5/4) to light gray (5Y 7/2) slip outside; light olive brown (2.5Y 5/4) slip inside. Rounded sloping shoulder; rather tall, straight neck with everted rim; high loop handles, circular in section, rising above rim and bent inward slightly.

30. Type 3 (fig. 32). MM66/89-1833.

   Max. pres. h. 51.5 cm; max. diam. 39.7 cm; rim diam. 16.2 cm; handle h. 13.1 cm; fabric th. 0.9 cm.

   Restored; complete profile less base. Pink to reddish-yellow (5YR 7/5) fabric; light gray (5Y 7/2) slip. Rounded shoulders form maximum diameter; ovoid body tapering to pointed base; pronounced ridged collar at base of short neck, tapering to everted rim; high loop handles with grooved oval section. Deep finger depressions under handle attachments; faint riling on exterior surface.

31. Type 3 (fig. 33). MM66/89-1880.

   Rim diam. 14.5 cm; handle h. 16.4 cm; fabric th. 0.8 cm.

   Restored; nearly complete profile missing base. Light reddish-brown to pink (5YR 6.5/4 ) fabric; light gray to pale yellow (5Y 7/2.5) slip. Shape identical to that of #30.

32. Type 3 (?) (fig. 34). MM66/89-1879.

   Handle ht. 13.5 cm.

   Two handles and shoulder attachments preserved. Dark gray (10YR 4/1) fabric; light gray (2.5Y 7/2) slip. Rounded or sloping shoulder; high loop handles, circular in section. Shape
Fig. 34. Basket jar #32.

Fig. 35. Basket jar base fragments #33 (left) and #34. (right)
of loop handles similar to #30 and #31.

Unassigned base fragments.

33. Truncated base (fig. 35). MM66/89-1882.

Diam. of toe 5.8 cm; fabric th. 1.1 cm.
Coarse, light gray (10YR 6/1) fabric; light gray (2.5Y 7/2) slip outside; yellowish-brown (10YR 5/4) slip inside. Diagonal smoothing or turning impressions stemming from base.
Toe is cut straight. Fabric is similar to that of #28; fragment may be part of #29 or #32.

34. Base (fig. 35). MM66/89-1600.

Fabric th. 1.2 cm.
Very pale brown (10YR 7/3) fabric; few large white and tan inclusions. Long, narrow base toe; interior covered with resin. Similar to base of #25; may be part of #27.

35. Base. MM66/89-2294.

Pres. h. 32 cm; fabric th. 1.2 cm.
Light gray to gray (10YR 6/1) fabric with light gray (2.5Y 7/2) slip. Interior surface in coated with a brownish yellow (10YR 5.5/6) slip. Fabric and shape is similar to jar #33; fragment may be part of #29 or #32.


Pres. h. 6.5 cm; base diam. 8.6 cm; fabric th. 0.7-1.0 cm.

The distribution of this jar type, commonly called "basket" or "basket-handled" jar, extends from Egypt in the south, throughout the coastal plain of Palestine and the Galilee, north into Phoenicia and the Syrian coast, and westward to Cyprus, Rhodes, and the coast of
Asia Minor. Using material from the Swedish excavations at Vouni and Marion, Gjerstad distinguishes three "developed" forms of "pithoid amphoras" on Cyprus occurring in Plain White ware from the Cypro-Archaic II (600-475 B.C.) to the Cypro-Classic II (400-325 B.C.) period. He suggests that the form was derived from the smaller decorated amphorae with horizontal handles represented by a few examples in Plain White III-IV. By the beginning of the 6th century B.C., the form developed into an elongated biconical jar with sloping shoulder (Plain White V) and by the Cypro-Classic period evolved into a softly rounded, conical jar with a longer, prominent toe (Plain White VI) and a variant with slightly carinated shoulder and a narrow concavity in the middle of the body (Plain White VII).

Stern describes two main types in Palestine (types I and II) that correspond to Gjerstad's type V and VI pithoid jars. Stern's type I will date from the end of the 7th to the middle of the 5th century B.C.; his type II, from the 5th to 4th century B.C. Most recently, Sagona has discussed these jars in terms of five sub-types which basically follow Gjerstad's grouping while adding a long, conical, neckless type shaped like a spinning top.

Following Sagona's typology, sub-type a), equivalent to Gjerstad's Plain White IV pithoid jar, is a squat biconical jar with narrow base dating from 700 to 600 B.C.; sub-type b), equivalent to Gjerstad's Plain White V pithoid head jar, is an elongated biconical jar dating from 700 to 330 B.C.; sub-type c), equivalent to Gjerstad's Plain White VI pithoid jar, is an ovoid conical jar with a smoothly convex body dating from 500 to 330 B.C.; sub-type d).

97For the most complete catalogue of "basket" jars see A.G. Sagona, "Levantine Storage Jars of the 13th to the 4th Century B.C.," OpAIA 14 (1982) 106-8; to these may be added Tell Keisan: Briend and Humbert (supra n. 17); Tel Michal: Singer-Avitz (supra n. 28) fig. 9.1:15, fig. 9.3:9, fig. 9.13:17,18,19, and fig. 9.15:1,2,3,4,5,6; Kition- Bamhoulia: Salles (supra n. 23) fig. 30:30,303,304; and the coast of Turkey: M.M. Cowin, Artifacts Recovered off the SW Turkish Coast by INA Shipwreck Surveys in 1973 and 1980 (Thesis, Texas A&M University 1986).

98Gjerstad (supra n. 81) fig. 15:3,4. J.-F. Salles, "Les niveaux 4 (Fer IIIC)," chapter 8 in Briend and Humbert (supra n. 17) 136-41, has pointed out problems with this proposed development: type IV jars were discovered in Salamis tomb 79; they predate the smaller jars of type III from tomb 3, suggesting that type III cannot be the ancestor of type IV and that the date for type IV should be raised.

99Gjerstad (supra n. 81) fig. 15:5.

100Gjerstad (supra n. 81) fig. 15:6,7. Type VII is merely a variant of type VI with a slightly carinated shoulder and an indented mid-section.

101Stern (supra n. 12) 110-12.

102Sagona (supra n. 97) fig. 4.
equivalent to Gjerstad's Plain White VII pithoid jar, is a variant of type c dating from 500 to 400 B.C.; and sub-type e is a very tall, conical jar with no neck dating from 500 to 330 B.C.

It must be admitted that the single example that I have designated type 1 from Ma'agan Michael is difficult to classify. I know of no good parallels for the shape, although it is most similar to Gjerstad's Plain White IV = Sagona's sub-type a) jar found primarily at Salamis but also at Tell Keisan. Could this be a reused amphora which had survived for as much as 100 years or is it simply a previously unknown regional variation? At the time of writing the vessel had not been properly reconstructed or drawn.

The type 2 amphoras from Ma'agan Michael may be attributed to Sagona's sub-type c) because of their rounded shoulders and short necks, although they still retain a roughly biconical shape with their maximum diameters near mid-height, reminiscent of Sagona's sub-type b)/ Plain White V. Of the Ma'agan Michael jars, #29 is most like Sagona's sub-type b) jars with its rather high neck and sloping shoulder. This biconical amphora is found occasionally in Palestine, where it continues only until the mid 5th century B.C. It is most common on Cyprus, where it is found from 600 B.C. to 330 B.C. but has also been found at Ialysos and the southern coast of Turkey.

The type 3 jars from Ma'agan Michael are good examples of Sagona's sub-type c) Plain White VI with their ovoid conical shape and low necks with everted rims. These conical basket jars are most common in Palestine, whereas only a few examples are known from Cyprus. That the type was manufactured in Cyprus is suggested by an amphora from courtyard C at Amathus that contained an Eteo-Cypriot graffito inscribed prior to firing. The type may be dated from the 5th to 4th centuries B.C.

103 Karageorghis (supra n. 41) pl. 45, 46, 221, 222, 223, 224.
104 Briand and Humbert (supra n. 17) pl. 23, 24.
105 Sagona (supra n. 97) 88-90, and sources for type 13; also Stern (supra n. 12) 111.
108 For sources see Sagona (supra n. 97) 106.
110 For discussion of dating see Sagona (supra n. 97) 90, and sources; also Stern (supra n. 12) 111.
The basket jars from Ma'agan Michael are made of three primary types of fabric. Most of the jars appear to be made of a grayish fabric. As has been noted earlier, this may be merely the result of discoloration occurring upon deposition. One of the type 2 amphoras is of a light brown fabric. All the type 2 jars contain traces of slip that vary in color from pale brown to orange. The preserved fabric color of type 3 jars is orange (pink to reddish brown) with a light gray to green slip. The single type 1 jar is of a pale yellow fabric with a washed surface. The fabrics noted at Ma'agan Michael correspond well with the two fabric types common along the Levantine coast, a light greenish clay and a red-orange clay.¹¹¹

The presence of certain morphological elements of these jars allows us to infer the various steps of their fabrication. According to Salles,¹¹² the base or lower portion of the jar was made first, in the form of a conical bowl, and set aside to dry while the other elements were formed. It would have remained heavy and shapeless to give more support to the sides, and was only later cut and shaped with a knife. To keep the walls of this lower portion of the jar from collapsing, they were tied or supported with a cord, leaving impressions as are evident on our jar #28. The top of the jar would have been fashioned next, also as a conical bowl, and then attached to the partially dried lower portion with large coils. This is evident from the thickened mid-sections on our type 2 jars, although there is no obvious juncture on the type 3 jars which display smooth continuous curves. The rim was formed separately on a rapid wheel and stuck on as is attested by the collar ridge or depression at the base of the neck. After the vessel is leather-hard, the handles were applied. The process of pressing the interior of the wall to attach the handle securely often left a depression or finger imprint under the handle attachment that is present on five of the nine Ma'agan Michael basket jars. Finally the exterior and in some cases the interior of the jars were covered with a slip and fired.

The two prominent features of this jar type are its great size and its two handles that

¹¹¹Stern (supra n. 12) 93.
¹¹²Salles (supra n. 98).
rise high above the mouth. The reconstructed height to rim of the jars from Ma'agan Michael reaches between 70 cm and 80 cm. Using the "summed cylinders" method\textsuperscript{113} on the basket jars which have been drawn, we may estimate the following volumes:

MM2727 --- 43.4 liters.
MM1833 --- 42 liters.
MM1645 --- 39.3 liters.

Salles notes an average height for the basket jars from level 4 at Tell Keisan of 85 cm, which could have weighed 100kg with contents. Transportation of such heavy jars was made possible by the insertion of a beam through the tall loop or basket handles which could then be carried by two men. This scene is depicted on a decorated bronze bowl from Cyprus.\textsuperscript{114} It may seem that such unwieldy jars would not have been easily stowed on board ships. However, the distribution of this jar type along the Levantine coast, Cyprus, and Rhodes, and the number of vessels found underwater, counters this assumption.

There has been much discussion concerning the origin of basket jars. Petrie, among others, suggested that they were of Greek origin after finding them in areas of Greek occupation in Egypt. Gjerstad thought that they were a product of Cyprus, noting their profusion in Cypro-Archaic II contexts. Stern follows the suggestion of Petrie, claiming that the earliest of these vessels have been found on Rhodes and in Greek colonies such as Mesad Hashavyahu, Daphnai and Naukratis, clearly dated to the 7th century. The large squat biconical jars from tomb 79 at Salamis dated to ca. 700 B.C.\textsuperscript{115} and similar jars from level 4 at Tell Keisan dated to the mid-7th century\textsuperscript{116} oppose this argument. Notwithstanding this, the dating of the material that Stern notes from Rhodes is problematic. One notices at first glance that the amphoras from Camiresi and Ialysos are of the more developed forms, analogous to Cypriot and Palestinian forms from the 6th and early 5th centuries B.C.\textsuperscript{117}

\textsuperscript{113}P.M. Rice, \textit{Pottery Analysis: A Sourcebook} (Chicago 1987) 221-2.
\textsuperscript{114}E. Gjerstad, "Decorated Metal Bowls from Cyprus," \textit{OpArch} 4 (1946) pl. V.
\textsuperscript{115}Karageorghis (supra n. 95).
\textsuperscript{116}Salles (supra n. 98).
\textsuperscript{117}Salles (supra n. 98) 141. Compare Jacopi (supra n. 106) Table IV: 129, 121, 77; "G. Jacopi,
Salles argues that the material in the tombs associated with basket jars is never dated later than 600 B.C. 118 Sagona states that "with only three examples from Rhodes which are tenuously dated to the 5th century B.C., and the greater number and variety in Cyprus, this claim [of a Rhodian origin] is hardly valid." 119 The argument for a Rhodian origin is questionable at best, and with such early examples as those from Salamis tomb 79, Cyprus does seem the likely source for this jar type even if its development there is not fully understood. 120

"PERSIAN" STORAGE JARS

Persian storage jars are represented by only seven rim sherds and two base fragments of varying shape.


Max. diam.(shoulder) 19.1 cm; rim diam. 10.7 cm; fabric th. 0.8 cm.

Reddish-yellow (5YR 7/6) fabric with black, gray, and red inclusions.

Cylindrical body, narrowing towards an angular shoulder with a slightly convex top; short, straight rim slightly beveled inside; handle from shoulder, twisted with groove and central ridge.


Rim diam.(est.) 11 cm; fabric th. 0.9 cm.

Light brownish-gray (2.5Y 6/2) fabric, reddish-yellow (2.5YR 6/6) core; very pale brown (10YR 7/4) slip on interior and exterior surfaces. Slightly convex top; short straight rim.


118Salles (supra n. 98) 141; Salles also notes that the Attic and Corinthian vases date anywhere from the first half of the 6th to as late as the 4th century B.C.

119Sagona (supra n. 97) 90.

120Salles (supra n. 98) 141, notes certain large amphoras from the Geometric period at Thera and Knossos that may constitute the jar’s ancestors, but there is as yet no intermediate form connecting the two.
Fig. 36. Persian storage jar #37.

Fig. 37. Base fragments #44 (left) and #45 (right).
Traces of resin on interior surface.

   Shoulder diam.(est.) 19.5 cm; rim diam.(est.) 11 cm; fabric th. 0.9 cm.
   Light olive-gray (5Y 6/2) fabric with fine gray inclusions. Cylindrical body; sharply angled shoulder; straight rim, grooved around outside and slightly beveled inside.

   Rim diam.(est.) 10 cm; fabric th. ??.
   Gray (5Y 5/1) fabric. Shape like that of #39 with slightly higher beveled rim.

   Rim diam.(est.) 10 cm; fabric th. 0.9 cm.
   Light gray (2.5Y 7/2) fabric; traces of a buff slip inside. Shape similar to that of #37 but with higher rim.

42. Jar rim. MM66/89-2708. ?
   Rim diam.(est.) 12 cm; fabric th. 0.9 cm.
   Pink (7.5YR 7.5/4) fabric. Shape similar to that of #37 with slight groove at base of rim.

   Gray to light gray (7.5YR 6.5/0) fabric. Heavily worn; may belong to one of the fragments above.

44. Jar base (fig. 37). MM66/89-1776.
   Pres. h. 16 cm; fabric th. 0.9 cm.
   Medium fine, gray (7.5YR 5/0) fabric; light gray (5Y 7/2) slip; large and small black and
white inclusions. Long, pointed base with rounded toe. Deep wheel ridges inside; resin coating inside with large lump at base. May be part of #38 or #39.


Fabric th. 0.7cm.
Buff-colored fabric with medium to large red, white and gray inclusions; buff to orange-colored slip or wash outside. Convex lower walls; pointed base with very short, "button" toe. Resin coating on interior.

The "Persian" storage jar, Stern's type H and Sagona's Type 6, is distinguished by a wide mouth with virtually no neck and broad shoulders at an acute angle to a biconical body with either a high, middle or low belly. Two vertical, often twisted loop handles are attached from the bottom of the shoulder to the body. All the Persian storage jar rims from the Ma'agan Michael shipwreck are similar in shape. They represent flat to slightly convex shoulders, wide mouths with short rims and only slight variations in rim height and shape. Fragment #37 preserves one of these twisted handles, "carelessly attached to the bottom of the shoulder," according to Stern.121 Zemer suggested that these small, crude handles were for tying the jars on board ships.122 Artzy has proposed a method of carrying these jars and suggests that the twist in the handle and the small ridge allows for a good grip when they were full of slippery materials such as oil.123

Only the two surviving bases allow us to define varying jar types. Base #44 is the heavier and more pointed example, similar to the base of Stern's jar subtype H6,124 which has its maximum diameter at least at mid-height or above. The distribution of this jar type includes the eastern Mediterranean basin from Egypt to the Galilee, and as far west as

121Stern (supra n. 12) 107.
123Artzy (supra n. 122) 69-73.
124Stern (supra n. 12) 109, fig. 152, and references.
Cyprus, Rhodes, and southern Anatolia. In Palestine, the type is found primarily in the coastal plain, Galilee, and the Shephelah. It has been found just about everywhere along and near the coast of Israel. Good examples have come from Tell Abu Hawam, Tell Keisan, Shiqmona, Tel Megadim, 'Atlit, Tel Mevorakh, and Ashdod Yam. Many examples have been recovered from the sea, as at 'Akko, and Zemer notes that this type "accounts for approximately half of all jars recovered from the sea on the Israeli coast-line." On Cyprus, the jars have been found principally at Bamboula, Ktima, Marion, Vouni, and Tsambres. Only one example has been noted on Rhodes: that coming from tomb 174 at Ialysos.

The examples from Palestine are consistently dated from the 6th to 4th centuries B.C. A terminus post quem for the jars from tomb 16 at 'Atlit is provided by an Attic black-figured lekythos which is dated to the end of the 6th century. The lower limit for the tomb group is established by Phoenician coins dating from the 5th century to the time of Alexander. On Cyprus, the jars have been designated Plain White VI and VII (475-325 B.C.) by Gjerstad. Using the dates for the jars from tomb group 16 at 'Atlit, Benson dates similar jars from Bamboula to the first half of the 5th century. He designates the jars Plain White V while admitting that they continued to be used into the Cypro-Classic II period.

125 See references in Sagona (supra n. 97) 98-100, Type 6.
126A. Zemer Storage Jars in Ancient Sea Trade (Haifa 1977) (Hebrew and English) no. 19-21; see also D. Barag, "A Survey of Pottery Recovered from the Sea off the Coast of Israel," IEJ 13 (1963) pl. 5:7.
127Zemer (supra n. 126) 25.
130Gjerstad et al. (supra n. 22) pl. 43, tomb 20: no. 2, 35, 72, 82.
131Gjerstad et al. (supra n. 22) pl. 102, tombs 1; 2; 6: no.3; 11: no.1.
132Dray and du Plat Taylor (supra n. 67) fig. 55:4, tomb 38.
133Jacopi (supra n. 106) pl. 3:174.
134Benson (supra n. 128) 46, following C. Haspel, Attic Black-Figured Lekythoi (Paris 1936) 62 and pl. 18:5.
135Johns (supra n. 13) 60.
136Gjerstad (supra n. 81) fig. 6:9,10; also see references in Sagona (supra n. 97) 100, type 6: 93-120.
137Benson (supra n. 128) 46.
Base #45 is much thinner and lighter than #44 and exhibits a fuller, convex profile. The small "button" toe on base #45 is similar to jar type b at 'Atlit.\(^{138}\) Stern includes this jar in his subtype H3, where the concavity of the body is more toward the center of the jar and the bottom is almost bag-shaped, tapering to a pointed base. This jar type has a rather limited distribution. It is similar to a jar from Bamboula.\(^{139}\)

**MISCELLANEOUS JARS**

**46. Jar Rim and Neck.**

MM66/88-1307. Rm. 4.

Rim diam. (est.) 17 cm; th. of rim 1.4 cm; fabric th. 0.55 cm.


This fragment may be part of a torpedo-shaped jar. A jar with a similar rim profile from Neirab, Syria, is illustrated with Sagona's type 12 storage jars.\(^{140}\) These jars appear primarily in Cyprus and Palestine, but also in Syria, Lebanon, Egypt, Mesopotamia, and Persia. Gjerstad states that they are of Syrian origin.\(^{141}\) They date primarily from the late 5th and 4th centuries B.C.\(^{142}\)

**47. Jar rim, shoulder with handle.**

MM66/88-1176. Rm.5,N.

Rim diam. 12.5 cm; max pres. diam. 34.5 cm; neck h. 5.8 cm; fabric th. 0.45 cm.

Light gray (5Y 7/1) fabric; light brown (7.5YR 6.5/4) slip. Jar with globular body; straight neck with thickened everted rim. The rounded strap handle is attached on the shoulder below the neck and was cut after firing.

I have found no direct parallels for this vessel, although, with the loop handle attached below the neck, it is most like earlier Etruscan amphoras which are best represented

\(^{138}\)Johns (supra n. 13) fig. 3:b.

\(^{139}\)Benson (supra n. 128) pl. 6:14; pl. 37: fig. 8:14.

\(^{140}\)Sagona (supra n. 97) fig. 3:8.

\(^{141}\)Gjerstad (supra n. 81) 113-4.

\(^{142}\)See references in Sagona (supra n. 97) 86-8; 104-5.
on the late 6th century B.C. shipwreck at Bon Porte, but also at Saint-Balaise.


Fabric th. 0.8-1.0 cm.

Coarse and porous fabric with organic inclusion impressions. Yellowish-brown (10YR 5/4) fabric; yellowish-red (5YR 5/6) slip. Probably bag-shaped body with rounded bottom; it may be a cooking pot.

I have found no parallels for this incomplete vessel.


144 B. Bouloumié, "Les amphores étrusques de Saint-Blaise ( Fouilles H. Rolland)." Revue archéologique de Narbonnaise 9 (1976) type 3A, especially fig. 2: 5, 6.
IV JUGS

The various types of jugs from the ship are primarily of Cypriot origin. Seven jugs are of a decorated type found most often in the tombs of Amathus and neighboring areas, stretching from Bamboula to Kition. Eight other jugs representing five types are all of Plain White VI ware with the exception of one in Black Slip. A double-ribbed handle fragment is representative of jugs or oinochoe found throughout the Mediterranean.

49. Jug (fig. 38). MM66/87-004(88-1153). Rm. 4,S.

Max. h. 19.8 cm; h. to rim 17.6 cm; max. diam. 15.2 cm; base diam. 6.8 cm; fabric th. 0.55 cm.
Restored complete. Gray to light olive-gray (5Y 6/1.5) fabric; black, white, and tan inclusions(<1mm, few 2mm); red (2.5YR 5/8) slip outside and inside of mouth, now faded. Decoration consists of narrow encircling bands of thin white paint at the base of the neck, on the shoulder, and below handle zone. Other decoration consists of traces of white paint preserved on the handle and where the handle is attached to the rim and white-painted "flames" on either side of handle attachment. Spreading, slightly concave disk base; globular body; short upward-tapering neck, collar rim, sloping inside; raised strap handle from rim to shoulder with slight longitudinal groove.

50. Jug (fig. 39). MM66/88-1025. Rm. 4,M.

Max. h. 19.9 cm; h. to rim 17.6 cm; max. diam. 14.2 cm; base diam. 6.8 cm; fabric th. 0.5 cm.
Complete. Light olive-gray (5Y 6.5/2) fabric; reddish-brown (2.5YR 4/4) slip with some lighter red and some black areas. Decoration consists of encircling bands of thin white paint as above; traces of white paint on handle and possibly on rim; white-painted "flame" on one side of handle. Shape like that of #49, but more ovoid with slight carination or finger ridge at maximum diameter(shoulder) and dent below base of handle. Spiral-turned ridge on disk base.

51. Jug (fig. 40). MM66/87-006(88-1220). Rm. 5,S.
Max. h. 18.7 cm; h. to rim 16.5 cm; max. diam. 13.8 cm; base diam. 6.2 cm; fabric th. 0.4 cm.
Restored complete. Gray to light gray (5Y 6/1) fabric; light gray, white, and few black inclusions(<1mm); reddish-brown (2.5YR 5/4) slip. Decoration consists of encircling bands as on #50; white band on handle outer surface. Shape like that of #50, with depressed ovoid body.

52. Jug fragment. MM66/88-1033. Rm. 2
Fabric th. 0.5 cm.
Shoulder fragment with handle attachment. Light brownish-gray (2.5Y 6.5/2) fabric; many gray and white inclusions(<1mm); brown (7.5YR 5/2) slip on exterior. Decoration consists of white encircling band below handle attachment. Shape and position of handle and curvature of sherd more like that of #49 globular jug with similar decoration.

53. Jug (fig. 41). MM66/88-1141. Rm.4,S
Max. h. 21.5 cm; h. to rim 19.6 cm; max. diam. 16.2 cm; base diam. 7.2 cm; fabric th. 0.4 cm.
Restored complete. Gray (5Y 5.5/1) fabric; white, dark gray, and tan inclusions(<1mm); light gray (5Y 7/2) slip. Decoration consists of two encircling bands in white paint: at base
Fig. 40. Jug #51 (scale 1:2).
Fig. 41. Jug #53 (scale 1:2).

Fig. 42. Jug #54 (scale 1:2).
of neck and below shoulder. Shape similar to those above: depressed ovoid shape like that of #51.

54. Jug (fig. 42).  
MM66/89-1857. Rm. 13, S.

Max. h. 17.5 cm; h. to rim 15.5 cm; max. diam. 13.3 cm; base diam. 6.6 cm; fabric th. 0.9 cm.

Complete; rim slightly damaged. Olive-gray (5Y 5/2) fabric; black, gray, white, and tan inclusions (<1mm); light olive-gray (5Y 6/2) slip. Red-brown-yellow rust-colored stain near base. Decoration consists of three encircling bands in white paint: at base of neck, below handle attachment, on lower body; white band on outer surface of handle; rim is worn, no surface preserved. Like #53 with slight wheel ridges on outside surface and ridge along length of handle.

55. Jug fragment.  
MM66/88-1200. Rm. 5.

Fabric th. 0.5 cm

Shoulder fragment. Pink (7.5YR 7/4) fabric; many brown and gray inclusions (<1mm); very dark gray (7.5YR 3/0) slip. Decoration consists of two bands of white paint: at apparent shoulder and at bottom of sherd. Curvature of sherd and decoration suggests a sherd from a vessel with shape and decoration like that of those above but of black slip ware.

These five complete vessels and two fragments represent a fairly common Cypriot jug type. They are distinguished by their globular body, short neck, and strap handle rising well above a collared rim. Because of these morphological elements, the collared rim and especially the method of the attachment of the handle to the rim, the shape is said to imitate metal prototypes.145 Parallels for the Ma’agan Michael jugs come from Amathus146 and the

145 Compare Gjerstad (supra n. 76) fig. 29:3; Jacopi (supra n. 106) fig. 250.
surrounding region at Limassol, Kourion-Bamboula, Kornos, Pyrgos, Ayia Zoni, and Kirotikia, Mari and perhaps Kition-Bamboula. One lone example is noted in Palestine, a White Painted V jug from Tell Jemmeh/Tell el-Far'ah. These jugs may be found (listed in order of frequency) in White Painted, Bichrome, Bichrome Red, Plain White, Red Slip, and Black Slip wares according to the Swedish Cyprus Expedition typology and are commonly attributed to period VI. Following this classification, the Ma'agan Michael jugs would be designated type VI (Cypro-Classical I -475-400 B.C.), which is distinguished by a depressed globular body, whereas type V is more biconical and type VII has a more angular body. Four of the jugs, #49, #50, #51, and #52, may be designated Bichrome Red VI or, according to a provisional designation suggested by C. Tytgrad, "Blanc-sur-Rouge". The two jugs with white-painted bands on white slip, #53 and #54, are most like White Painted VI ware, although the typical White Painted technique usually consists of applied black paint on white slip. Perhaps the applied white paint


148Benson (supra n. 128) pl. 35:3,18.

149Louloupis (supra n. 78) pl. 25:52, pl. 26:10,92.


151V. Karageorghis, "Chronique des fouilles et découvertes archéologiques à Chypre en 1961," BCH 86 (1962) fig. 73.


154Salles (supra n. 23) fig. 33:297.


156Gjerstad (supra n. 81) 116, fig. 9.

157Compare Nicolau (supra n. 20) pl. 48:92; Benson (supra n. 128) pl. 35:18; Loulloupis (supra n. 78) pl. 25:52.

158Tytgrad (supra n. 146) 749, fig. 14.

159Compare Gjerstad (supra n. 76) fig. 58:7 = CVA British Museum 2, pl. 19:21; Nicolau (supra n. 20) pl. 46:34,47, pl. 47:54,56a; Benson (supra n. 128) pl. 35:3; Loulloupis (supra n. 75) pl. 26:10;
represents a case not yet discovered elsewhere, or the paint on the Ma'agan Michael jugs has faded. The final fragmented example with black slip, #55, is most like the White-on-Black ware because of the encircling band of white paint.\textsuperscript{160} The decoration on these jugs typically consists of two or three painted encircling bands in either white or black at the base of the neck, shoulder, and below the handle zone. The bands vary in width, are occasionally wavy, and in the Bichrome technique, are bordered by thin bands of a contrasting color. The surface of the handle is commonly painted as is the exterior of the rim. The jugs may also be decorated with a stylized flower pendant hanging from the band at the base of the neck and with various decorative brush strokes, such as the "flames" on either side of the handle base. One jug from Amathus has a painted Cypriot syllabic inscription reading a-\textsuperscript{ta}.\textsuperscript{161} Most of the complete Ma'agan Michael examples have three encircling bands in white paint and white paint on the handles and rims where preserved. Although two of the Ma'agan Michael jugs have brush strokes or "flames" on either side of the handle attachment (#49 and #50), none have the typical stylized flower pendant.

The predominance of this jug type at Amathus and in the Amathus area, both from tombs and from habitation sites, suggests a likely origin there. Walters published a series of these jugs from the British Museum, grouping them under the heading "Style of Amathus."\textsuperscript{162} Karageorghis and Nicolaou both reported finding 70 vases from a tomb in Limassol, locality of Kontsoulia, at least two of which in White Painted and Bichrome VI ware are of this same type. Karageorghis notes that they are "d'un style regional local."\textsuperscript{163} C. Tytgat similarly notes that a jug from Amathus of the White on Red technique "pourrait etre caracteristique du site, comme l'est la forme du vase."\textsuperscript{164}

\textsuperscript{160}Compare Karageorghis (supra n. 150) fig. 93; Karageorghis (supra n. 153) fig. 12.
\textsuperscript{161}Karageorghis (supra n. 151) fig. 39.
\textsuperscript{162}Walters (supra n. 146) 191f.
\textsuperscript{163}Karageorghis (supra n. 147) 490.
\textsuperscript{164}Tytgat (supra n. 146) 748.
56. Juglet (fig. 43).

MM66/88-1071. Rm. 3, N.

Max. h. 5.5 cm; max. diam 4.8 cm; base diam. 2.3 cm.

Complete. Light gray to white (5Y 7.5/2) fabric; fine gray inclusions (.25mm). Flat base, slightly concave; almost biconical body narrowing upwards; funnel-shaped mouth with collar rim; strap handle from rim to shoulder.

This type of small juglet is quite common in Cyprus, where it is usually designated Plain White V or VI. Notable examples designated Plain White V or VI come from Kornos, Idalion, and elsewhere. A similar juglet from Tsambres is dated to the late 5th to early 4th century B.C. The shape continues into the 4th century B.C. with little change: compare a juglet from tomb 427 at Amathus designated Hellenistic I. Stern groups this type with other globular juglets with flat or disk bases and notes that the type was also common in the coastal region of Palestine. A very similar juglet comes from stratum II at Tell Abu Hawam, which may be dated to before 385-83 B.C.

57. Jug (fig. 44).

MM66/88-1024. Rm. 3, M.

Max. h. 17.4 cm; max. diam. 13.4 cm; base diam. 6.3 cm; fabric th. 0.35 cm.

Complete. Hard, fine, light gray (5Y 6/1) fabric; pale yellow (5Y 8/3) slip. Spreading, beveled ring base; globular body with conical shoulder; off-centered neck; pinched rim;

165Plain White V: Gjerstad (supra n. 76) fig. 57:2; Gjerstad (supra n. 81) fig. 9:3; Plain White VI: Gjerstad (supra n. 76) fig. 62:8.
166Louloupis (supra n. 78) pl. 27:87.
167Gjerstad et al. (supra n. 21) pl. 170:121:529.
169Dray & du Plat-Taylor (supra n. 67) fig. 47:8.
170Nicolaou (supra n. 20) pl. 52:5.
Fig. 43. Juglet #56 (scale 1:2).

Fig. 44. Jug #57 (scale 1:2).
vertical strap handle from rim to above shoulder, slightly twisted and off-set of neck. Wheel ridges below shoulder and deep encircling incision below ridges.


Fabric th. 0.4 cm.

Shoulder fragment of jug similar but larger than #57. Very pale brown (10YR 8/3) fabric; very fine dark inclusions (mica?); white (5Y 8/2) slip.

This type of plain white jug with pinched rim, represented by these two examples from Ma'agan Michael (#57 and #58), is quite common in the Cypro-Classical I-II tombs at Salamis.\(^{173}\) Many of the jugs from Salamis, which make up a large portion of the total grave furniture, have the distinctive wheel ridges and incisions below the shoulder as on the Ma'agan Michael example. The vast numbers of this jug type in the necropolis of Salamis suggest a local origin although isolated examples come from Tsambres and Kornos.\(^{174}\) They are generally designated Plain White VI.

59. Jug (fig. 45). MM66/88-1148. Rm. 4, N.

Max h. 30.1 cm; max. diam 20.0 cm; base diam. 9.1 cm; fabric th. 0.4 cm.

Restored complete except for a few body sherds. Light gray (5Y 6/1) fabric; white inclusions(<1mm); possibly encircling bands; pale brown (10YR 6/3) paint preserved on small body sherd. Elongated ovoid body; conical neck; trefoil mouth with spout of rim missing; flat concave, raised, spreading base; vertical handle from rim to shoulder.

Similar relatively large jugs with pinched rims are common in Cyprus. Fragments of large jugs designated Plain White and White Painted V from Kaloriziki,\(^{175}\) a White Painted VI jug from Marion, and a Plain White example from the 4th century deposits at Kition-

\(^{173}\) Karageorghis (supra n. 168) pl. 68:67,97,94; pl. 73:14,20,22; pl. 83:5,29; pl. 163:18,21,36; Karageorghis (supra n. 41) pl. 281:49, 50.

\(^{174}\) Dray and du Plat-Taylor (supra n. 67) fig. 44:3; Louloupis (supra n. 78) pl. 26:158.

Fig. 45. Large jug #59 (scale 1:2).
Bamboula are similar to the Ma'agan Michael jug in size and shape. The trace of brown paint on one body sherd from the Ma'agan Michael example may suggest original encircling bands and, therefore, a White Painted ware. According to Gjerstad's classification, the Ma'agan Michael example would be White Painted VI, which is distinguished by a more slender body and a slightly raised handle.\textsuperscript{176}

Michal Artzy noticed that many of the jugs of this shape were found with their pinched rims broken as on the Ma'agan Michael jug.\textsuperscript{177} The frequency of broken rims on this jug type is striking\textsuperscript{178} and merits further study. The broken rims may suggest similar forming techniques resulting in similar breaking patterns; the jugs may have been stoppered, perhaps for sealing wine, the rim breaking upon removal of this stopper; or perhaps the rim was broken intentionally to make pouring easier.

60. Jug or Beaker (fig. 46). MM66/88-1146. Rm. 4, M.

Max. h. 14.8 cm; max. diam. 12.2 cm; base diam. 5.7 cm; rim diam. 9.1 cm; fabric th. 0.4 cm.

Complete. Light gray (2.5Y 7/2) fabric, although possibly stained; black, white, and few yellow inclusions(<1.5mm); reddish-brown (2.5YR 4/4) slip outside and down inside of neck. Globular body, tapering to flat concave slightly raised base; wide vertical neck with light finger ridging (4 ridges); splaying flat rim; handle from rim to shoulder.

A common utilitarian shape in Cyprus, this vessel type is of Plain White V, VI, and VII ware.\textsuperscript{179} The Ma'agan Michael example appears to be Plain White VI ware. Very similar jugs are reported from Amathus in a pale yellowish fabric,\textsuperscript{180} and many others occur

\textsuperscript{176}Gjerstad (supra n. 81) 117-8, fig. 10:6.
\textsuperscript{177}M. Artzy, pers. comm., 1990.
\textsuperscript{178}Compare Gjerstad et al. (supra n. 20) pl. 99:5 from Marion; L. Rocchetti, \textit{Le tombe dei periodi geometrici e arcaico della necropoli a Mari di Avia Irini <<Paleokastro>>} (Rome 1978) fig. 27:1, 47:34; V. Karageorghis, "Chronique des fouilles et découvertes archéologiques à Chypre en 1980" \textit{BCH} 105 (1981) fig. 84:a; Benson (supra n. 175) pl. 52:K891.
\textsuperscript{179}Gjerstad (supra n. 76) fig. 62:22.
\textsuperscript{180}Nicolaou (supra n. 20) pl. 46:21,30.
Fig. 46. Jug or beaker #60 (scale 1:2).

Fig. 47. Jug or beaker rim #61 (scale 1:2).
with slight variation throughout Cyprus in the Cypro-Classical period.\textsuperscript{181}

61. Jug or Beaker Rim (fig. 47). MM66/89-1615. Rm. 8, S.
   Rim diam.(est.) 10 cm; fabric th. 0.4 cm.
   Neck and rim fragment. Light gray (5Y 7/2) fabric; black, gray, and white inclusions (<1.5mm); very dark gray (5YR 3/1) slip. This rim is probably from a vessel similar in shape to #60 but with black slip.
   Such globular jugs with wide necks are designated Cypriot Black Slip V at Khirokitia\textsuperscript{182} and Black Slip VI at Vouni.\textsuperscript{183} An example also appears in the museum of the University of Michigan.\textsuperscript{184} Much like the Ma'agan sherd, this ware is distinguished by a rather soft, buff clay with a matt slip which flakes off easily.

62. Dipper Juglet (fig. 48). MM66/88-1147. Rm. 4,M.
   Max. h. 12.1 cm; h. to rim 10.9 cm; max. diam. 6.7 cm; base diam. 5.0 cm; fabric th. 0.3 cm.
   Complete except for fragmented rim. Light gray (5Y 6/1) fabric; black, white, and few tan inclusions; dark brown (7.5YR 3/2) residue on exterior, possibly resulting from use in oil, continues over broken rim edge, suggesting juglet was used after rim broken. Cylindrical body, widens above flat raised base, barrel shaped body with finger ridging (6) below shoulder, splaying rim (broken). Raised twisted loop handle from rim to shoulder.

63. Dipper Juglet Base (fig. 49). MM66/89-1613. Rm. 6,S.
   Base diam. 5.6 cm; fabric th. 0.5 cm.

\textsuperscript{181}See example from Amathus with reconstructed handle: Aupert (supra n. 109) fig. 16; cruder versions from Kiton-Bamboula: Salles (supra n. 23) fig. 30:271; Tsambres: Dray and duPlat-Taylor (supra n. 67) fig. 51:1,2,3; and Salamis: Karageorghis (supra n. 41) pl. 232:583, 588, 642, 643, 644, 759.
\textsuperscript{182}Florentios (supra n. 168) pl. 37:14.
\textsuperscript{183}Gjerstad (supra n. 76) fig. 61:6.
\textsuperscript{184}CVA University of Michigan 1, pl. 10:21 = Gjerstad (supra n. 76) fig. 56:3.
Fig. 48. Dipper juglet #62 (scale 1:2).

Fig. 49. Dipper juglet base #63 (scale 1:2).

Fig. 50. Double-ribbed handle #64 (scale 1:2).
Base fragment. Very pale brown (10YR 7/3) fabric; gray and white inclusions(<1mm); dark brown (7.5YR 3.5/2) residue inside and outside (cf. #62). Flat raised base that is identical to but slightly larger than that of #62.

These jugs (#62 and #63) represent a common shape known throughout Cyprus and, in varying forms, in Palestine. Examples come from tomb groups excavated by the Swedish Cyprus Expedition at Vouni\textsuperscript{185} and Marion,\textsuperscript{186} and are also known from tombs at Kornos,\textsuperscript{187} Amathus,\textsuperscript{188} and Bamboula.\textsuperscript{189} The shape can be divided into sack- or bobbin-shaped jugs which continue with minor change from type IV through type VII. The Ma'agan Michael jug appears to be Plain White VI, which is characterized by a slightly raised handle, a short, concave neck, and body with softly convex sides.\textsuperscript{190}

E. Stern notes related jugs with either an elongated cylindrical or sack-shaped body, primarily from the coastal plain of Palestine.\textsuperscript{191} He notes that the jug type appears in Cyprus in the 6th through 4th centuries, whereas it is restricted in Syria and Palestine to the 5th and 4th centuries.

64. Double-ribbed Handle (fig. 50). MM66/88-1130. Rm. 3,S.

Pres. h. 6.2 cm; w. 2.7 cm; th. 1.35 cm.

Finely levigated, medium-fine, brown (10YR 5/3) fabric; gray and mica inclusions.

Decoration in black paint: vertical band between handle ribs and on either rib and four short transverse strokes in middle. Handle is roughly a 90-degree angle, possibly from rim to shoulder.

Similarly decorated handles are common on decorated Cypriot jugs of the Cypro-\ldots

\textsuperscript{185}Gjerstad et al. (supra n. 22) pl. 100: Tomb 2:#15; pl. 104: Tomb 8: #21.
\textsuperscript{186}Gjerstad et al. (supra n. 21) pl. 134:8.
\textsuperscript{187}Loulloupis (supra n. 78) pl. 27:88.
\textsuperscript{188}Nicolaou (supra n. 20) pl. 47:55.
\textsuperscript{189}Benson (supra n. 128) pl. 35:12.
\textsuperscript{190}Gjerstad (supra n. 81) 114, fig. 7:11,12.
\textsuperscript{191}Stern (supra n. 12) 119 and references; see especially the assemblage from Shiqmona in Elgavish (supra n. 14).
Archaic and Cypro-Classical periods. Examples in White Painted wares come from Kornos\textsuperscript{192} and elsewhere.\textsuperscript{193} Examples of similar Cypriot imports in Palestine occur in level 3 at Tell Keisan with simple transverse strokes on the upper and lower portions of the handle.\textsuperscript{194} The technique is most common on Greek oinochoai and may originate there. Greek oinochoai are known throughout the Mediterranean, for example, from an early (late 7th century B.C.) settlement at Mesad Hashavyahu,\textsuperscript{195} from Histria,\textsuperscript{196} and elsewhere.

\textsuperscript{192} Loulloupis (supra n. 78) pl. 25:110, 125, 156.
\textsuperscript{193} Compare Gjerstad (supra n. 76) fig. 49:14 and fig. 58:4.
\textsuperscript{194} Briend and Humbert (supra n. 17) pl. 19.
\textsuperscript{195} Naveh, "The Excavations at Mesad Hashavyahu," \textit{JES 12} (1962) fig. 8:5, 6, 8, 9.
\textsuperscript{196} Histria, \textit{Monografie arheologica} 1, Pt.3: \textit{Documene ceramice, numismatice si epigraphice inedite} (Romania 1954) fig. 266, 267, 268.
V MISCELLANEOUS SHAPES

Those vessels which did not fit nicely into other categories are considered miscellaneous shapes. These include the lamps, a cooking pot, and a pithos or water jar.

65. Lamp (fig. 51). MM66/88-1068. Rm. 3,N.

Max. h. 4.2 cm; max. l. 11.0 cm; max. w. 8.6 cm; fabric th. 0.4 cm.

Complete. Light gray (2.5Y 7/2) fabric; white, dark gray, and red inclusions (<1mm); light gray (7.5YR 6/0) slip; nozzle blackened from use. Raised flat base (cutting marks); broad flat rim; pinched rim nozzle. Little finishing or smoothing outside; few dried sponge marks; lump of excess clay on base.

66. Lamp (fig. 52). MM66/89-2107. Rm. 14,N.

Max. h. 4.3 cm; max. l. 11.5 cm; max. w. 9.9 cm; fabric th. 0.4 cm.

Complete; rim fragment near nozzle missing. Gray (5Y 5.5/1) fabric; white, tan, and black inclusions(1mm); wet-smoothing/self-slip inside; nozzle blackened from use. Shape like that of #65; finger pinching impression on complete side of nozzle.

In Palestine, these pinched bowl lamps with flat raised bases become common in the Middle Iron Age and are typical of Late Iron Age sites. It is not clear, however, just how late the type continued in Palestine. Albright notes that at Tell Beit Mirsim they were gradually replaced in the Persian period by a small, folded lamp type.\textsuperscript{197} Wampler notes

Fig. 51. Lamp #65 (scale 1:2).

Fig. 52. Lamp #66 (scale 1:2).
that they were frequent in the 5th century level at Tell En-Nasbeh, although they were
gradually replaced and became uncommon after the 5th century B.C.198 Lapp notes an
example from the mid-5th century at Tell Taanach but that they disappear before the end of
that century (also Rast notes they were less frequent in Period VI, 450-400 B.C.).199 E.
Stern notes that these lamps were frequent in tomb 14 at Beth Shemesh in the middle or end
of the 6th century B.C.200 At En-Gedi, the type with raised flat base was only found below
building 234, which belonged to the 5th-4th century; therefore, contrary to Lapp and others,
Stern concludes that the high-based lamps could not have continued later than the end of the
6th cent. B.C.

This same lamp type with raised flat base is also found on Cyprus in the late 6th
century at Amathus201 and Idalion,202 but continues into the 5th and 4th centuries in
abundance. The best parallels for the Ma'agan Michael lamps come from the Komissariatio
sanctuary at Limassol dated to around 500 B.C.203 It is interesting to note that several
"Syro-Cypriot" lamps were found in the Astarte-Aphrodite sanctuary at Tamassos associated
with ashes, charcoal, and animal bones.204 Buchholz suggests that they may have been
manufactured strictly for certain cultic occasions. At Amathus, similar lamps are reported
from level II, a mixed Hellenistic layer, and later levels of the city site,205 and with type VI
and VII pottery in the eastern necropolis.206 In the Classical city at Kition-Bamboula the
type is represented by fragments.207 Very similar lamps are also reported from Salamis208

198J.C. Wampler, Tel En-Nasbeh II: The Pottery (New Haven 1947) 46.
Archäologie und Altes Testament (Kurt Galling Festschrift) (Tübingen 1970) 186; W.E. Rast, Taanach I:
200Stern (supra n. 12) 128.
201Gjerstad et al. (supra n. 21) Tomb 7:251; pl. 11:1.
202Gjerstad et al. (supra n. 21) #36,#152,#153,#851,#1050.
203Karageorghis (supra n. 18) fig. 15:129-41; pl. 22.
204Buchholz (supra n. 19) 358-9; fig. 67a-e.
205Aupert (supra n. 30) fig. 27, 38.
206Nicolaou (supra n. 20) fig. 6:112.
207Salles (supra n. 23) fig. 35:332,326,327.
and in tombs at Tsambres dating from the 5th to the mid 4th centuries B.C.\textsuperscript{209}


Max. h. 4.5 cm; max. l.(pres.) 14.0 cm; max. w. 12.9 cm; fabric th. 0.5 cm.

Complete except for rim fragment. Pink (7.5YR 8/4) fabric; black, gray, and white inclusions(1mm); reddish-yellow (5YR 7/6) slip; nozzle area blackened from use. Large, open, flat lamp; broad flat rim; sharply pinched wick-hole.

68. Lamp (fig. 54). MM66/88-1161. NW trench.

Max. h. 2.8 cm; max. pres. l. 9.8 cm; max. pres. w. 7.8 cm; fabric th. 0.25 cm.

Base and rim fragment, missing nozzle. Medium-fine, pink (7.5YR 7/4) fabric; black inclusions(.5mm); light gray (2.5Y 7/2) slip. Bottom shaved longitudinally.

These two lamps represent the most common lamp types from Persian period sites in Palestine. They are characterized by a large, flat body, sometimes with knife-shaved surface, a broad, flat rim, and a sharply pinched wick-nozzle. They date from the 6th to 4th century B.C. and have been found throughout Phoenicia, in Syria-Palestine, Cyprus, and at Mersin.\textsuperscript{210}

69. Cooking Pot (fig. 55). MM66/87-010. Rm. 2,M.

Max. h. 22.5 cm; max. diam. 27.2 cm; mouth diam. 15.0 cm.

Complete. Reddish-yellow (5YR 6/6) fabric; black and few white inclusions(<2-3mm); bottom blackened from use. Round bottom; globular body; flaring neck with slight ledge inside; two handles slightly raised from rim to shoulder. Riling on exterior narrows towards the bottom.

Stern notes that cooking pots of the Persian period Levant are characterized by

\textsuperscript{209}Dray and du Plat Taylor (supra n. 67) type 2: fig. 60:10.
\textsuperscript{210}Stern (supra n. 12) 127-8, for references, see n. 59.
Fig. 53. Lamp #67 (scale 1:2).

Fig. 54. Lamp #68 (scale 1:2).
Fig. 55. Cooking pot #69 (scale 1:2).
globular bodies and short wide necks. The Ma'agan Michael cooking pot is roughly similar to his type B cooking pot, although the Ma'agan Michael vessel has a more rounded body and handles extending farther down the shoulder. Similarly shaped cooking pots, characterized by rounded bodies and short flaring necks, have been noticed at Lachish from the 5th century and at Samaria from the late 5th century. The late Cypro-Archaic levels at Idalion, Cyprus, produced a cooking-pot neck fragment of thin red ware with a similar, although more pronounced, interior ridge. Perhaps the closest parallel for the Ma'agan Michael cooking pot, however, comes from a 5th century B.C. context at Olynthus. The vessel is wheel made of reddish-buff clay and has the characteristic flaring neck with interior ledge, and strap handles from the rim to the widest part of the body. Unfortunately, none of these parallels are precise enough to allow a probable identification of the origin and date for the Ma'agan Michael cooking pot.

70. Pithos or Water Jar (fig. 56). MM66/90-013. Rm.13,S.

Max. h.(est.) 112.5 cm; max. diam. 77.0 cm; rim diam. 52.0 cm, base diam. 17.5 cm, neck h. 22.7 cm.

Restored; base and top complete but do not fit. Dark gray (5 YR 4/1) fabric with red-orange core at thickest point; small white inclusions; light gray (5 Y 7/1) slip over most of interior and streaked over exterior surface; patches of white (10 YR 8/1) plaster, sometimes mottled yellow-tan, on interior and exterior.

Large depressed ovoid body; wide vertical neck; heavy, beveled ring rim; collar ridge at base of neck.

A good parallel for this vessel comes from the warehouse (Entrepôt) at Amathus, which would have been in use in the 5th century B.C.

211Stern (supra n. 12) 100.
212O. Tufnell, Lachish III: The Iron Age (London 1953) pl. 74;30.
213J.W. Crowfoot et al., The Objects from Samaria (London 1957) fig. 12;10.
214Robinson (supra n. 71) pl. 137;218, where it is called a two-handled bowl.
215Aupert (supra n. 109) fig. 27.
VI BLACK-GLAZED AND GREEK POTTERY

The few black-glazed vessels found include a one-handler and two salt cellars most like Attic examples. Two kantharoi, one in black glaze and another with cream-colored slip are of indefinite origin.

71. One-handler(?) (fig. 57). MM66/89-1750. Rm. 14,N.

Max. diam. 15.8 cm; max. h. 5.3 cm; fabric th. 0.5 cm.
Complete profile except handle. Grayish-brown (10YR 5/2) fabric; black (2.5Y 2.5/0) glaze. Ring base has grooved outer face (2 grooves), reserved resting surface and glazed inner face. Decoration within base consists of one wide, concentric band, a thin circle, and a central dot in black glaze. Shallow, nearly vertical walls; flat rim; evidence for at least one horizontal handle.

Although no handles survived, evidence for at least one handle is provided by the irregular break at the handle zone and the streaked application of glaze around this break. This would suggest that the vessel was a one-handler, although we may not rule out the possibility of a two-handed vessel since the other side of the vessel is missing. The designation one-handler is given to shallow bowls with one horizontal handle set below the rim. They are typically equipped with a ring base and have a flat rim with a slight overhang on the inside which made for more accurate pouring. The one-handler, probably known as kanastron in Attic, is one of the most common black-glazed shapes. It became popular after 480 B.C. and lasted until the end of the 4th century.216

Similar but slightly smaller vessels were found in the Athenian Agora, where they

216Sparks and Talcott (supra n. 65) 107-8.
Fig. 57. One-handler #71 (scale 1:2).

Fig. 58. Salt cellar #72 (scale 1:2).

Fig. 59. Salt cellar #73 (scale 1:2).
and can be dated to within the last quarter of the 5th century B.C. One-handler Agora 749 has a similar base decoration, although lacking the central dot and thin circle, and a slightly different groove on the outer face of its base.\textsuperscript{217} Another one-handler, Agora 750, has a wide black circle and central dot very similar to the Ma'agan Michael bowl.\textsuperscript{218} These two vessels date from 450 to 425 B.C. A similar bowl but with a plain ring foot was discovered at Kition and also dated to 450-425 B.C.\textsuperscript{219}

72. Salt Cellar (fig. 58). MM66/88-1069. Rm. 4,N.

Max. h. 2.5 cm; max. diam. 6.3 cm.

Complete. Reddish-yellow (5YR 6/6?) fabric; completely covered in black (10YR 2.5/1) glaze. Flat base; nearly vertical walls; straight rim.

73. Salt Cellar (fig. 59). MM66/88-1070. Rm. 4,N.

Max. h. 2.5 cm; max. diam. 6.2 cm.

Complete. Light reddish-brown (5YR 6/4?) fabric; completely covered in black (10YR 2.5/1) glaze. Shape like that of #72. Finger print on inside surface near rim.

These two small bowls or salt cellars also have good parallels from the Athenian Agora. Agora 913 and 914 are nearly identical to the Ma'agan Michael examples and are dated to 430-400 B.C and 425-400 B.C. respectively.\textsuperscript{220} Similar salt cellars from the Agora were originally dated to 425-400 B.C. by their association with various figured vases in a well.\textsuperscript{221} These small black-glazed bowls with curved walls coming in towards a flat base represent the most common type of salt cellar. The shape is most common in the late 5th

\textsuperscript{217} Sparks and Talcott (supra n. 65) fig. 8, pl. 31.
\textsuperscript{218} Sparks and Talcott (supra n. 65) pl. 31.
\textsuperscript{220} Sparks and Talcott (supra n. 65) pl. 34, fig. 9.
\textsuperscript{221} P.E. Corbett, "Attic Pottery of the Later 5th Century from the Athenian Agora," Hesperia 18 (1949) pl. 93: 69, also #70.
century and does not last beyond it.  

74. Kantharos (fig. 60). MM66/89-1507. Rm. 7,S.
Rim diam.(est.) 11 cm; handle h. 5.8 cm; fabric th. 0.25-.3 cm. Rim fragment and handle. Light brown (7.5YR 6/4) fabric; black (10YR 2.5/1 to 5Y 2.5/1) glaze inside and outside. Slightly globular body; wide flaring neck; vertical strap handle from rim to body, raised slightly above rim.

75. Kantharos (fig. 61) MM66/89-1576. Rm. 7.
Pres. handle h. 6.0 cm; fabric th. 0.25 cm. Handle fragment. Shape similar to that of #74. Light brown (7.5YR 6/4) fabric; cream-colored to pinkish-white (7.5YR 8/2) paint on exterior wall and handle; thin, encircling band of brown paint; interior glazed or painted black (10YR 2.5/1). Vertical strap handle like that of #74.

The resemblance of the two handles, #70 and #71, suggests that they belong to very similar vessels although with varying surface treatment. Kantharoi with cream or white slip appear to be more common than the black-glazed variety and are usually dated to the second half of the 6th century B.C. The shape is most common at Chios, where it is considered to have originated. These bowls are marked by white or cream surface with a narrow black band below the handle zone. The interior is usually black with broad reserved bands. The shape with cream or white slip is also known at Aegina, Delos, Ialysos, and Naukratis, and in slight variation at Corinth. Later examples of the same vessel type,

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222Sparks and Talcott (supra n. 65) 136.
224D. Williams, "Aegina, Aphaia-Tempel.V. The Pottery from Chios," AA (1983) 169-176, fig. 10,11, etc.
226L. Laurenzi, "Necropoli Ialisie (Scavi Dell'Anno 1934)," Clara Rhodos 8 (1934) fig. 26right.
Fig. 60. Kantharos #74 (scale 1:2).

Fig. 61. Kantharos #75 (scale 1:2).
marked by taller and slimmer bodies, are noted at Chios in the Athena Temple Cell, Period II.\textsuperscript{228} Other late examples in white slip with a narrow brown band below the handle zone are known from Kofina, near Chios.\textsuperscript{229}

I am able to cite only two examples of kantharoi with black glaze, from Ialysos on Rhodes,\textsuperscript{230} and Histria.\textsuperscript{231} These two vessels have rim diameters only slightly narrower than the reconstructed Ma'agan Michael vessel.

\textsuperscript{228} Boardman (supra n. 223) pl. 65: 888,889: one example is treated entirely in cream slip: the other example has cream slip with its lower body painted black.


\textsuperscript{230} Jacopi (supra n. 106) fig. 204.

\textsuperscript{231} P. Alexandrescu, Histria IV: La céramique d'époque archaïque et classique, VIIe-IVe siècle (Bucharest 1978) fig. 28, #734.
VII CONCLUSIONS

DATE

Since the excavation produced no other material, such as inscriptions or coins, that could more precisely date the shipwreck, the pottery alone provides our best indication of the ship's date.232 Although the majority of the pottery is from the eastern Mediterranean, especially the coastal plain of Syria-Palestine and Cyprus, our most precise dates are provided by the few black glazed Attic vessels. The two salt cellars, #72 and #73, have been dated from 430/425 to 400 B.C., and the black-glazed "one-handler" #71 from 450 to 425 B.C. This would suggest that the ship wrecked at Ma'agan Michael some time after 425 B.C.

The Cypriot material also suggests a similar date for the shipwreck. Parallels for the Ma'agan Michael pottery come primarily from multi-occupational tombs and to a lesser extent stratified occupation sites on Cyprus. The fundamental Cypriot ceramic typology was established by Einer Gjerstad of the Swedish Cyprus Expedition. It established a relative chronology based on the form and ware of pottery and determined an absolute chronology based on associated Attic pottery.233 Admittedly there are problems with this typology, devised in the 1930's and 40's: for example, it is based primarily on pottery from tombs at Marion and Vouni and then applied to the entire island and, therefore, does not account for possible regional variation. Even so, it is still used by most Cypriot archaeologists today, and its application is worthwhile here.

The majority of Cypriot vessels from Ma'agan Michael are type VI. This includes most of the jugs and the two Bichrome Red amphoras. Only juglet #56 and the fragmented

233 Gjerstad (supra n. 76) 427.
amphora #20 may be as early as type V. Many of the small bowls could be type VI or VII, and the jugs with pinched rim (#57 and #58) may be type VI or VII. This assemblage with a predominance of type VI, followed by some of type VII and very few residual possible type V wares, fits best in the Cypro-Classic IB period dated to the last quarter of the 5th century B.C.²³⁴

The pottery, therefore, can be dated from around 425 to 400 B.C. The problem still remains of how much later than this the shipwreck actually took place. One may assume that ceramics aboard a ship had relatively short lifespans, although the compact nature of the black-glazed vessels and their scarcity on this shipwreck makes such an assumption tenuous. The plain and coarse wares, although not as precisely dated, are found in the 5th and 4th centuries B.C., so that the lower date for the ship could be as late as 375 B.C.

DISTRIBUTION AND SHIPBOARD USE OF CERAMICS

The preservation of an intact hull allows a unique opportunity to analyze the distribution of artifacts throughout the ship. Such conditions rarely exist in most ancient shipwrecks from the Mediterranean, where ships are often broken open resulting in "amphora wrecks."²³⁵ Attention to the function of ceramic vessels, and other artifacts not dealt with here, and their distribution throughout the shipwreck site reveals our only indications of how space on board the ship was utilized. These same materials may give insights into the circumstances and lifestyles of those on board the ship. Any kind of reconstruction of a shipboard community requires a certain amount of conjecture, although one may also compare ethnographic data and assemblages and reconstructions of shipwrecks of similar size and date.

Although no indications of shipboard structures such as a galley or cabin were found on the wreck, a simple graph of the number of utilitarian vessels found in each room of the

²³⁴Gjerstad (supra n. 76) 203.
ship, and of both bowls and jugs alone for comparison (fig. 62) demonstrates a definite pattern of space utilization. The largest concentration of vessels occurs in the stern, beginning in room two and increasing to the maximum concentration of vessels in room 4. Forward of room 5, the number of ceramics decreases abruptly to a few fragments in rooms 6 to 8. Another concentration of ceramic vessels is noticed just forward of the mast step in room 13.

The concentration of galley or utilitarian wares in the offshore end of the ship reinforces the initial identification of that end as the stern. The two ceramic vessels assigned to room 1 (#18 and #68) may not have originally been stored with the other vessels concentrated between rooms 2 and 5. The fragmentary lamp #68 was found outside the hull, although it must have been located somewhere in the ship's stern. The large bowl fragment #18 matched fragments later found around midships so that no original location can be defined with certainty. One would imagine at least some deck planking in the stern of the ship in association with the steering mechanism, and it is perhaps here that these objects were originally placed. The distribution of vessels in rooms 2 through 5 is more certain. All the vessels were presumably stored on layers of dunnage and matting in the bilge; some were actually stored in baskets. The total inventory of vessels from rooms 2 through 5 includes 12 jugs, 1 juglet, 5 small bowls, 3 bowls with horizontal handles, 1 mortarium, 2 lamps, 1 cooking pot, 2 salt cellars.

Although no evidence of shipboard cooking facilities was found, the vessels stored in the stern were primarily for the preparation and serving of food. It is likely that most if not all of the cooking took place ashore. The single cooking pot had been charred from use. The mortarium stored beneath the cooking pot could have been used for the preparation of grain for baking. Although we did not find any grinding stones associated with the mortarium stored beneath the cooking pot, suitable stones may have been found among the ballast. Whereas the Ma'agan Michael mortaria did not show any signs of ware, one would
Fig. 62. Distribution of utilitarian wares.
not expect a ship to be provisioned with worn out ceramics. A mortar is mentioned as part of the galley equipment on the Kyrenia shipwreck, and a mortar appears in a photograph of objects looted from the wreck at Giglio.

The number of small plain bowls were found rather evenly distributed throughout the stern storage area. Although I noted parallels in cultic contexts on Cyprus, purely utilitarian roles are more likely. Two skyphos-shaped bowls were found together in room 5. Sparkes and Talcott report that skyphoi were the most common drinking cup used in Athens from the 6th to the 4th centuries B.C. The two black-glazed salt cellars, tiny juglet, and lamp were probably stowed in a basket beside frame III. Their careful packing suggests that they were prized possessions, perhaps belonging to the captain himself. Talcott mentions that salt cellars were useful for salt or other condiments but served many other uses as measures, paint-pots, funnels or door-knockers. Tiny juglets, like that stored with these salt cellars, would have contained expensive oil or perfume.

The number of jugs in the stern storage area, concentrated in the forward area of room 4, at first seems striking. One explanation for the quantity of jugs on board the ship, especially the seven of identical type, is that it represents a "sailor's trade" commodity. It is also likely that the several types of jugs would have served various purposes. In fact, the number of jugs on board is not excessive when compared to shipwrecks of similar size. For example, three small black-glazed pitchers and four oil jugs are reported among the galley wares on the Kyrenia shipwreck. The single large jug with broken lip may have held wine. As was noted above, the broken rim may indicate that the vessel was initially sealed. A large jug on the Hellenistic shipwreck at Serçe Limani, also probably sealed or stoppered.

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238Sparkes and Talcott (supra n. 65) 81.
239Sparkes and Talcott (supra n. 65) 132.
may have been a container for shipping small quantities of wine. The entire surface of the dipper juglet was discolored except for the upper tip of the handle. Perhaps this is where crew members held it while they dipped out oil from a large jar.

Six jars, including the two side-handled amphorae and those only represented by fragments, were also part of the utilitarian wares stored in the stern. Because of their proximity to cooking wares, it is likely that they held foodstuffs, such as wine or oil, for shipboard use. They were small enough to be stowed in this area. The large painted jar, preserved only in fragments, may also be included with these even though the scatter of its sherds from room 6 to room 16, just outside the northern edge of the preserved hull, suggests that it was stored with the other larger jars. We can hypothesize that the hole was cut in the vessel's shoulder so the contents, possibly wine or oil, could be consumed without breaking a sealed stopper.

Stored with the cooking and food preparation vessels, personal ceramics, and food were other items such as a tin ingot, a strigil, small wooden palettes, a small lidded box, and the ship's carpenter's tool kit.

The other concentration of utilitarian wares from room 13, forward of the maststep, is associated with the pithos, which probably served as the ship's water jar. Contrary to the preference for porous water jars on land that allowed evaporation and cooling of the water, such seeping may not have been advantageous on a ship. The plaster-like coating on the interior and exterior of this pithos may have been added to waterproof particularly porous areas of the fabric. Large water jars are known from other ancient wrecks. For example, David Owen reported among the finds looted from the Classical shipwreck at Porticello a pithos approximately 2 meters high, which probably served as the ship's water jar. As was indicated above, the Ma'agan Michael pithos was probably placed on the starboard side of room 13. The absence of a stringer between the mast step and frame 13 allowed access to

242Eiseman (supra n. 232) p. 3, nt. 2.
the bilge for bailing and space for the storage of ceramics and tools. The total inventory of utilitarian ceramics stored in this area entails 3 small bowls, 1 cup-shaped bowl with button handles, 2 mortaria, 1 jug, 1 jar, and 2 lamps, one of which was found in the survey of Shelley Wachsmann and is most likely from this general area. It is hard to imagine stowing vessels near the bilge. The two mortaria, stacked one atop the other, the cup-shaped bowl and the jug were clearly associated with matting or basketry. The bowls and even the jug could have been used to get water from the large water jar. Among the alternative uses for the mortaria proposed above was serving meals, much as similar large vessels are used today in traditional village homes around common bowls.

The two storage areas described here may indicate the location of cabins or living quarters on the ship. It is interesting that two lamps were kept in both areas of the ship. The same pattern is found on the Dramont D wreck near St. Raphael, France, where a stern cabin area contained food, water, tools, and other supplies, and a forward storage area contained other crockery. The 4th-century B.C. shipwreck at Kyrenia, Cyprus, also had stern and forward storage areas. Unfortunately, since we are awaiting the final Kyrenia excavation report, the specific location of the vessels is not yet known.

The nine basket-handle jars so far identified provide our only, although somewhat meager, trace of a cargo. Although most of the sherds were not particularly worn, we can still imagine that they underwent a fair amount of shifting and movement. A chart of sherd find spots shows that individual amphoras had been strewn over a wide area but generally in the middle and forward area of the ship. Many of the sherds were found spilling out of either side of the ship and forward of the bow.

Indications of what these jars might have contained may be obtained from inscribed basket jars that have come to light. A basket jar from the royal tombs of Salamis contains a

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244 Swiny and Katsev (supra n. 236) 344-5.
syllabic inscription that mentions oil. A basket jar from Kadesh-Barnea is inscribed with the Hebrew "sheen" and an inverted "V." The "sheen" is considered to be an abbreviation for Hebrew "shemen," or oil, and the inverted "V" is usually considered to designate the value of "ten," although Yadin, noting ostraca from Samaria, suggests that it may designate "five." The inscription would then read "five measures of oil." That these jars were used to transport oil or olive oil is supported by their abundance in the Galilee, an area noted for its olive oil. Zemer notes that in oil amphoras no interior coating or resin was needed because the oil would not evaporate or seep through the porous ceramic walls. It was also noted in laboratory analysis that oil eats away at caulking materials such as tar or bitumen, so that one would not expect such a coating on oil amphoras. All but one of the basket jars from Ma'agan Michael did not have a resinous coating on the interior, suggesting that they may have originally contained olive oil. One basket jar, #26, did contain traces of a resin coating. Resin, usually pine resin, was commonly used to water- or liquid-proof the porous ceramic jars for efficient transport of wine. Resin was noticed on the interiors of some of the eight or so heavily worn "Persian" storage jar fragments from Ma'agan Michael, suggesting a similar usage.

Because of the paucity of storage-jar remains on the wreck, it is not possible to determine if these jars were part of a larger cargo or merely stored foodstuffs for shipboard use. The proximity of the wreck to the shore would surely have allowed salvaging in antiquity, so we presently have no way of determining the original number of storage jars. Further research of this problem could involve calculating the theoretical capacity of the Ma'agan Michael hull and assessing how much of this is accounted for by the estimated amphora capacities, the weight of ballast stones, and other materials retrieved from the

246M. Dothan, "The Fortress at Kadesh-Barnea," IEJ 15 (1965) fig. 7:13, pl.31:D.
249Zemer (supra n. 126) 110.
250Zemer (supra n. 126) 95.
wreck site.

ORIGIN AND ROUTE

For most shipwrecks from the Classical and Hellenistic periods, amphoras, and especially Greek amphoras, have proven to be a reliable key to a ship's origin and route.251 Because of the scanty amphora remains on the Ma'agan Michael shipwreck and the ubiquity of basket jars and Persian storage jars in the eastern Mediterranean, we must rely primarily on galley wares for indications of the ship's origin and route. Because galley wares might be easily broken on board a ship and replaced at any stop along a voyage, they give some indication of the ship's route but, for the same reason, they are not always reliable indicators of a ship's home port or origin.252 In the present case, however, there are many indications that the ship was almost new when it wrecked and, therefore, may have been on its maiden voyage. With this in mind the galley wares from Ma'agan Michael may also be more representative of the ship's origin.

The source determination of utilitarian pottery from archaeological contexts is frequently a difficult task. Difficulties arise not only from the emphasis of most excavations on fine and decorated wares, but also from the lack of inherent distinctiveness in utilitarian wares which hinders the identification of styles. Provenience studies utilizing chemical or petrographic analysis provide our best method of determining origins of utilitarian wares. Although delayed by unforeseen circumstances and not dealt with here, neutron-activation analysis of the Ma'agan Michael pottery will be carried out as a second phase of investigation. The present typological study utilizes the spatial occurrence of ceramic styles and assumes, according to the criterion of relative abundance, that pottery styles originate in the region where they are most frequently found.

Accordingly, the Ma'agan Michael pottery may be divided into the following

251 K. Muckelroy (supra n. 235) 71-3.
252 Eisman (supra n. 232) 31-32.
categories: Cypriot, Palestinian, Attic, and East Greek. The Cypriot vessels, jugs and decorated amphorae, account for just over 35% of the total assemblage of galley wares. The decorated ceramics are attributed specifically to the southern coast of Cyprus from Amathus to Kition. This is especially significant because they date from a time when Cypriot pottery export was almost completely displaced by Greek competition. Another 35% of the galley wares are either of local Palestinian or Cypriot manufacture. Although these vessels, the plain bowls, mortaria, and lamps, could have been found in ports of either region, some patterns are apparent. For example, the mortaria are far more common in Palestine than in Cyprus, even though source determination analysis at Tell el-Hesi has indicated Syrian, Lebanese, and Cypriot sources. The small bowls are found in both places, although the best parallels have been found in Cyprus. The open lamps with flat or shaved bases are common throughout Syria-Palestine and Cyprus in the late Iron Age and Persian periods. The lamp variety with raised base may not exist in Palestine after the end of the Iron Age, whereas it is found in Cyprus until the 4th century B.C. These patterns may suggest that 10.4% of the galley wares are more likely to have come from Palestine and 25% are more likely to have come from Cyprus.

The remainder of the vessels include a few Attic (8.3%) and East Greek (?) (12.5%) wares. These two categories are not useful because of the extensive exportation of Attic black-glazed pottery throughout the eastern Mediterranean in the last half of the 5th century B.C. Under the ambiguous designation "East Greek," I have included those vessels influenced by Greek shapes, e.g. bowls with horizontal handles, double-coil jug handle, and kantharoi, which could have been produced at many places. A few vessels (2.1%) can not as yet be identified with any certainty. These include the cooking pot and the fragmented storage jars which make up part of the galley items. One can note only that the cooking pot

253Gjerstad (supra n. 76) 242-9.
is probably not Palestinian, and the jar with shaved handle may be related to earlier Etruscan amphoras.

Other evidence from the shipwreck may also provide indications of possible origins for the ship and crew. For example, the ship-building technology utilizing lacing and "made-frames" is attributed to the central and western Mediterranean.255 This kind of evidence may be more significant in the future, but our knowledge of ancient ship-building traditions in the Mediterranean is not yet broad enough to allow us to exclude these techniques from other regions. Such a distinction would be based on only two hulls from the eastern Mediterranean, separated by as much as one thousand years: the Late Bronze age shipwreck at Ulu Burun, Turkey256 and the 4th-century B.C. shipwreck at Kyrenia, Cyprus.257 The ballast stones may also provide an indication of the origin and route of the ship. According to the geology consultant, Dr. Arie Shimron, 60% of the ballast stones are a type of schist available in Corsica or in the Tyrrhenian Sea.258 This evidence may not be significant either, because there was no indication of a specific ballast loading sequence; the schist was mixed randomly with other common Mediterranean stone types. Also, it is commonly assumed that ballast stones could be off-loaded and loaded as frequently as were cargoes and, therefore, may not always indicate a ship's origin. It should be noted that the hull was made of Aleppo pine with some oak fittings and the wooden objects on board the ship were of olive wood, pistachio, and plane (platanus orientalis), all wood types common in the eastern Mediterranean.

Although it is not yet possible to reconcile the contradictory indications of the origin of the Ma'agan Michael ship, the pottery seems to provide our clearest indication. The

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257 Swiny and Kasev (supra n. 236).

predominance of Cypriot pottery common to the southern coast from Amathus to Kition suggests a west-east route (fig. 63). A route initiating further west, perhaps in the Tryhnenian or Adriatic Sea, remains possible, although at present there is no clear indication of this in the surviving pottery. The ship's pithos or water jar is most like a pithos from the entrepôt of Amathus. Because of its sheer volume, the pithos would have been more easily positioned on board the ship at an early stage in the voyage, presumably before the loading of any cargo. This may suggest Amathus or some Cypriot port on the southwest coast as the ship's home.

Either way, the ship probably headed east or southeast to the coast of Phoenicia. Presently, no good parallels for the Ma'agan Michael material have been found in the important sites of Byblos, Sidon, or Tyre. This may be a result of later destruction or a result of the scale of archaeological research carried out in Lebanon.

The situation is quite different along the present day coast of Israel. Stern notes twelve excavated sites with Persian-period strata along the coast of Galilee and the 'Akko plain: Akhzib, Gesher ha-Ziv, Shave-Zion, Beth ha-'Emek, 'Akko, Horvat 'Uzza, Yas'our, Tel Bireh, Tell Keisan, Gil'am, Tell Abu-Hawam, and Shiqmona. Six additional sites in the 'Akko plain and three sites on the coast near Shiqmona have been identified in surveys.259 South of Shiqmona, no fewer than 35 Persian-period sites have been identified along the coastal plain of the province of Dor. The principal sites from north to south include Tel Megadim, 'Atlit, Dor, Tel Mevorakh, Tel Michal, Tel Poleg, Makmish, Tel Reshef (Appolonia), Tell Abu-Zeitun, Tell Qasile, Mesad ha-Yarkon (Tell Kudadi), and Jaffa.260 The main anchorages along the Palestine coast are positioned at the mouths of rivers, such as the Kishon, Galim, Megadim, and Tanninim Rivers and in the few bays along this stretch of coast such as 'Akko, 'Atlit, and Dor.

The periplus attributed to Pseudo-Scylax, written in the mid-fourth century B.C.,

259Stern (supra n. 12) 240.
260Stern (supra n. 12) 241.
Fig. 63. General map of Mediterranean basin and proposed route of ship (after E. Stern, *Material Culture of the Land of the Bible in the Persian Period* (Jerusalem 1982) map insert).
mentions a few of these sites. K. Galling has reconstructed this section of the periplus to include Akhzib, 'Akko, Mt. Carmel (a prominent topographical landmark for seafarers and site of a shrine to Zeus), Shiqmona beyond the bay, Adaros (which may be equated with 'Atlit), Dor, and Crocodilonpolis, which is at the mouth of the Tanninim or Crocodile River near Tel Mevorakh.261 Following a similar itinerary, the Ma'agan Michael ship could have been heading for anchorage in the Tanninim River leading to Tel Mevorakh or further south to any number of Persian period sites already mentioned.

HISTORICAL CONCLUSIONS

The ship which wrecked or ran aground off the present Ma'agan Michael beach may be seen to represent a modest maritime venture, perhaps from the southern coast of Cyprus to one or perhaps to several of the settlements along the coast of Palestine. While we can not yet say why and how the ship ran aground and why the ship was carrying so much ballast, we can say with some certainty that the ship was carrying olive oil and wine although we do not know the extent of these cargos. Small spills of barley in the aft and forward areas of the ship may be indications of another cargo.

K. Muckelroy rightly cautions that one should "not overemphasize the contents of one vessel to illustrate a whole trading system, since one cargo is a very ephemeral assemblage, and may be totally unrepresentative."262 Yet it may be possible to interpret the activities of this ship in the context of wider commercial systems in the 5th century B.C.

At this time, Palestine and Cyprus were included in the Fifth Persian satrapy called "Beyond the River." This period saw an extension of Phoenician settlement southward along the coast of Palestine, possibly under Persian encouragement. Of the coastal settlements mentioned by Pseudo-Scylax, Akhzib, 'Akko, and Shiqmona were considered Tyrian colonies, and the southern region from Dor to Jaffa, and perhaps 'Atlit, belonged to Sidon. In

262Muckelroy (supra n. 235) 238.
the midst of this region, the Periplus mentions "the river of the Tyrians," which Galling equates with Tel Tanninim (Crocodilonpolis), which should include nearby Tel Mevorakh. E. Stern compares this mingling of Phoenician settlements in the region of Dor with the situation of Tripolis. Accordingly, the administration of trade, tax-collecting, and daily life would be divided between the king of Tyre or Sidon, depending on whose citizens formed the majority in the town. Along with these Phoenician occupants, there is evidence for a Greek merchant population, as is suggested by the Greek favissa at Dor. The same pattern of groups of Greek merchants within a local population has also been noted at Al Mina, Tell Sukas, Tabal al Hamman, Jaffa, and Tell Jemmeh, and possibly at 'Akko.

Similar multi-cultural settlements can be seen on the southern coast of Cyprus. Traditional interpretation of the ancient sources, epigraphic material, and coinage, however, has pictured linguistically, culturally, and religiously divided kingdoms. Phoenician kings have been identified from the mid-5th century at Marion, Lapethos, and Salamis, and the Phoenician dynasty at Kitian is known to have lasted from the early 5th century to 312 B.C. It is usually suggested that these kings were installed by the Persians following the Peace of Kallias in 448 B.C. as part of a strategy to control Cyprus. This strategy of utilizing "Persophile" kingdoms to check "Hellenophile" kingdoms is best seen in the alliance of the Persians and Phoenicians against the Cypro-Greek city of Idalion, which was incorporated by Kitian around 470 B.C. Maier argues that such military activity is less a result of a systematic program of Persian domination or a strong Greek nationalist sentiment, as, for example, in the case of Euphoras of Salamis in 411 B.C., and more a matter of traditional conflicts between dynasties.

263 Galling (supra n. 261).
264 Stern (supra n. 12) 242.
268 F. G. Maier, "Factoids in Ancient History: The Case of Fifth-Century Cyprus," JHS 15 (1985) 32-
Whereas Kition was definitely a colony of Tyre, whose governor was subject to the king of Tyre, populations of most of these Cypriot kingdoms consisted of Greeks, Cypriots, and Phoenicians. The kingdom of Amathus, for example, is noted for its "Eteocypriot" character, and Pseudo-Scylax notes that its inhabitants were "autochthonous." From its coinage, however, we know that the kings of Amathus were Greek, but its material culture shows strong Phoenician influences.269

The Cypro-Phoenician character of the pottery assemblage on the Ma'agan Michael shipwreck fits well in this picture of cultural diversity and peaceful symbiosis in the major kingdoms of Cyprus and the Phoenician settlements along the Levantine coast. Although much more modest than the description gained from Ezekiel, the wreck appears to be a good example of the probably very routine trade between Cyprus and the Phoenician colonies of Palestine.

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