A BYZANTINE SHIPWRECK AT ISKANDIL BURNU, TURKEY:
PRELIMINARY REPORT

A Thesis
by
MANUELA FRANCISCA LLOYD

Submitted to the Graduate College of
Texas A&M University
in partial fulfillment of the requirements for the degree of

MASTER OF ARTS

August 1984

Major Subject: Anthropology
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ABSTRACT

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During the 1981 Turkish underwater survey, the Institute of Nautical Archaeology (INA) in conjunction with Texas A&M University located a large mound of Byzantine amphoras at Iskandil Burnu, marking a potentially important shipwreck site. Since there are no immediate plans for the excavation of this wreck, an analysis of the site was made from artifacts raised and site photographs.

The wreck was revisited in 1982 and 1983. Over the three-year period a total of 13 man-hours were spent on the wreck site, two photomosaics were compiled and 16 artifacts, mainly pottery, were raised.

A great deal of information has been learned from a study of this pottery, the photomosaics and observations recorded during dives. During the late sixth- to early seventh-century, a ship about 20 meters long and 5 meters in the beam left a port in southern Palestine carrying a main cargo of two types of wine. The number of smaller pottery vessels indicate the possibility of at least two merchants on board, one of whom may have been Jewish,
transporting small household containers.

The importance of this study, aside from the new closed deposit of pottery, lies in the conclusion that a shipwreck can be interpreted to a significant extent, by a complete survey and extensive research, prior to its excavation.
DEDICATION

To Mary
ACKNOWLEDGMENTS

This study could not have been realized without the assistance from many people. To all those who donated their time, expertise and encouragement, many of whom are not listed below, I am truly grateful.

First and foremost, I would like to thank George F. Bass for suggesting this study as a thesis topic, and Donald A. Frey and the Institute of Nautical Archaeology for putting its resources at my disposal and for providing me with the opportunity to visit the site. I would like to acknowledge my appreciation to the Director of the Bodrum Museum of Underwater Archaeology, T. Oğuz Alpözen, for his gracious cooperation and to the Commissioners from the Turkish Ministry of Culture, Yaşar Yildiz and Aşkin Cambazoğlu, for their active participation. To all members of the three survey teams who shared their expertise and trained observations with me, a hearty thank you. Funding of the surveys was provided by the Institute of Nautical Archaeology, Texas A&M University and through the generous donations of Jack Kelley.

I would like to thank Donald A. Frey for the underwater photography, darkroom assistance and his unfailing good humor and support throughout the project. All object photographs in this paper were taken by Margaret Cowin. My appreciation to Frederick H. van Doorninck, Jr., and Sheila Matthews, who provided me with the fabric descriptions of the pottery and
who acted as my 'eyes' and answered long letters full of
questions on the artifacts. My deepest gratitude also to
Netia Piercy who gave countless hours of her time to
produce the marvelous object drawings.

During the course of my research, I had occasion to
correspond with a number of archaeologists. For their
prompt and extremely helpful replies to my inquiries, my
sincere appreciation to John W. Hayes, Barbara Johnson, Avner
Raban, Kathleen Warner Slane, Caroline Williams and Uza
Zevulun. Invaluable while researching this paper were the
tireless professionals of the Interlibrary Services at
Texas A&M University.

For their help during the writing of this thesis, I
would like to thank all of my committee members, and in
particular, George F. Bass for his guidance, patience, and
endless support. I extend many thanks to all of my fellow
nautical archaeology students for their encouragement and
moral support; especially to Cheryl Ward Haldane for typing
and editing assistance, to D. Douglas Haldane for proof-
reading, and to Jay P. Rosloff for providing me with a place
to stay.

Finally, I owe more than can be said to my mother for
her understanding and support.
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INTRODUCTION

During September and October of 1981, the Institute of Nautical Archaeology (INA) in conjunction with Texas A&M University spent 40 days conducting a survey off Turkey's southwestern coast. Tracing leads from sponge divers, the expedition found several promising shipwreck sites. On the last day before turning homewards, two of the survey team, Tufan Turanli and Ali Uygun, while searching for a site which supposedly existed at the tip of Iskandil Burnu (ill. 1), swam across a large pile of amphoras. This discovery generated considerable interest because of the ideal site conditions; a compact mound of amphoras, relatively undisturbed by man, lying on a moderate slope in deep sand capable of preserving hull remains. A photomosaic was compiled of the site and a few diagnostic pieces of pottery were raised. These pieces, eastern Mediterranean in origin, subsequently dated the ship to the Byzantine era.

In 1982, I was invited to analyze the site as an experiment in determining the maximum amount of information obtainable from underwater surveys prior to excavation. This thesis proposes to interpret this wreck site by

The American Journal of Archaeology provides the model for format and style.
answering three questions: what is the country of origin and exact date of the cargo? What can be learned about the size of the ship itself and the arrangement of its cargo? And lastly, what can a study of this shipwreck contribute to our knowledge of the economic condition and maritime commerce of the era?

Since the majority of this cargo was carried in two types of transport amphorae common to the eastern Mediterranean Sea throughout the Byzantine period, the search for answers to the first question can be focused in both a temporal and geographic framework.

Studying photomosaics of a site provides information about the size of a ship and the spatial arrangement of its cargo. By counting amphorae in site photographs and measuring the capacities of similar amphorae raised from the seabed, a rough estimate of the size and tonnage of the ship can be made. Hull alignment on the seabed and its relationship to the arrangement of the cargo amphorae can be estimated from both photomosaics and observations made from dives at the site.

Although the cargo does not necessarily denote a vessel's home port, information gathered during the preliminary study of this wreck site adds to the knowledge of Byzantine maritime commerce and trade routes in the eastern Mediterranean. This thesis shows that with a complete survey and extensive research a shipwreck can be
interpreted to a certain extent prior to its excavation.

Institute staff members have conducted surveys along the Turkish coastline for the past twenty years. These surveys have been undertaken for a variety of reasons: to build up a portfolio of promising sites for excavation, to make a complete record of wrecks along the coastline before they are destroyed, and to amass trade route data.

With the purchase in 1979 of the Virazon, INA's research vessel, annual surveys have become feasible. The normal practice has been for the Virazon to sail from its home port of Bodrum, Turkey, each autumn, with a small crew, to investigate the accounts of local sponge divers who work along a particular section of the coastline. When a potential site or dump pile is located, its position is recorded, photographs are taken, and a few representative pieces of pottery are raised. Due to the constraints of time and money, the usual practice is to pass only one or two dives at any site. Information that could be gathered by spending one or two days at each promising site is lost. A complete survey, such as that undertaken at Iskandil Burnu, entails a more thorough investigation of a site and the compilation of an accurate and all-inclusive photomosaic. 4

Iskandil Burnu

Iskandil Burnu (27°22'1" E, 36°42'6" N), meaning "Sounding Point", is at the very tip of the Datça
Yarımadası, the longest peninsula in southwestern Turkey.
The coastline is rugged and precipitous; the nearest protected spot is the ancient harbor complex at Knidos. Jutting out as it does, the Point poses a danger for any ship traveling the coastal route or blown in from the open sea. The locations of several wrecks are known in the vicinity of the Point.

The wreck under study (pl. 1, p. 117) is located about 50 meters northeast of the Point, on a slope of between 20 and 30 degrees. The rock-sand interface begins at about 20 meters depth. Downslope from the interface, the sandy-pebbly bottom is fairly flat and featureless. Approximately 10 meters from the interface, a compact mound of amphoras 4 to 5 meters wide extends downslope for about 8-to-10 meters, thinning out in the lower 3-to-4 meters. Partially obscured by sea growth and sand, the mound and amphoras are moderately concreted. The mound is oriented upslope-downslope on an almost perfect north-south axis, and lies 25 to 35 meters deep. At about 35 meters, the slope angle increases; due to the greater depth, the area below the mound was not fully investigated, although a few sherds and complete amphoras were observed.

Amphora concentration decreases away from the mound, but a number of randomly located complete and fragmentary amphoras are found on the surface, or partially buried in sand, between the mound and the rock-sand interface.
Upslope on the rocks, only fragments of amphorae are found. A trail of both complete and partial amphorae extends eastwards from the Point, in both shallower and deeper water. East of the mound, only a few sherds can be seen along the rock-sand interface, although Cemal Pulak of the survey team reported seeing complete amphorae in this area.

The 1981 Survey

Following the discovery of the site on October 26th, survey director Donald A. Frey decided to spend the rest of that day and the next investigating it. Over a one-and-one-half day period, the crew spent approximately four man-hours on the wreck. This investigation centered on the amphora concentration. The concentration was comprised of two readily distinguishable types of amphorae: a long, cigar-shaped type with ring handles, and a squat, egg-shaped type also with ring handles. At least two other types of amphorae were seen, and examples of each type were raised to the surface (pl. 2, p. 108). Several jug forms and examples of cooking ware were also removed from the wreck. A total of nine pieces of pottery (81X-0 to 81X-8) was raised and brought back to the Bodrum Museum of Underwater Archaeology.

Most of the time on the seabed was spent looking for and distinguishing between various types of pottery visible (pl. 3, p. 119). Divers probed the immediate area
of the mound to determine its extent and thickness. This investigation showed that at least two layers of amphoras were buried in the sand.7

A series of overlapping black-and-white photographs of the mound were taken by Donald Frey immediately after the first amphoras had been raised, so that any subsequent pieces raised could be located and a permanent record kept for future study. These photographs were used to compile a photomosaic of the site (pl. 4, p. 120). Not readily apparent on the bottom, but visible in the mosaic, were diagonal rows of egg-shaped amphoras on the sand. This indicates both a possible stacking arrangement and that the vessel may have listed to one side after settling on the bottom. A series of color photographs was also taken of the mound from various angles and perspectives.

The 1982 Survey8

Early in the season, a team led by George Bass briefly visited the site. Divers inspected the sandy area at the rock-sand interface to determine if any amphoras were buried upslope, and immediately found a concentration of small pottery containers. One tiny juglet (81X-9/82)9 was removed and its location marked with a lead diving weight. The discovery of this concentration of pottery, 8 to 10 meters above the amphora mound, raised new questions about the extent of the site.

A study of the 1981 photomosaic disclosed several new
pottery shapes. Objectives for the 1982 visit to the site were numerous; most were based on examination of the new pottery shapes and investigation of the 8 to 10 meters discrepancy between the beginning of the amphora mound and the rock-sand interface. Above all, we wished to learn the possibility for any hull existing, and the number of amphora layers, to aid in the determination of the size of the ship.

On November 11th, the Virazon returned to Iskandil Burnu. As this was during the regular survey season, the Virazon had to be prepared to sail whenever local sponge divers were available to show potential wrecks to the crew. Over a five-day period, a total of 6.5 man-hours were spent on the site. Each night was passed moored in the Büyük Liman at Knidos, about 20 minutes away.

Several dives were devoted to photography. Close-up photos were taken of new pottery shapes. A larger and expanded photomosaic was made to include the area between the amphora mound and the rock-sand interface. However, due to the camera flooding, the resultant mosaic was not as all-inclusive as we had wished.

It became immediately apparent that most of the cigar-shaped amphorae were located upslope, to the right and left of the mound. These were counted, with random measurements taken of intact amphorae. The 1981 mosaic showed only a few of this type, mostly downslope, atop other amphorae. It also became apparent that the site had been visited by
others as several amphoras had been moved from their 1981 locations and at least one complete, unique type, visible in the 1981 photomosaic, was missing. About 20 centimeters of sand had accumulated at the lower end of the wreck during the one-year interval.

A number of dives were spent trying to relocate the lead diving weight which marked the position of the juglet. Although divers were unable to relocate the weight, another type of juglet was found a few centimeters above a section of planking. A second area of wood was located in the center of the amphora mound. Both sections of wood were oriented on an almost perfect north-south axis and were in excellent condition, although buried under only 15 centimeters of sand.

Most of the survey time was employed in locating, drawing and counting the new pottery shapes. Egg-shaped amphorae were divided into three types: long-necked large, short-necked large, and small. Of the latter, only five were seen in the center of the wreck, and one was raised. Long-necked (ca. 6 centimeters), large amphorae were also relatively few in number, but there was insufficient time to count them. A number of cooking pots and round-bottomed jugs were seen in the center of the wreck. Five new shapes of pottery containers were raised (81X-10/82 to 81X-14/82). In addition, the foot to a glass goblet (81X-15/82) found concreted inside an amphora fragment on the rocks above
the wreck was raised.

The 1983 Survey

The survey crew paid a brief visit to the site in August, under the direction of Cemal Pulak. The objectives were to find and raise some pieces which had come under question, and to photograph the right and left sides of the wreck to expand the photomosaic to include the number of cigar-shaped amphoras on the plan. Unfortunately, again due to camera problems, the latter task was not accomplished.

During tests of a new metal detector, the lead diving weight which marked the position of the juglet raised in 1982 was found. Several other juglets were seen in this area just below the rock-sand interface, near a section of darkened wood in about 25 meters of sand. No photographs were taken of this area because of the lack of time and camera problems.

Seen at the very end of the 1982 survey was the top to a long, bulbous-necked, long-handled amphora with two plates concreted inside. This was relocated and raised, but I have seen neither drawings nor photographs of the amphora and plates and therefore will omit further reference to them.
THE FINDS

Sixteen objects were raised from the wreck during the 1981 and 1982 surveys. These may be divided into four categories: amphoras, jugs, cooking ware, and miscellaneous. The amphoras are further divided into five classes: egg-shaped, cigar-shaped, hourglass, carrot-shaped, and miscellaneous.

Most of these finds are identified on the plan (ill. 2). Unfortunately, the locations of amphoras 81X-1, 81X-2, 81X-4, 81X-6 and 81X-7 are not known, although it is believed that they came from the upper part of the wreck.

Many of the ceramic pieces share common features of manufacture. "Worm holes" or "worm tracks" found in the fabric of several, for example, may indicate that organic temper of some sort was used by the potter, providing food on the seabed for marine borers. Some of the larger or heavier pieces bear smooth areas, or "ghosts", on their shoulders, perhaps from resting on carriers' shoulders before being fired. Several pieces have a slight ledge or drip ring at the juncture of the neck and body that may result from the shoulder having been shaved thinner after the pot was righted; the original shoulders were made thick to bear the weight of the upside-down vessel on the wheel.

The format of the catalog which follows is based on
1. Amphora 6
2. Amphora with plates (raised 1983)
3. Amphora 5
4. Amphora 2
5. Jug 4
6. Raised 1983

7. Cook Ware 1
8. Cook Ware 2
9. Jug 3
10. Misc. 1
11. Approx. location Jug 1
12. Approx. location Jug 2

------ Approx. location of rock-sand interface

Ill. 2. Plan of surface finds (no scale)
that standardized by the Institute of Nautical Archaeology in Yassi Ada I,\textsuperscript{15} with several modifications: colors are here identified according to the Munsell Soil Color Charts (Baltimore 1975); ware descriptions or fabric temper follow the Wentworth Scale and Tyler Scale for sediment sizes,\textsuperscript{16} and hardness is identified by Moh's Scale.\textsuperscript{17} Munsell colors, fabric descriptions and Moh numbers were supplied by Frederick van Doorninck and Sheila Matthews, but van Doorninck cautions that some Moh numbers may be incorrect, and that all of the 3's may actually be 5's.

Capacities for intact amphoras were measured with water. Each amphora was filled first to the base of its neck, and then to its rim, with both measurements recorded and listed in the catalog below. Each operation was repeated to ensure accuracy. Capacities of broken amphoras 81X-1, later mended, and 81X-4 were calculated mathematically.

Abbreviations in the catalog are as follows:

- **diam.** diameter
- **h.** height
- **Inv. No.** inventory number
- **kg.** kilogram
- **l.** liter (following number)
- **l.** length (preceding number)
- **max.** maximum
- **pres.** preserved
wgt. weight
Measurements are in meters, as 0.123

Egg-Shaped Amphoras

Amphora 1 Large egg-shaped amphora Inv. No. 81X-4
Ill. 3; pl. 5 (p. 121). Location unknown
Max. pres. h. 0.438; max. diam. 0.360 (0.165 from base);
rim diam. 0.098; capacity 17 l; wgt. 6.9 kg. Very
bottom missing; lip slightly chipped. Surface
discolored; covered with encrustation. "Worm holes"
in lower half of body. Slip reddish-brown (5YR 5/3-
4/3); fabric light red (2.5YR 6/6). Ware is somewhat
gritty, with medium to coarse quartz and buff grit,
very fine to fine black and red grit. Moh-3.

Short neck with rounded central ridge. Just
below neck are three lines of fine combing, 0.005 and
0.006 apart, not shown on drawing. Below these is a
band of fine combing 0.080 wide. 0.035 below the
combing band, the body is wheel ridged; ridging is
slightly on the diagonal and is equally spaced to
rounded bottom. Combing and ridging covered with
extra bits of clay over entire body. Two vertical
ring handles asymmetrically placed on band of combing.
Handles ovoid in section, each with central ridge
spine. Both handles fabricated in three pieces: a
central ring attached to body with additional pieces
of clay.19 Thumb marks evident.
Ill. 3. Amphora 1 (81X-4)
(Scale 1:4)
Amphora 2  Small egg-shaped amphora  Inv. No. 81X-12/82
Ill. 4; pl. 6 (p. 122).  Location on plan
Max. h. 0.327; max. diam. 0.255 (0.115 from base);
rim diam. 0.088; capacity 9.75-9.9 l; wgt. 4.9 kg.
(damp). Complete except for old chip in rim and oval
hole in neck. 20 Heavily encrusted and worn. Slip
reddish-brown (5YR 4/4); fabric ranges from brown to
light brown (7.5YR 5/5-6/4). Ware is silt-like with
no inclusions. Moh-3.

Almost round short neck is smooth, with slight
central ridge. Typical slight ledge at juncture of
neck and body. A wide band of narrow ridging begins
about 0.010 from base of neck. Heavy ridging, spaced
ca. 0.010 apart, begins 0.110 from neck and continues
concentrically to center of slightly rounded base.
Ribbing very worn in places. Large smooth area, or
"ghost", on shoulder. Two opposing ring handles are
placed vertically on shoulder over ridging. Handles
ovoid in section, with a central spine on each; they
are made in three pieces as on Amphora 1, but are
well-smoothed together, as are the handle attachments.
The shape is similar to that of Amphora 1, but with
a lower belly.

These egg-shaped amphoras are two variations of the
standard Palestinian sandy, baggy storage jar, or havit,
common to the eastern Mediterranean from the Hellenistic
ILL. 4. Amphora 2 (81X-12/82)
(Scale 1:4)
through the Arab periods,21 and found on virtually every site in Palestine.22 Specifically the Iskandil Burnu amphorases represent a type which occurs in southern Palestine from the mid-sixth to the early seventh century,23 differing from egg-shaped amphorases found in northern Palestine with distinctly carinated shoulders.24 Using as criteria a similar body shape, neck details, and reddish-brown fabric, we find the closest parallels in Palestine at Nessana,25 Caesarea,26 the Herodium,27 Ashdod,28 Lachish,29 Tell en-Nasbeh,30 Jericho,31 Ramat-Rahel,32 Tell Jemmah (Gerar),33 and Bethany.34 A number have been recovered off the coast of Israel.35

Jars with similar bodies, but longer necks, or everted rims were found in sixth- and seventh-century levels at Horvat 'Usa,36 Ein el-Jedide,37 Mt. Nebo,38 the Jerusalem area,39 Pella,40 Beth-Shean,41 and Tell Keisan.42

Outside Palestine, the same shape has been found west of the Black Sea,43 on land and under water in Turkey,44 in Egypt;45 in North Africa,46 off the northeast coast of Cyprus,47 and Greece.48

Many variations are seen in this bag jar, in each stage of its development. The Hellenistic and Roman shapes tend to have much longer necks, either funnel-shaped or ending in heavy, everted rims; they are either rounder in shape, or elongated with a waist below the handles.49 All of these types are found also in later contexts. Possibly
during the fifth century, the neck began to shorten.\textsuperscript{50} Towards the end of the Byzantine period and continuing into the seventh and eighth centuries, new wares and painted decoration emerge.\textsuperscript{51} The shapes tend to revert to those encountered in earlier periods. The bodies may have flatter sides, or waists below the handles, or may be shorter in length. Bases are round, flatter, or have an umbellicus. The neck lengthens and again may be funnel-shaped.\textsuperscript{52}

The excavated number of these egg-shaped amphorae from sites all over Palestine attests to the popularity of the type in local manufacture. With the variety of fabrics, shapes and sizes available, it was probably made there at several sites. A number of production centers are known; Zevulun names Bethlehem, Na'aran and Lod in Judea; Beth Ramata in Transjordan; and Kf. Sichin and Kf. Hanania in Galilee.\textsuperscript{53}

The Talmud obviously considered the havit a wine jar and even discussed the purification of amphorae previously used by Gentiles.\textsuperscript{54} The sixth-century jar found in the wine-press at el-Jedide,\textsuperscript{55} and the one found in a wine-press at el-Kursi,\textsuperscript{56} strengthen the belief that the primary contents of these amphorae was wine.\textsuperscript{57} It is known from the Talmud that the jars were made in two standard capacities, of one and two se'ah. The possibility exists that Amphora 1 represents a two se'ah size and Amphora 2 a one se'ah size.\textsuperscript{58}
After fermenting for only three days in the wine-press, the wine was transferred to a pitch-coated havit.\textsuperscript{59} Because of the continuing fermentation process, the amphoras were filled only two-thirds full. It is written in the Talmud: "He does not fill the havit up to its brim, but only two-thirds full so that its fumes can exhalе."\textsuperscript{60} The jar was then sealed either with a stopper of unbaked clay, or a cap of baked clay which was then plastered around the edges with clay to produce an air-tight seal.\textsuperscript{61}

Cigar-Shaped Amphoras

Amphora 3  Large cigar-shaped amphora  Inv. No. 81X-6  
Ill. 5; pl. 7 (p. 123).  Location unknown
Max. h. 0.800; max. diam. 0.260 (ca. 0.550 from base); ovoid lip 0.110 X 0.116; capacity 25-25.15 l; wgt. 8.4 kg. Complete; upper half with several "worm holes", lower half badly cracked on one side. Surface heavily encrusted and worn. Slip dark reddish-brown (2.5 YR 3/4); fabric red (2.5YR 5/6). Ware is smooth and even with no noticeable inclusions. Moh-3.

Very short, undifferentiated neck is ovoid and asymmetrically placed on body. Thickness of neck varies due to random extra layers of clay.\textsuperscript{62} Cylindrical body tapers to slight toe, 0.032 in diam. Heavy wheel marks over most of body, visible only in oblique light (not in drawing). Fine band of combing,
Ill. 5. Amphora 3 (81X-6)
(Scale 1:4)
0.023 wide begins 0.160 from rim. At 0.085 from base, body wall thickens into an interior ledge, concurrent with the start of the 0.090 wide band of exterior ridging 0.005 apart and decreasing to 0.003 apart above the toe. Two vertical ring handles roughly placed on shoulder, varying greatly in thickness. Handles ovoid in section, with finger grooves along exteriors; fabricated in three pieces like those on the egg-shaped amphorae, but well-smoothed to body.

Amphora 4  Small cigar-shaped amphora  Inv. No. 81X-1
Ill. 6; pl. 8 (p. 124).
Location unknown
Max. h. 0.705; max. diam. 0.200 (ca. 0.580 from base);
ovoid lip 0.105 X 0.110; capacity 13 l; wgt. 5.4 kg.
Complete; badly cracked and broken in half, but later mended. Surface heavily encrusted. Fabric very friable and whole surface appears "worm-riddled".
Slip reddish-brown (5YR 5/3); fabric reddish-yellow (5YR 6/6). Ware is smooth and even with fine to very fine mica grit, fine to very fine black grit, medium quartz grit. Moh-3.

Overall shape similar to that of Amphora 3 but narrower. Very short vertical neck is ovoid and asymmetrically placed on body. Neck and upper shoulder covered with extra layers of clay. Approximately 0.160 from lip is a 0.040 wide band of 5 ridges; above this band are 4 very faint ridges.
Ill. 6. Amphora 4 (81X-1)  
(Scale 1:4)
Remainder of cylindrical body smooth and tapers to 0.030 wide, flat toe. Interior ledge concurrent with start of exterior ridging at toe, as in Amphora 3. Two ring handles placed vertically on shoulder at widest part of body. Handles made of three sections as other ring handles, but roughly pressed to shoulder. One handle partially separated at its lower attachment showing handle section to be hollow or full of bubbles. Finger grooves evident on handles.

These cigar-shaped amphoras evolved from the Punic fish or *garum* jars. The Byzantine variety is found over a wide geographical range, but recently (1975) Riley has made an extensive study of these jars and identified their home as the Gaza region. For this reason, they are most commonly known as Gaza amphoras. They are normally found in the fifth- and sixth-century strata in the southern coastal region of Palestine, but are rarely reported in northern Palestine.

The closest parallels to Amphoras 3 and 4 in Palestine were found at Ashdod, Ramat-Rahel, Gezer, Tell Jemnah, the Jerusalem area, Nazareth, Kh. Siyar el-Ghanam, and in Amman, Jordan. A large number have been recovered off the southern coast of Israel, attesting to their suitability as cargo amphoras.

Outside of Palestine, the same basic shape has been reported north and west of the Black Sea, on land and
under water in Turkey, off the coast of France, in Spain, in England, in Greece, off Cyprus, in North Africa, and widely in Egypt and Nubia.

It is difficult to trace a development in the shapes of these jars, but it seems that a distinction can be made in their necks. Zemer places jars with a thickened or everted rim in the earlier group (third to fourth centuries), and dates those with a sharp or vertical rim to the fifth and sixth centuries. It also appears that on late Roman examples, as those from Beth-Pelet, the handles are stepped on the band of ridging, rather than above the band as in our examples. The earlier Herodian examples have a well-defined, long neck and rim, and tend to have a rounder base although the rounded base is also found in later contexts and may have been an intermediary shape between the Gaza jars and the egg-shaped amphoras.

Riley poses a logical argument for the contents of the Gaza jars having been the famous white wines of Gaza and Ascalon. Fifth- and sixth-century writers from the western Mediterranean and Constantinople praised the wines of Gaza, and Gregory of Tours related how some Gaza wine was used for the Eucharist in Lyons. This trade in Gaza wines may have been in the hands of non-Jews. These jars were also used to contain other items: the remains of fish were found in some in Kassarwit, and at Tomis they were used for storing or shipping nails.
a secondary usage.

Hourglass Amphorae

Amphora 5
Hourglass amphora Inv. No. 81X-0

Ill. 7; pl. 9 (p. 125). Location on plan
Max. pres. h. 0.420; max. diam. 0.262; rim diam. 0.100.
Upper one-half to two-thirds preserved; rim slightly chipped, hole in shoulder. Lightly encrusted; badly cracked and repaired. Slip yellowish-brown (10YR 5/4); fabric strong brown (7.5YR 5/6). Ware is hard and smooth, with sparse, very fine black grit. Moh-3.

Neck tapers slightly to everted, wide-collared rim. Well-defined collar ending at mid-point of upper handle attachment. Wheel ridging on neck very faint. Body ridges begin at lower handle attachment, spaced about 0.008 apart. Directly below are 9 bands of vertical planes, 0.013 apart, gradually widening to 0.040 apart. Two opposing, very roughly constructed loop handles, basically ovoid in shape, 'stepped' between the collar and the turn-of-the-shoulder. Handles possibly formed from two or three pieces of clay; top is attached with extra lumps of clay. Lower part of handles narrower, with pinch marks very evident.

The upper half of a similar amphora was seen during the 1982 survey on the western side of the amphora mound, and was raised in 1983.
ILL. 7. Amphora 5 (81X-0)
(Scale 1:4)
This class of hourglass-shaped amphora is the most common and most widely traveled amphora class of the sixth and seventh centuries.\textsuperscript{94} It first appears in the early fourth century at Athens and on the Danube,\textsuperscript{95} and continues at least through the mid-seventh century, with its most common occurrence during the sixth century.

An Egyptian origin has often been postulated for this amphora due to its heavy distribution in Egypt,\textsuperscript{96} Nubia,\textsuperscript{97} and North Africa,\textsuperscript{98} and because it was the typical wine jar used at the Monastery of Apa Jeremias in Saqqara during the sixth to seventh centuries.\textsuperscript{99} Recent petrological evidence, however, suggests a non-Egyptian origin. Dr. D. Williams favors southwest Asia Minor, northern Syria, Cyprus, Lesbos and Euboea.\textsuperscript{100} "Peacock has argued that due to the presence of serpentine, a mineral found neither in the Delta nor in the Nile Valley, this amphora is not of Egyptian origin, but more probably from either Cyprus or Asia Minor and perhaps more specifically from the region of Antioch."\textsuperscript{101}

These hourglass amphorae are found in a number of shapes, sizes and fabrics, as evidenced by the large variety seen in the 100-plus examples from the seventh-century shipwreck at Yassi Ada.\textsuperscript{102} In general, however, the fabric is normally sandy and gritty, ranging in color from buff to orange.\textsuperscript{103} Because of the smoothness of the fabric of Amphora 5, John Hayes has suggested that it could be a Cypriot version or copy.\textsuperscript{104}
Only a few examples have been found in Palestine. In Turkey, it is the most common type of amphora found at Anemurium and in Istanbul in fifth- to seventh-century strata. It has been widely reported in the Black Sea region and in Britain. Examples have also been found in France, Sicily, and on land and under water in Cyprus and Greece.

Carrot-Shaped Amphorae

Amphora 6
Large carrot-shaped amphora
Inv. No. 81X-11/82
Ill. 8; pl. 10 (p. 126).
Location on plan
Max. h. 0.760; max. diam. 0.238; rim diam. 0.116;
capacity 11.27-11.37 l; wgt. 11.6 kg. (damp).
Complete; very lightly encrusted, surface in excellent
condition; some ridges lightly worn. Slip is red
(2.5YR 4/4); fabric also red (2.5YR 5/6). Possibly
self-slipped. Ware has a few fine mica particles, and
medium to very coarse black, red, buff and quartz
particles. Moh-3.

Circular rim slightly flared; upper one-half of
neck collared. About 0.023 down from rim is a well-defined interior ledge, approx. 0.005 wide by 0.010
thick, possibly to hold a stopper. Neck narrows, then
begins a steep slope to an angular shoulder. Conical
body tapers to a small, flat base (slightly on the
diagonal) with a diam. of 0.042. Well-defined and
evenly rounded ridging begins 0.086 from rim and
Ill. 8. Amphora 6 (81X-11/82)  
(Scale 1:4)
continues to toe; the spacing widens slightly as it approaches toe. Wheel marks faintly visible on interior. Handles oppose each other, attached to rim and to just above the turn of the shoulder. Handles differ in shape and placement, but angle downwards and then turn in. One edge of each handle is thin and folded over; finger grooves evident. Handles made in at least two pieces; top parts are joined to body with additional clay. Unique amongst surface pottery on wreck.

Amphora 7    Small carrot-shaped amphora    Inv. No. 81X-2
Ill. 9; pl. 11 (p. 127).    Location unknown
Max. pres. h. 0.602; max. diam. 0.194; neck diam. 0.038; capacity 7.5 l; wgt. 3.5 kg. Complete except for very top of neck. Small hole drilled in neck. Heavily encrusted on one face; surface very worn and crazed. Slip yellowish-red (5YR 4/6); fabric reddish-yellow (5YR 6/6). Ware has a few very coarse mica and red grit, occasional quartz grit. Moh-3.

    Neck tapers downwards then flares to form angular shoulder. Conical body tapers to a concave base, 0.005 in depth. Heavy wheel ridging very worn, but distinct over most of vessel's surface; it runs on a slight diagonal, first upwards and then downwards. Flattened area (ghost) centrally placed on one face at the maximum diameter. Both handles curve upwards and
Ill. 9. Amphora 7 (81X-2)
(Scale 1:4)
out from neck base then curve downwards and slightly inwards to join body just above shoulder. Handles asymmetrically placed and differ in size; sections are generally oval on bottom, with central spine on exterior, possibly from thumb and forefinger ridges. One handle definitely made in two pieces; additional clay added to base of attachment. Second handle has an extra piece of clay smoothed over its top surface. Lump of extra clay on body under handles. This amphora is unique amongst the visible containers on the wreck.

These two carrot-shaped amphoras, and particularly Amphora 6, are of the same general body type as a seventh-century piece from the Yassi Ada shipwreck, an early sixth-century example from the Athenian Agora, a seventh-century example from Anemurium, and an example from Salamis, dated after the mid-fourth century. None of these parallels are exact, for the handles, bases and necks all differ slightly from those of Amphora 6.

Amphoras 6 and 7 probably represent variations or regional copies of the coarse, brown Egyptian wine amphora, the full range of forms seen at the Monastery of Epiphanius at Thebes. This class varies greatly in size and shape; no two are alike. The Egyptian amphoras are made from Nile mud, and are the typical wine amphoras of the fourth to seventh-centuries, degenerating in form and quality
by the seventh-century.\textsuperscript{121}

Outside of Egypt, their distribution is spotty and rare. Only a few examples have been found in the excavations in North Africa,\textsuperscript{122} Palestine,\textsuperscript{123} Turkey,\textsuperscript{124} and the Black Sea area.\textsuperscript{125}

Miscellaneous Amphora

Amphora 8 Squat amphora Inv. No. 81X-7

Ill. 10; pl. 12 (p. 128). Location unknown

Max. h. 0.297; max. diam. 0232; lip diam. 0.116;
capacity 4.9-5.0 l; wgt. 4.1 kg. Complete except for one handle. Lightly encrusted surface, discolored,
with some slip exfoliation.\textsuperscript{126} Slip reddish-brown
(5YR 5/4-4/4); fabric reddish-yellow (5YR 7/8-6/6).

Ware is somewhat gritty, with medium quartz particles,
fine to very fine black grit, and a few fine to very
fine red grit. Moh-3.

Very heavy, thick walled (0.010) jar with high,
bulging belly tapering downwards to a vaulted concave base (h. 0.037) with a slight button center. Vertical neck with extended flat rim. Junction between neck and shoulder defined by horizontal ridge. Irregular wheel ridging on shoulder, wavy in places. On interior wall of belly is a band of 16 well-defined lines of combing, commencing 0.095 from rim and varying in their spacing; these do not correspond to any
Ill. 10. Amphora 8 (81X-7)
(Scale 1:2)
exterior markings. Vertical loop handles extend horizontally from rim, then round and curve inwards. Handles fairly oval in section, and well-smoothed onto pot. This small amphora is unique amongst the visible pieces of pottery on the wreck.

Jars of similar shape and size, but with more angular shoulders and a less-vaulted concave base were found in late Byzantine to early Arab levels at Cafarnaou and in Amman. All of these small amphorae were decorated with red-painted designs. Caroline Williams suggests a late Byzantine to early Arab jar from Ashmunein in Egypt as a possible parallel for the body shape, but the base and neck are different.

Jugs

Jug 1

Juglet

Inv. No. 81X-9/82

Ill. 11; pl. 13 (p. 129). Approx. location on plan

Max. h. 0.122; max. diam. 0.081; rim diam. 0.026; hole diam. 0.010; capacity 0.225-0.240 l; wgt. 0.02 kg.

Complete; slip exfoliating in places. Slip reddish-brown (2.5YR 4/4); fabric red (2.5YR 5/8). Ware has very fine mica, some very fine black grit and a few very fine quartz pieces. Moh-1/2

Small, one-handed juglet with long, slightly bulbous neck and rounded, extended collar at the rim. Tool marks on inside of neck, probably from the potter pulling up or supporting clay from inside to form
Well-rounded, ovoid body tapers to slightly concave base with central button. Entire body except for lower 0.025 covered with irregular ridging; some flattened or curled over. Small, extra lumps of clay random over ridging. Two flattened areas on one face, possibly from jug's falling over while drying. Vertical loop handle poorly attached - extends above rim then curves and swoops in to pinched bottom attachment on shoulder. Handle section basically ovoid, with one edge pinched by fingers along length.

Ill. 11. Jug 1 (81X-9/82)  
(Scale 1:2)
Late Byzantine juglets tend to be coarser and heavier in shape than Jug 1. The closest parallels to this juglet are all dated to the fourth century or earlier. The top of a similar juglet, missing its handle, was found in the fourth-century level at Sacidava.132

Small juglets, perhaps for precious oils, are very commonly found in Hellenistic through Roman deposits in Palestine; however, the bodies tend to be more spherical than ovoid, and the bases are rounded, flat, or with ring-feet.133 The base and manufacture of Jug 1 point to a later, as yet unknown locale.

Jug 2  Juglet  Inv. No. 81X-10/82

Ill. 12; pl. 14 (p. 130). Approx. location on plan
Max. h. 0.200; max. diam. 0.113; rim diam. 0.065;
capacity 1.08-1.18 l; wgt. 0.41 kg. Complete; slip
beginning to exfoliate in places. Slip and fabric
both red (2.5YR 4/6 and 2.5YR 5/8, respectively).
Ware has very fine mica, some very fine black and a
few very fine quartz inclusions; identical to Jug 1.
Moh-2.

One-handed juglet, slightly lopsided. Nearly
cylindrical body with wide mouth; straight, plain
neck and rim. Body tapers with incurving turn
towards flattish, string-cut base. Lumpy and irregular
ridging begins 0.028 from rim. Rounded ridging spaced
0.008 apart over most of body, except at maximum
ILL. 12. Jug 2 (81X-10/82)
(Scale 1:2)
diameter, where ridging is sharper and only 0.002 apart. Several old scratch marks on lower half of body. Base has concentric, flattened ribbing to very worn button center. Vertical loop handle, ovoid in section springs outwards and downwards from lip, then curves sharply inwards to shoulder. Very sloppy lower handle attachment.

The closest parallels to Jug 2 come from a mid- to late sixth-century deposit at Mt. Nebo. Similar flattened bases were found at Bethany. The same body shape, but having concave bases with button centers was found in fifth- to sixth-century deposits at the Herodium, and in Umayyad levels in Amman. Juglets of the same general shape, but possessing two handles and carinated shoulders came from Nazareth, dated to the sixth century.

Jug 3
One-handed jug
Inv. No. 81X-3
Ill. 13; pl. 15 (p. 131).
Location on plan
Max. h. 0.256; max. diam. 0.188; oval rim 0.080 x 0.090; capacity 3.72-4.06 l; wgt. 1.4 kg. Complete; 'V'-shaped crack from drying, 0.030 long on neck. Lightly encrusted. Slip ranges from dark brown to strong brown (7.5YR 4/4-4/6); fabric light red (2.5YR 7/6-6/6). Ware composed of very fine to fine black grit. Moh-3.

Egg-shaped body tapering to slightly lopsided concave base with button center. Fabric heavy. Neck
ILL. 13. Jug 3 (81X-3)
(Scale 1:2)
collapsed on one side before firing. Slightly bulbous neck flares out to plain, oval rim. Deliniation at neck-shoulder junction with small ridge. Two bands of combing; one just below neck, the second just below handle. Wide wheel-ridging on inside surface; exterior fairly smooth. Vertical loop handle runs from rim to shoulder at a sharp angle. Handle section flattened-oval and well-smoothed at both attachments.

Jug 4
One-handled jug
Inv. No. 81X-5
Ill. 14; pl. 16 (p. 132).

Location on plan
Max. h. 0.290; max. diam. 0.230; oval rim 0.095 X 0.085; capacity 5.65-5.90 l; wgt. 1.4 kg. Complete; broken and mended, several worm holes in body; surface worn. Lightly encrusted and discolored. Slip reddish-brown (5YR 4/3); fabric goes through a series of color changes; grey-light brownish-red-pale brown-light brown (10YR 6/1-2-3-5/4-5-6). Ware is somewhat gritty, with medium to coarse quartz and buff grit, and very fine to fine black and red grit. Moh-2.

One-handled jug with broad, rounded shoulder and belly, tapering to off-center concave base with central button. Fabric thin. Straight neck with slight bulge; flaring, everted simple rim. Ribbed inside, smooth exterior surface. Neck-shoulder junction defined by horizontal ridge. Widely spaced wheel-ridging continuous on interior surface; ridging on outside
Ill. 14. Jug 4 (81X-5)  
(Scale 1:2)
very worn, but continuous from neck to base, spaced about 0.010 apart. One face of pot with two large depressions, or ghosts. Vertical loop handle runs in a smooth curve from lip to just above shoulder, where it is pinched. Handle section flattened-ovoid, with finger ridges on outside.

Six more jugs are visible on the wreck; all appear to be of the same type as Jug 3.

No close parallels have been found for either of these jugs. The same general shape, though with a different base and handle, and thinner fabric was found in a late sixth- to seventh-century strata at Bethany. John Hayes writes that something similar in shape to Jug 3 was found in a late sixth- to early-seventh century deposit at Soli, in Cyprus, but in buff ware.

Jug 4 is of the same general body shape as an Umayyad jug from Amman, with a longer neck.

A number of jugs with the same type of concave base and button center were found in a seventh-century deposit in Cyprus. The same form of base has also been reported in late Byzantine to early Arab levels in Palestine, Amman, Egypt, and Histria.

Cooking Ware

Cook Ware 1 Two-handed pot Inv. No. 81X-14/82
Ill. 15; pl. 17 (p. 133). Location on plan
Max. h. 0.178; max. diam. 0.187 (0.191 across handles);
Ill. 15. Cook Ware 1 (81X-14/82)  
(Scale 1:2)
rim diam. 0.104; capacity 2.58-2.73 l; wgt. 1 kg. Complete; two tiny chips in rim. Very little encrustation; surface excellent. Slip red (2.5YR 4/6); fabric pale red to light red (10 R 6/4-6/6). Ware is somewhat gritty, with a few very fine to fine black grit, a few fine red grit and a few medium quartz pieces. Moh-3.

Two-handed cooking pot with fabric of even thickness. Very short neck with well-defined, extended collar. Neck-body juncture pronounced by a small, horizontal ridge. Bulging belly tapers with an inward curve to base. Base rounded on edges, but with shallow concavity and off-center button. Interior is smooth, with no markings. Narrow, rounded wheel-ridging commences 0.015 from neck, and extends to center of base, widening out under belly. Vertical loop handles extend horizontally from collar then round off and return in a sharp inward curve to just above the maximum width of belly. Attachments very well-smoothed to collar; thumb marks visible on lower attachments. Handle sections rounded below, with three well-defined finger grooves on top and sides.

Five more cooking pots visible on wreck.

This is a late example of the common eastern Mediterranean cooking pot, which commenced its long history in the fifth-century B.C. Very close parallels to this vessel
come from Jericho, Bethany, Nazareth, Kh. Siyar el-Ghanam, and Amman, all dated to the sixth and seventh centuries.

Narrow-mouthed cooking pots are found on nearly all sites in Egypt, Palestine, Cyprus and Turkey. The variations in the treatment of the rims, handles, and bases found in one stratum at any site are enormous. In general, those from Hellenistic strata tend to have longer necks and bodies, with a concave base. Roman pots are much rounder in shape, with smaller handles. Possibly in the fourth century, the base begins to flatten and the characteristic 'Byzantine bulge' appears in the belly. During the sixth and seventh centuries, the necks are found in a number of shapes, but handles extend horizontally from the rim, and then curve into the shoulder. Bases tend to be only slightly rounded, or concave, but begin rounding again in the seventh century. The progression of rounded to flat to rounded bases also holds true for Egypt and Cyprus; Cypriot handles tend to be narrower and rounder.

This type of cooking vessel, or kedera, is the most frequently mentioned cooking pot in talmudic literature. "In Tosephta, Ketuboth 5,8 the kedera is listed with the absolutely indispensible household objects that a husband who was about to divorce his wife had to grant her in settlement." All foods that had to be boiled were first
prepared in the kedera: meat, vegetables, fish, cereal, and milk dishes. Since many of these foods needed constant stirring, this type of pot was rarely provided with a lid.\textsuperscript{161}

Cook Ware 2  Closed casserole  Inv. No. 81X-8

Ill. 16; pl. 18 (p. 134). Location on plan
Max. h. 0.215; max. diam. body 0.226 (diam. across handles 0.280); wgt. 3.9 kg. Complete; knob missing about one-half of ledge. Old, long crack on one face of pan. Moderately concreted. Both slip and fabric red (2.5YR 4/6 and 2.5YR 5/6, respectively). Ware has very fine mica and very fine black grit inclusions. Moh-3.

Covered, two-handled casserole, fired in one piece; now a separation 0.120 long between cover and pan. Cover and pan pinched together when leather hard, forming an angle which fits between thumb and forefinger. Pan with straight sides sloping to an almost flat base. Well-rounded ridging from lip to center of base, gradually widening as it approaches base. Concentric ridges around button center of base. Two handles, almost square in section, attached 0.010 below rim; almost horizontal, but bent slightly upwards. Cover rounded and slopes smoothly from knob to where it flares out to meet pan. Concentric ribbing on cover, from knob to 'shoulder'; narrow near knob and
ILL. 16. Cook Ware 2 (81X-8)
(Scale 1:2)
widening as approach rim. Knob perforated with hole, 0.004 in diam.

This piece is unique amongst visible artifacts on wreck.

This casserole is one of the few known examples of an uncut 'ilpas satum, or closed casserole. A normal lidded casserole ('ilpas or lefes) was shaped by the potter as one piece and, when leather hard, the lid was separated from the body; the separation cut was made with a knife held at an oblique angle to ensure a good seat for the lid. The term 'ilpas satum was applied to a casserole produced and sold with its lid attached. "After the lid had been cut from the body, it was immediately rejoined by light finger pressure while the vessel was still turning on the wheel. With the lid re-attached, the casserole was allowed to dry and then fired in the kiln. This ensured that the two parts shrunk evenly. Later, the lid could be easily detached by the buyer at home by lightly tapping along the line of join." The closed casseroles were more expensive than a normal lidded casserole, for the buyer could be ensured that the pot was unused and the cover tight-fitting. When and how such pots were used, however, is still unknown. Uza Zevulun, curator of the Haaretz Museum in Tel Aviv, is currently studying this type of vessel, and cautions against the impression that such vessels were used
only, or mainly, in ceremonial or religious Jewish contexts, just because they are mentioned several times in rabbinical sources. Closed casserole have been found in Nabatean, Christian, Pagan, and Samaritan sites, as well as Jewish ones, from the first century A.C. onwards. Zevulun dates our example to the fifth-sixth centuries.\(^{165}\)

Not many examples of closed casserole have been found. An uncut example was found on the Hill of Ophel, in Jerusalem, and described by its excavators as having a "singularly narrow mouth."\(^{166}\) Several have been recovered in Israel with the lid detached, and it is interesting to note that in these cases the lid did not separate smoothly from the pan.\(^{167}\) None of these are close parallels to our example.

For exact parallels to 81X-8, it is necessary to look at normal casserole, illustrated with and without lids. These are found at many sites in Palestine\(^{168}\) and in Cyprus.\(^{169}\) Identically-shaped pans were found at the Herodium in a fifth- to sixth-century level,\(^{170}\) at Ramat-Rahel in late sixth- to early seventh-century strata,\(^{171}\) and at Pella, also in a late sixth- to early seventh-century level.\(^{172}\)

Lids were made in two general shapes: hemispherical, as in our example, and "cyma recta".\(^{173}\) Similarly shaped and ridged lids, but with differently-shaped ledges on the knobs, come from a Byzantine deposit at Kh. Siyar el-
Ghanam, and sixth- or seventh-century levels at Beth-Shan; there are also fourth- to fifth-century examples in the Haaretz Museum. Most lids have a vent or steam hole, sometimes through the knob, as does our example, but often in the lid near the knob or rim.

Casseroles were used to improve the flavor of foods pre-cooked in a kedera, and for stewing and steaming meats and vegetables. The hole in the lid was used to drain the dishes.

Miscellaneous Items

Misc. 1  Fusiform container  Inv. No. 81X-13/82
Ill. 17; pl. 19 (p. 135).  Location on plan
Max. h. pres. 0.410; max. diam. 0.162; rim diam. 0.049; capacity 2.8-3.2 l; wgt. 1.3 kg. (damp).
Complete except for bottom of toe and possible handle. Lightly encrusted; surface badly "worm-riddled" and worn. Slip reddish-brown to yellow-red (5YR 4/4-4/6); fabric light red (2.5YR 6/6). Ware has some very fine black and mica inclusions. Moh-3.

Spindle-shaped container; collared upper neck with flaring rim. Long neck flares into rounded body which tapers to concave junction with thick toe. Toe broken off diagonally. Wheel ridging very worn; commences on the shoulder, and runs almost to toe; spacing widens as ridges approach base. Visible on neck are three or four rounded lumps of clay, which may have
ILL. 17. Miscellaneous 1 (81X-13/82)
(Scale 1:2)
once represented the bases to a handle with splayed attachments. This jar is unique amongst the visible pieces of pottery on the wreck.

Close parallels have not been found for this jar, but it probably belongs to the family of spindle-shaped, thin-walled water jars fabricated from micaceous, reddish-brown clay, found over a wide geographical range, from the second to the sixth centuries.180

H.S. Robinson studied the typological development of this form from the numerous examples recovered in the Athenian Agora, and found that from the second to the late fourth centuries, the jars had only one handle with splayed attachments, after which a second splayed handle was added.181

Similar fusiform jars have been discovered in North Africa,182 Egypt,183 Nubia,184 Palestine,185 Turkey,186 The Black Sea region,187 Cyprus,188 Greece,189 Sicily,190 Spain,191 and Britain.192 The finds attest to the popularity of the form up to the mid-sixth century, after which the export seems to have been drastically reduced, with only the occasional piece reported later.

The source for these jars is still under dispute. Originally they were thought to be Egyptian.193 Hayes has consistently favored an Asia Minor origin, "possibly in the Sardis region."194 Peacock pointed out that one of the metamorphic areas of the Aegean or Anatolia was more
plausible than Egypt...and Williams cautiously supports him from heavy mineral analysis."\textsuperscript{195}

In the Persian level at Kamid el-Loz, in Lebanon, three jars were found which have identical body and neck shapes to that of 81X-13/82, but without the handles, and only a short, pointed toe.\textsuperscript{196} That form may be the antecedent to the much later Romano-Byzantine micaceous jar.

If the four lumps on the neck of our jar represent the bases to only one splayed handle, a type which may have died out in the fourth or fifth centuries, perhaps our jar represents a late variety, or was an antique on board.

\textbf{Misc. 2} Glass goblet base \hspace{1cm} \textbf{Inv. No. 81X-15/82}

\textbf{Ill. 18.} Location not on plan

Max. h. pres. 0.026; max. diam. 0.050. Broken where stem begins to flare. Translucent; filmy due to the number of tiny bubbles and pitting from the sea.

Color greenish-aqua (5G 5-6/2).

Rim is hollow and varies in thickness and width.

Rough on edge and bottom. Remains of pontil mark.

Very rough in appearance and texture at the junction of the single thickness and rim's double layer.

The break in the stem occurs at an unfortunate place, making it difficult to tell whether the stem is knobbed, or is flaring into the base of the vessel. Both types were common in the Mediterranean Basin throughout the
Romano-Byzantine period.

Similar bases with hollow stems have been found on Cyprus\(^{197}\) and in Palestine,\(^{198}\) in fifth- to seventh-century levels. Since the bases found at Karanis tend to have solid stems,\(^{199}\) this glass fragment was probably Cypriot or Syro-Palestinian in origin.

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**Ill. 18. Miscellaneous 2 (81X-15/82)**  
(Scale 1:1)

**Summary**

A number of the pottery vessels, especially the smaller ones, can be associated with one another on the basis of common technical characteristics. Jug 2 and the covered casserole exhibit similar rounded/flat bases. The basic handle shapes, placements and methods of attachment of Jug 1, Jug 2, Jug 4, and Cook Ware 1 all resemble one
another. The style of wheel-ridging appears to be identical on Jugs 1 and 2; Cook Wares 1 and 2; Amphoras 1 and 6, and possibly the fusiform container (Misc. 1). The similarity of the three-part ring handles on both the egg- and cigar-shaped amphoras is obvious.

On the basis of fabric types, the smaller pieces seem to fall into two groups. The first group is the 2.5-5YR 4/4 to 4/6 and 2.5YR 6/6 range, with fine mica and black grit and perhaps some quartz; it includes Jugs 9 and 10, the covered casserole, the fusiform container, and possibly Amphora 6 with temper added for less plasticity. The second basic grouping is 2.5-5YR 4/4, 10YR 6/4 with similar black grit, more visible quartz and no apparent mica. This group is much smaller, containing only Jug 4 and Cook Ware 1.

This categorization is quite speculative, since neither the large and small egg-shaped amphoras or the large and small cigar-shaped amphoras appear to fall into any such grouping. It is obvious, however, that Amphora 8 and Jug 3 stand apart in terms of wall-thickness, fabric and technique; Amphora 8 appears to belong to an entirely different potting tradition than the other ceramic containers.
THE SHIP

Using information derived from the photomosaics and visits to the site, one may interpret this ship to a certain extent. We know that the site is that of a shipwreck and not a dumpsit because of the number and distribution of the amphorae. We know that a hull lies under the sand because three sections of wood were uncovered in two different areas and also because the amphorae remain neatly arranged in rows (see plan, ill. 2, p. 12). How much of the hull may be preserved is unknown. The conditions are such that a good section of it may exist, especially under the mound of amphorae as well as downslope in the deeper sand. With the exception of the knowledge that wood exists, the information below is postulated from a surface examination of the site, and hence any offered numbers or opinions are speculative. Unless otherwise stated, the tentative conclusions below are based upon the assumption that the amphorae on the wreck site represent those of the main cargo of one ship.

Orientation Of The Hull

The arrangement of the amphorae in an upslope-downslope pattern suggest the orientation of the ship's keel as upslope-downslope and just a few degrees off a perfect north-south axis. The ship seems to have listed to one side and then broken apart, while preserving the
original position of some of its cargo amphoras.

The alignment of the discovered wood agrees with the orientation of the cargo amphoras. The grain of the small section found in the center of the amphora mound runs upslope-downslope. The two areas of planking found just downslope from the rock-sand interface are aligned along the same axis.

Since the majority of the smaller pottery containers were discovered in the upper half of the wreck, we may speculate that the upslope section of the wreck contained the galley, and is therefore the stern end of the ship (see, however, Artifact Distribution below). If the upslope end was the stern, the ship settled on its port side. This would accord well with the fact that the vast majority of all excavated hulls have, for some unknown reason, settled on their port sides.

Size Of The Ship

The mound, or the heaviest concentration of amphoras, covers an area approximately 8 meters long by 4-to-5 meters wide. The finds of wood are separated by about 14 meters. Since the amphora pile continues downslope below the location of the lower wood for another 4 meters, we can say that the ship was at least 18 meters in length and its beam 4 meters. This is based upon the assumption that the discovered wood belongs to one continuous hull.
The hulls from both the fourth- and seventh-century A.C. shipwrecks excavated at Yassi Ada were about 20 meters in length and 5 meters wide.\textsuperscript{202} We can postulate that this ship was the same size.

A rough estimate of the cargo's tonnage can be reached by counting the number of amphorae visible on the surface in the photomosaic, and knowing their capacities from similar amphorae which were raised. The total number of amphorae on a wreck is generally based upon a count of necks.\textsuperscript{203} In this case, however, the necks of both the cigar- and egg-shaped amphorae are virtually indistinguishable on the mosaic, and other methods had to be employed.

During one dive in 1982, the cigar-shaped amphorae were counted. The archaeologist divided the wreck site roughly in half, and counted the numbers in both the upper and lower halves of the site. Complete amphorae were both counted and measured to determine whether they were of the small variety (70-plus centimeters) or of the large variety (80-plus centimeters). They divided equally: 4 large and 4 small amphorae. Since most of the cigar-shaped amphorae on the bottom are broken, a different counting method was employed. The diver mainly counted the existing shoulders with handles. In a few cases where a base was visible, but no upper part to a cigar-shaped amphorae was seen in the surrounding area, the base was included in the count. With such fragmented amphorae it
was impossible to ascertain whether the amphora was of the small size. Since the complete amphoras divided equally into the large and small sizes, an assumption is made that roughly an equal number of each size originally existed. This would make a total of 23 large and 23 small cigar-shaped amphoras now visible on the wreck.

The complete, small egg-shaped amphoras were counted during one dive; only 5 were seen. It proved unfeasible to count the large egg-shaped amphoras under water, so they were counted on the photomosaics. A rough estimate of 260 was made by counting the visible tops and bodies. Bases visible in the mosaic were not counted unless it was fairly certain that they represented separate amphoras. In the center of the mound the amorphoras are lying almost upside-down, so that only their bases are visible; these also were included in the count.

The main cargo of the ship appears to have been comprised of only egg-shaped and cigar-shaped amphoras. Since only one example of each size was raised to the surface, the capacities and weights of those examples must be used as average figures in determining the total weight of the ship's cargo, even though there is a great variance in size among similar amphoras examined on the seabed. The format for the cargo tonnage calculations follows that presented in Yassi Ada. An assumption is
made that both the egg- and cigar-shaped amphoras contained wine. The conservative specific gravity of 1.000 is employed for wine.

The total weight of the cigar-shaped amphoras is calculated as follows:

Capacity of 23 small amphoras
at 13 liters apiece 299 l = 299 kg.

Weight of 23 empty small
amphoras at 5.4 kg apiece 124.2 kg.

Total weight of 23 full small amphoras 423.2 kg.

Capacity of 23 large amphoras
at 25 liters apiece 575 l = 575 kg.

Weight of 23 empty large
amphoras at 8.4 kg apiece 192.2 kg.

Total weight of 23 full large amphoras 768.2 kg.

The total estimated weight for full cigar-shaped amphoras visible on the wreck is therefore 423.2 kg. + 768.2 kg. = 1,191.4 kg. = 2,621 lbs. = 1.31 tons.

The total weight of the egg-shaped amphoras can be calculated in the same fashion:

Capacity of 5 small amphoras
at 9.75 liters apiece 48.75 l = 48.75 kg.

Weight of 5 empty small
amphoras at 4.9 kg apiece 24.5 kg.

Total weight of 5 full small amphoras 73.2 kg.
Capacity of 260 large amphoras

at 17 liters apiece       \[4,420 \text{ l} = 4,420 \text{ kg.}\]

Weight of 260 empty large
amporas at 6.9 kg. apiece  \[1,794 \text{ kg.}\]

Total weight of 260 full large amphoras  \[6,214 \text{ kg.}\]

The total estimated weight for full egg-shaped
amporas visible on the wreck is 73.2 kg. + 6,214 kg. =
6,287.2 kg. = 13,831.84 lbs. = 6.92 tons.

The estimated total weight for the ship's cargo of
wine, taken from the amphoras visible on the bottom is
thus 1.31 + 6.92 = 8.23 tons. This is the minimum that
the ship carried. Just how much it actually did carry is
another question.

We do not know how extensively this wreck has been
looted, nor what was the original ratio of egg-shaped
amporas to cigar-shaped amphoras. From the visible
amporas it appears that the percentage of cigar-shaped
amporas is small. However, since many are found on top
of the other vessels, and therefore accessible to looters,
the ratio could have been much higher. If we assume that
10 small and 10 large cigar-shaped amphoras have previously
been removed from the wreck, then only 0.6 ton is added,
bringing the total roughly to 9 tons. Yet the similarly-
sized seventh-century ship at Yassi Ada is estimated to
have carried just under 40 tons.\(^{205}\)

There are two major unknown variables in the
calculation of the cargo's tonnage: the original number of large egg-shaped amphoras (the small amphoras being so few in number as to be insignificant in calculations), and the seemingly empty 8-to-10 meter sandy space between the amphora mound and the rock-sand interface. If only one-half of the original egg-shaped amphoras are visible in the mound, then 7 tons more could be added, bringing the total cargo to 16 tons. This, however, is still very low for a ship of this size. If, as is very likely, the 8-to-10 meter sandy area conceals one-half of the wreck, and only one-quarter of the egg-shaped amphoras are actually visible, then an additional 14 tons can be added, making an estimated total weight for the ship's cargo of about 30 tons, only 10 tons short of that of the Yassi Ada Byzantine ship. The Iskandil Burnu ship may not have been fully laden when she sank, or part of its cargo may have been perishable. It is also quite likely that the 10 missing tons can be accounted for from looting, or the number of amphoras located off of the wreck site, especially in deeper water; or any combination of the above.

Too little is known about this ship to estimate its displacement or actual tons burden. J. Richard Steffy has calculated that the Byzantine ship at Yassi Ada was capable of carrying 1200 amphoras if full laden, and rated it at 60 tons burden. The ship under question at Iskandil Burnu could very well have had the same capacity.
Artifact Distribution

The ultimate arrangement of objects on a shipwreck is, to a certain extent, random. A moderate amount of movement in the items on board is inevitable as a ship breaks up, even if the seabed is flat and the ship holds together sufficiently long to allow the sea to concrete together its contents.

The distribution of the cigar-shaped amphoras clearly illustrates the displacement of artifacts. Only 14 of these are located in the lower half of the wreck, where they are found almost exclusively on top of the other amphoras, indicating that they rolled down the moderate slope of 20°-30°. Thirty cigar-shaped amphoras, on the other hand, are located in the upper half of the wreck, strengthening the belief that originally the secondary cargo of wine was located in the very upper part of the wreck, and perhaps even the remains of an earlier cargo.

The large egg-shaped amphoras contained the primary cargo of the ship's voyage. Many of them remain neatly arranged in rows in the amphoras mound. The egg-shaped amphoras visible in rows show mainly their sides and bottoms, suggesting that some have fallen over from a greater height.

It has proven impossible at this point to illustrate the original stacking arrangement of the cargo.207 There
appear to be two staggered layers of egg-shaped amphoras in the mound. This is possible despite the shallow layer of sand over the hull remnants, only 15 to 20 centimeters, since many of the amphoras in the upper layer are fragmented.

The majority of smaller vessels - eight jugs, six cooking pots and the covered casserole - were found in the upper half of the wreck; the few pieces found in the lower half are all surface finds and undoubtedly rolled down the slope. From their locations, it would appear at first glance that the galley was located in the upper half of the wreck site. The fact that none of these containers exhibit any signs of use, however, raises the question of their identification as galley wares; none of the cooking pots are fire-blackened, and the covered casserole certainly has never been used. They may represent the small cargo of a merchant who perhaps accompanied his wares on board.

The collection of juglets located just below the rock-sand interface also poses a problem. If all of the smaller containers were galley wares, then why are the two concentrations separated by almost 10 meters? Would such a number of tiny juglets be necessary in a galley? Unless they were a part of some rituals involving the crew, it makes more sense to consider them as a merchant's cargo stored in the very end of the ship.
Not knowing what else is buried beneath the sand makes it difficult to determine the position of the ship's galley. It may have been located at the lower end of the wreck, but there are no indications for this from the surface finds. It could have been situated at the upper end of the amphora mound, placing it at midships, or just aft of midships. It is not unreasonable to expect six cooking pots and eight jugs as part of the galley wares, especially if some or all of the crew were Jewish and needed separate vessels for the different food groups. This does not explain, however, why the cooking pots are not fire-blackened, or the casserole unopened, unless the latter was being saved for a special occasion.

In conclusion, it seems likely that the galley was located in the upper end of the shipwreck, somewhere between the two concentrations of small containers, neither of which were galley wares, being more likely items of individual cargoes. Only the fusiform container is best identified as pantry ware from a galley; the rest of the galley wares are most probably still buried under the sand.

Various possibilities exist to explain the seemingly empty 8-to-10 meters between the rock-sand interface and the amphora mound. They are presented in increasing order of likelihood.

1. The site actually represents two, possibly overlapping wrecks. This is unlikely in view of the
orientation of the wood grain found separated by 14 meters. Further, although no exact parallels were found for the juglets, their fabric and features seem to place them within the same pottery tradition as the artifacts in the lower part of the wreck.

2. The hull is broken somewhere in this area. Again, this seems unlikely because of the exact orientation of the wood grain in the two areas of planking.

3. A bulkhead or some structure separated the wine cargo from a perishable cargo such as papyrus from Egypt, or dates, figs and flax from Palestine.\textsuperscript{209} These organic cargoes could have been stored in sacks or baskets, the remnants of which are now buried or disintegrated.

4. What is visible is actually a deck cargo, not the main cargo. A superstructure could have been located in the space. This might account for the wood being only 15-to-20 centimeters deep, and a possible nail head concretion that was seen flush against a plank in the upper area.

5. It is most probable that the sand in this area actually conceals one-half of the ship, for parts of several amphorae are visible here in the photomosaics. The wreck site, therefore, is likely that of one continuous hull with only one-quarter of the amphorae actually visible.

No anchors have been found in the vicinity of the site. It is possible that they are either buried under
the sand, or were thrown into the deeper water as the ship was foundering. The type of ballasting is also unknown. If stones were used, they are buried. Sand was often utilized in this period; however, it would be impossible to ascertain the possibility of sand in this case without a petrological examination of sediment in the vicinity of the wreck.
CONCLUSIONS

In the absence of coins or other readily identifiable and dateable objects, the origin and date of this ship must be found through a study of the pottery. Although origin of a ship's cargo does not necessarily denote the home port of a ship or its crew, it does indicate a possible starting point for a particular voyage. Preliminary analysis of the artifacts raised at Iskandil Burnu indicates that this voyage originated in southern Palestine and traveled north sometime in the late sixth or early seventh century carrying a cargo of wine.

The largest portion of the wine was carried in egg-shaped amphoras of a type found over a wide geographical range (ill. 19), but concentrated in Palestine, where they are considered to be the local wine containers. The closest parallels to these amphoras on the wreck come from late sixth-century strata in southern Palestine.

A secondary cargo of wine was contained in cigar-shaped amphoras whose distribution ranges from Nubia to the Black Sea to England (ill. 20). From petrological analysis, such jars are considered to have originated in the Gaza region and were most widely used during the sixth century.

The other amphoras described above are unhelpful in determining the origin of the ship's last voyage. The two
III. 19. Distribution of similar egg-shaped amphoras
1. Gaza
2. Ashdod
3. Ramat-Rahel
4. Gezer
5. Tell Jemmah
6. Jerusalem
7. Nazareth
8. Amman
9. Tarsus
10. Anemurium
11. Serçe Liman
12. Iskandil Burnu
13. Yassi Ada
14. Sacidava
15. Constanța
16. Histria
17. Cape Andreas
18. Corinth
19. Carthage
20. Benghazi
21. Alexandria
22. Abu Mina
23. Kellia
24. Esna
25. Edfu
26. Ballana

ILL. 20. Distribution of similar cigar-shaped amphoras
1. Ashdod
2. Jerusalem
3. Bethany
4. Mt. Nebo
5. Caesarea
6. Cape Andreas
7. Kourion
8. Kornos Cave
9. Anemurium
10. Iskandil Burnu
11. Yassi Ada
12. Chios
13. Istanbul
14. Sacidava
15. Constanța
16. Cernavoda
17. Oltina
18. Histria
19. Dinogetia
20. Agora
21. Corinth
22. Carthage
23. Benghazi
24. Tocra
25. Ptolemais
26. Kellia
27. Abu Mina
28. Wadi Natrun
29. Saqqara
30. Thebes
31. Kalabsha
32. Sayala
33. Ballana

Ill. 21. Distribution of similar hourglass amphorae
carrot-shaped amphoras may be Egyptian in origin, but could have been picked up anywhere and may be a part of the ship's stores. Two hourglass amphoras were also found on the wreck. This type of amphora was the most commonly traveled of the sixth and seventh centuries (ill. 21), and again, could have been purchased anywhere. Scholars are divided as to its origin; however, analysis of the fabric now indicates a source somewhere in Asia Minor.

The nationality of a ship is sometimes indicated by the coarse ware and cook ware on board since these usually are local wares and not traded. The majority of the smaller coarse-ware containers at Iskandil Burnu, whether part of the ship's galley utensils or individual cargoes, all find their closest parallels in southern Palestine during the late sixth century.

The cargo amphorae and cook ware together indicate that the ship's voyage originated in southern Palestine, probably at Gaza or Ashkelon, or possibly even Caesarea, all of which were loading ports for the export of Palestinian wine during the Romano-Byzantine period. Her final route and destination are unknown, but may be hypothesized.

The ship was small, most probably a coastal freighter practicing cabotage. Even in historical times, ships in the region were not sailed across open water more than was necessary. Limitations of technological knowledge and
navigation dictated that the coast be kept in sight whenever possible. This method of sailing was followed particularly along the Levantine coast and throughout the Aegean, where the close proximity of the islands and the intensity of coastal trade made it feasible.212

The two major directions of traffic in the eastern Mediterranean were east-west-east and north-south-north. In view of the location of the Iskandil Burnu wreck site we can rule out a direct east-west route for this ship. She could have been traveling the long way to the western Mediterranean, following the coastline as much as possible, but this is unlikely: a ship traveling from Palestine to Rome kept to the south of Crete for protection against the prevailing northerly winds.213 A ship making the voyage from Palestine to Turkey and points north, on the other hand, most likely would have kept to the coastline as much as possible. We do not know where our ship may have stopped, whether at Cyprus or the Lycian coast, Rhodes or perhaps even Knidos, before she tried to tack against the winds around the Datça peninsula and was driven back into the Point.

The seasonal aspect of maritime commerce in the Mediterranean basin strongly suggests that the voyage took place between March and November, and more probably between May 27th and September 14th, as recommended by the Talmud.214 A south-to-north route during this time period
went against the prevailing north wind. The length of an uneventful trip between southern Palestine and Rhodes was about 10 days; between southern Palestine and Constantinople, about 20 days. Return trips seem to have taken only half the length of time.²¹⁵

The number and distribution of both types of Palestinian amphoras along the coastline of Turkey and into the Black Sea indicate the frequency of trade between Palestine and the Black Sea Region, despite repeated incursions of the Huns, Slavs and Avars into the Balkans during this period. If Constantinople had functioned as an entrepôt between the two regions, we would expect to find more of these amphoras there.

One very interesting question regarding the ship needs to be addressed. In view of the closed casserole, was someone related with the ship, whether crewman, passenger or merchant, a Jew from southern Palestine? The population of Palestine is estimated to have reached 2,800,000 during the sixth century, before the plague.²¹⁶ Only 10-15% of this population is believed to have been Jewish, mainly concentrated in the northern half of Palestine.²¹⁷ A.H.M. Jones states that the Jews seem to have been completely exterminated in Jerusalem and Judea,²¹⁸ but this is not the case. Sufficient Jews existed in Jerusalem in A.D. 607, that a local governor forced them to accept baptism.²¹⁹

It is well known that the Syrians and Jews were the
most prominent among Eastern merchants. A number of Palestinian Jews, including rabbis, owned ships in Caesarea. A large Jewish guild of navicularii existed in Alexandria from the fourth century onwards. A semi-autonomous colony of Jewish merchants existed in the Gulf of Aqaba until Justinian withdrew their autonomous status. Numerous references are made to Jewish merchants in the north of Palestine; what is unknown is the number of such merchants operating out of southern Palestine. Does the closed casserole indicate the presence of one? Sizeable Jewish communities existed on Cyprus and in numerous urban centers outside of Palestine. If the covered casserole was not a part of the ship's stores, then it is possible that it was part of a cargo going to a Jewish community outside of Palestine, or was the personal property of a traveling Jewish merchant on board the ship.

The volume of trade in the Empire, both maritime and overland, was greatly diminished during the sixth to mid-seventh centuries despite the efforts of Justinian to regain control of the Mediterranean. Droughts, plagues, and the resultant pestilences in the mid-sixth and again in the early seventh centuries resulted in reduced populations. The movement of peoples and increasing hostilities on all sides of the Byzantine empire resulted in unsettled conditions. North Africa was threatened by the Berbers and Vandals. Egypt was continuously raided
by the Berbers to the west, Blemmyes and Nobadæ to the south, and the Saracens to the east. Justinian and his successors fought losing battles against the Avars and the Slavs to the north and west, and the Persians to the east, the latter abetted by the Jews who were staging their own uprisings. Arab raiding increased; by 638 Jerusalem and by 640 Caesarea were in Arab control. Despite the negative factors and uncertainties of travel by water, maritime commerce continued to be the cheapest and most profitable means of transporting bulk goods throughout the Empire. This is well illustrated by the large number of shipwrecks of the Byzantine period known along the Levantine and Turkish coasts.

Most of the information presented above has been derived from a preliminary analysis of the pottery recovered from the wreck. This research relied upon the fortunes of excavation and published results. Only during the past 20 years have scholars, led mainly by the Israelis and the Rumanians, taken an interest in Byzantine coarse-ware pottery; previously the emphasis, if Byzantine pottery was considered at all, was on the fancier glazed wares. Untold amounts of Byzantine coarse-ware pottery lies untouched and unpublished in museum storerooms. Until all of this information is made available, doubts will always exist about the accurate dating and identification of pottery. A case in point is our one-handed fusiform
container which was supposedly not used after the fifth century, yet exists on a late sixth-century shipwreck.\textsuperscript{226}

The pieces recovered from the wreck at Iskandil Burnu represent an important new assemblage of Byzantine coarse-ware pottery, if for no other reason than the existence of the fusiform container and the rarity of the uncut covered casserole. Yet for a number of the vessels, close parallels could not be found. Until petrological analyses are done on the clays, and a body of comparable data is assembled, the question of provenence for many of the ceramic pieces on the wreck will remain unanswered.
NOTES


2. The term "Byzantine" refers to various time periods in different parts of the Mediterranean basin. In Syro-Palestinian, North African and Egyptian chronologies, Byzantine is generally employed to denote the period between Constantine and the Arab conquest (early fourth to mid-seventh centuries). Late Byzantine in this area is normally thought of as the time period from Justinian to the Arab expansion (mid-sixth to mid-seventh centuries).


4. A complete survey requires advance planning and may not occur in the same year as the discovery of the site. Such a survey was conducted by INA at Kaş in 1983, when five days were spent in investigating and mapping a Bronze Age site found in 1982. This work was preliminary to the planned 1984 excavation.

5. In 1981, the survey team consisted of Donald A. Frey, director and photographer; Jack Kelley, INA board member and sponsor; Tufan Turanli, Virazon captain; Murat Tilev, Virazon Engineer; Ali Uygun and Feyyaz Subay, archaeology students; and Sezgin Gökmen, medical student. Aşkin Cambazoğlu and Yaşar Yıldız served as commissioners for the Turkish Department of Antiquities; both were actively involved in the diving. Information on the survey in this thesis was supplied by all participants with the exception of Jack Kelley.

6. At the end of each survey, all artifacts are brought to the Bodrum Museum of Underwater Archaeology for conservation, cataloging and eventual storage.
7. Frey (supra n. 1) 5.

8. Returning to Iskandil Burnu in 1982 were Frey (director), Turanli, Tilev, and Subay. New members were Robin Piercy, archaeologist; and Cemal Pulak and Manuela Lloyd, archaeology students. Archaeological commissioners were Aşkin Cambazoğlu and Yaşar Yıldız.

9. A new system was devised for numbering all survey material in 1982 by Donald Frey and the author, thus enabling all material from one particular site to be numbered sequentially, even if raised in different years. Thus, 81X-9/82 means the ninth piece to be raised from site X, found in 1981, but raised in 1982.

10. Pulak (director), Frey, Turanli, Tilev and Piercy returned to Iskandil Burnu in 1983. New members were Bill Sturgis, and Selim Dincer, Commissioner from the Fisheries Department. Serving as archaeological commissioners were Aşkin Cambazoğlu and Yaşar Yıldız. Frey, Pulak and Turanli provided information on the survey.

11. The plan was made from tracing over a composite of the 1981 and 1982 photomosaics, and then adding other amphoras visible in various other photographs. This is a plan of only the visible, or surface artifacts on the wreck; all attempts have been made to reduce the distortion; however, the relative sizes of the various pieces are not drawn to scale.


17. Joukowsky (supra n. 16) 371.

18. The 1981 survey notes show that this amphora, when raised, had a toe which later broke off. No one has since located it. All of the other egg-shaped amphoras appear to have flat-rounded bottoms; none has been seen with such a toe. Possible parallels for this type of
amphora with a toe were supplied by Avner Raban (personal communication, October 19, 1983): "It is a somewhat rare variety of a rather bulky toe, yet we do have two samples of an exact parallel from under the sea at Caesarea (not published) and a few from random UW finds off the shore south of Haifa (found in surveys)."

19. This observation was confirmed by Dr. Raban (personal communication, September 7, 1983) who states that such three-part handles are characteristic of the southeastern Mediterranean from the fourth to the mid-seventh centuries.

20. Vent holes were drilled into either the sealed lid or the shoulder of such amphoras, to allow the carbon dioxide to escape. The holes were plugged after fermentation had ceased, and often later reopened and enlarged when the user wished only a small amount of wine: U. Zevulun et al., Function and Design in the Talmudic Period, trans. E.B. Heinemann (Tel Aviv 1978) 27, figs. 103-105, 123, 128. The hole in the neck of Amphora 2, however, seems to me not to be such a vent hole for it is in the wrong place.


22. I employ the term Palestine as it was used during the Romano-Byzantine period - the area now encompassing Israel and west Jordan.

evolutve in ceramica romano-bizantina (sec IV-VII) din spatiul Mediteranean si Pontic," Pontica 9 (1976) 159 (hereafter Scorpan, "Origini").

24. Zevulun (supra n. 20) 26, figs. 100, 104.

25. C. Baly in H.D. Colt, ed., Excavations at Nessana I (London 1962) pl. IV, nos. 130:1 and 2. Dated only as Byzantine: ". . . Not possible to suggest a dating criterion beyond the probability that they become flatter-sided as time goes on."

26. Riley (supra n. 23) 28, figs. 2, 3 (fig. 3 has a band of fine combing on the shoulder, which is apparently rare; it is difficult to tell from most of the line drawings and photographs which I have if most of the parallel amphoras have combing or fine ridging). Riley dates these after the fifth century.


29. O. Tufnell et al., Lachish (Tel ed-Duweir), The Iron Age (London 1953) pl. 96:505.

30. J.C. Wampler, Tell en-Nasbeh II: The Pottery (Berkeley 1947) pls. 21:352, 22:360; dated to the sixth century; C.C. McCown, Tel en-Nasbeh I (Berkeley 1947) figs. 21:22 and 24, dated 'Roman'.


33. J.G. Duncan, Corpus of Dated Palestinian Pottery (London 1930) pl. 48 dated as Justinianic.

34. S.J. Saller, Excavations at Bethany (1949-53) (Jerusalem 1957) figs. 39:7051 and 41:7312, both dated to the last quarter of the sixth century. Fig. 41:7313 shows a white-painted jar from the same level.

36. A. Ben-Tor, "Excavations at Horvat 'Usa," Atiquot (Hebrew) 3 (1966) figs. 8:5 and 8:6, dated to the fifth-sixth centuries.

37. R.W. Hamilton, "Notes on a Chapel and Winepress at 'Ain el-Jedide,“ QDAP 4 (1935) fig. 1a. The neck of this amphora is slightly longer than that of Amphora 1, but the shape is the same. Dated to the sixth-seventh centuries, and was found in the winepress.

38. H. Schneider, The Memorial of Moses on Mount Nebo, Part III: The Pottery (Jerusalem 1950) fig. 2:5 dated to the second half of the sixth century.


41. N. Zori, "The Ancient Synagogue at Beth-Shean," Eretz-Israel (Hebrew) 8 (1967) 46. This example is painted and dated to the sixth century.

42. Landgraf (supra n. 21) 67-80. At Keisan, the same shape occurred mainly in a black (Beisan) or red (Aiyadiya) fabric, either painted or not.

43. Scorpan (supra n. 23) pl. 2:6 illustrates a sixth century type from Sacidava. His distribution maps show six locations in the eastern parts of Rumania and Bulgaria: Scorpan, "Contributions" (supra n. 23) fig. 8.

44. J.W. Hayes, "Excavations at Sarachane in Istanbul: 5th Preliminary Report: A 7th-Century Pottery Group," DOPapers 22 (1968) 215. A few sherds of the painted type were found. C. Williams, "A Byzantine Well-Deposit from Anemurium (Rough Cilicia)," Anatolian Studies 27 (1977) fig. 4:19, dated to the sixth-seventh centuries; this illustrated example does not closely match the amphoras from Iskandil Burnu. Caroline Williams, (personal
communication, February 3, 1984) on the amphoras from Anemurium: "...few examples in a mottled buff to orange-red clay full of impurities including a small amount of silver mica." Examples of the bag-shaped amphora have been found by INA surveys in southern Turkey at Kizilağaç Adası in 1982, and Kekova Ölüdeniz in 1983. Both of these amphora piles are composed of egg-shaped amphoras, slightly more squat in shape than those at Iskandil Burnu. One example of an almost exact parallel was found during the Slope survey at Serçe Liman: D. Slane, The History of the Anchorage at Serçe Liman, Turkey (Unpublished thesis, Texas A&M University, College Station, TX 1982) fig. 54, no. AS 136.

45. R. Mond and O.H. Meyers, Cemeteries of Armant I (London 1937) pl. LXV:M22, dated to the fifth century; M. Egloff, Kellia, III, La poterie copte (Geneva 1977) no. 185, dated from the mid-seventh century onwards. These are known to have been made in Abu Mina and are in a distinctive yellow clay.


47. J. Green, Cape Andreas Expedition, 1969 (Great Britain n.d.) fig. 8:2, from site 10.

48. The exact same shape as that of Amphora 1 was found in Corinth, but in the yellow Egyptian clay: C.K. Williams and O.H. Zervos, "Corinth 1982: East of the Theater," Hesperia 52 (1983) pl. 11, dated to about A.D. 600. Examples from H.S. Robinson, The Athenian Agora V, Pottery of the Roman Period: Chronology (Princeton 1959) pl. 32 (M 329 and M 330) are dated to the mid-sixth century, but are longer in shape and painted.

49. A Hellenistic example is given in: E. Grant and G.E. Wright, Ain Shems Excavations (Palestine) V (Haverford 1938) pl. 69:5. Roman examples are almost as numerous as Byzantine, but for the best selection of the full range of shapes available, see: Y. Yadin, Masada - Herod's Fortress and the Zealots Last Stand (Jerusalem 1966) 94. A typical mid-late Roman form was found in the Agora: Robinson (supra n. 48) 68, with pl. 15 (K 108) dated to the mid-
third century.

50. Riley (supra n. 23) 218.

51. Kelso and Baramki (supra n. 31) 32; Schneider (supra n. 38) 44-46; Smith (supra n. 40) pl. 21.

52. G.M. Fitzgerald, Beth-Shan Excavations III, The Arab and Byzantine Levels (Philadelphia 1931) pl. 31 for two late sixth/early seventh century pots which are elongated, have long necks, and one of which is painted. Various late Byzantine examples come from the Citadel in Amman: G.L. Harding, "Excavations on the Citadel, Amman," AOA 1 (1951) figs. 3 and 4; C.M. Bennett and A.E. Northedge, "Excavations at the Citadel, Amman, 1976 - Second Preliminary Report," JCS 22 (1977-78) pl. CI. The full range of shapes seems to have been found at Pella: Smith (supra n. 40) pls. 32, 45. A very interesting late shape was found at Samaria: J.W. Crowfoot, G.M. Crowfoot and K. Kenyon, Samaria Sebaste III: The Objects (London 1957) fig. 84a. This amphora has one horizontal and one vertical ring handle.

53. Zevulun (supra n. 20) 26.

54. Zevulun (supra n. 20) 26-29.

55. See n. 37.

56. Zemer (supra n. 35) 66-67.

57. Many fourth century bag jars, primarily of the northern type, were found in the storage room of the "Patrician House" at Meiron. These jars were still filled with wheat, ful, walnuts, barley, olives, and tubers. Whether this was a primary or secondary usage for these jars is not defined: E.M. Meyers et al., Excavations at Ancient Meiron, Upper Galilee, Israel 1971-72, 1974-75, 1977 III (Cambridge, MA 1981) 60-66. A typical ultimate usage for these jars, especially during the Roman period was as burial containers for infants: L.Y. Rahmani, "Jewish Tombs in the Romema Quarter of Jerusalem," Eretz-Israel (Hebrew) 8 (1967) 187, with fig. 2.

58. Zevulun (supra n. 20) 26. "Weights and Measures, Ancient," Encyclopaedia Britannica 23 (1967) 379, lists a se'ah as 796.8 cu. in., which converts to 13.06 liters. No date is suggested for the usage of this se'ah, but given Hebrew conservatism, it is plausible that the size of a se'ah remained constant. If a Byzantine se'ah was 13.06 l, and the havit were of one and two se'ah size, then the two capacities of egg-shaped amphoras should be 13.06 and 26.1
liters. This is not the case. Amphora 2 is roughly 10 liters; Amphora 1 is 17 liters, which may be low. Zemer (supra n. 35) 69, nos. 54 and 55 are 20.6 liters and 21.6 liters, respectively; p. 73, nos. 60-62, the small size, are 10, 7 and 6 liters, respectively. If we assume average capacities of 20 liters for a full, large egg-shaped amphora, and 10 liters for a full, small-sized amphora, then if a se'ah represented the capacity of a two-thirds full amphora, a large amphora would be 13.2 liters and a small amphora, 6.6 liters. This amounts to roughly a one se'ah and a one-half se'ah, rather than a one and two se'ah. I do not know of any two se'ah size amphoras; if a se'ah is indeed 13.06 liters; all seem to fall roughly under a one or one-half se'ah size, if two-thirds full. If a se'ah is closer to 10 liters in size, then known amphoras would be of one and two se'ah size, if full.

59. From "Tosephta, Trumoth 7,9"; "Aboth d'Rabbi Nathan, ch. 4": Zevulun (supra n. 20) 26.

60. Translated from the Tosephta, Menahoth 9,10: Zevulun (supra n. 20) 27.

61. Zevulun (supra n. 20) figs. 105-121.

62. Almost everyone describing these amphoras has noted that there are "invariably accretions of clay on the shoulder and around the rim." Riley (supra n. 23) 27. Van Doorninck and Pulak (personal communication, 1983) believe that the clay may have been left from fresh clay chucks which would have been needed to support the top of the amphora after it had been turned upside-down to work the lower half. This view is supported by Landgraf (supra n. 21) 82. Due to its fired state, this clay could not have been sealing material.

63. The handle probably separated from the body because it dried at an improper rate during manufacture.

64. Raban (personal communication, September 7, 1983); C. Eiseman, "Amphoras from the Porticello Shipwreck (Calabria)." LJNA 2 (1973) 15-19 with figs. 4:9, 10, 11, 14 and 7:15, 17.

65. Dr. D.P. Peacock undertook "petrological investigation (which)though limited, strongly supports the hypothesis that Caesarea type 2 was made at Gaza..." in Riley (supra n. 23) 30-31.

66. These amphoras have been variously typed as Caesarea type 2: Riley (supra n. 23) 27-31; Ballana type 10: W.B. Emery and L.P. Kirwan, The Royal Tombs of Ballana and
Gustul: Mission archéologique de Nubie, 1929-34 II
(Cairo 1938) 390 with pl. I1I:10; British type VI: A.C.
Thomas, A Provisional List of Imported Pottery in Post-
Roman Western Britain and Ireland (Redruth, England 1981)
16; Carthage LR Class 4: Carthage I (supra n. 23) 117;
and Almagro type 54: Beltrán-Lloris, Las anforas romanas
en España (Zaragoza 1970) 547-48), n. 1271. C. Scorpan
first typed it as Type K (supra n. 23) 267, and later as
Type J: "Origini" (supra n. 23) 165, or Type XIV:
"Contributions" (supra n. 23) 279-81.

67. Riley (supra n. 23) 27; Zemer (supra n. 35) 61.

68. Dothan and Freedman (supra n. 28) 69, fig. 14:1,
where it was the most common sixth century jar.

69. Aharoni, 1964 (supra n. 32) fig. 24:9 with pl. 4,
identical to Amphora 3 and dated late sixth, early seventh
centuries; Aharoni, 1962 (supra n. 32) fig. 4:3 illustrates
a sixth-seventh century example with fine ribbing at the
neck.

70. R.A.S. Macalister, The Excavation of Gezer 1902-
1905 and 1907-1909 I (London 1912) 361, fig. 188. This
jar is just dated "Roman", but is identical in shape to
Amphora 3, except that the ribbing begins under the lower
handle attachment.

71. W.M.F. Petrie, Gerar (Tell Jemmeh) (London 1928)
pl. LVI:47p, dated Justinianic.

72. Crowfoot and Fitzgerald (supra n. 39) pl. 12:34,
dated early to mid-sixth century.

73. B. Bagatti, Excavations in Nazareth I (Jerusalem
1969) fig. 218, dated to the sixth century.

74. P.V. Corbo, Gli scavi de Kh. Siyar el-Ghanam
(Campo dei Pastori) e I monasteri dei dintorni (Jerusalem
1955) 59-60, fig. 15:5 for a Byzantine base.

75. F. Zayadine, "Excavations on the Upper Citadel of
Amman, Area A (1975 and 1977)," ADAJ 22 (1977-78) 48, fig.
16:248, dated fifth to sixth centuries.

76. Zemer (supra n. 35) 61, nos. 49-53.

77. Scorpan (supra n. 23) pl. 1, fig. 5, illustrates
a sixth century example from Sacidava; Bass found examples
from Histria, Tomis and the northern Black Sea dating to
the end of the sixth century to the beginning of the seventh
century: Yassi Ada (supra n. 15) 183; M. Lazarov,
Potshchnalata Flotiliya (Varna 1975) 198, fig. 59, dated to the fifth century. Scorpan's distribution maps show six locations in the eastern parts of Rumania and Bulgaria, and one in the northern Black Sea: Scorpan, "Contributions" (supra n. 23) 281, fig. 20.

78. A few examples were found at Anemurium in sixth-seventh century deposits: C. Williams (personal communication, February 3, 1984). A fat example dated fourth to fifth century from Tarsus, very similar in shape to Amphora 3, but with the handles stepped on the band of ridging: H. Goldman, Excavations at Güzül Kule, Tarsus II, The Hellenistic and Roman Periods (Princeton 1950). Identical amphoras have been raised by sponge divers and are in the Bodrum Museum: T.O. Alpözen, "Bodrum Müzesi Ticari Amphoralari," TürkArkDerg 22 (1975) pl. 8:8. The top half to an identical amphora was found during the Slope survey at Serçe Liman: Slane (supra n. 44) 168-70, with fig. 53 (AS 134), dated to the sixth century. A very similar, complete amphora was found on the seventh-century wreck at Yassi Ada: Yassi Ada (supra n. 15) 183-84 (p 73). A very rough top was found at Arslanli Burnu during the 1982 INA survey.


80. Beltrán-Lloris (supra n. 66) 547-48, for fourth-to-sixth-century examples from Estruch and Tarragon; Egloff (supra n. 45) 117 mentions Almagro's prototype from Ampurias.

81. Thomas (supra n. 66) 16, for a fifth century example from the Billingsgate Bath Bridge in London; Riley (supra n. 23) 30, n. 19 for examples from the late fourth to fifth century strata in Wroxeter, Shropshire, and the St. Katherine Coleman Site in London.


83. From Cape Andreas, Cyprus, site 10: Green (supra n. 47) 19, fig. 7:3 (handles stepped on the ridging).

84. Sherds were found at Benghazi: Landgraf (supra
85. Emery and Kirwan (supra n. 66) 390, pl. 111:10. In Egypt, they have been found at Kellia, Abu Mina, Tell-Edfu and Esna: Eglloff (supra n. 45) 117, pl. 60:3, type 182, slightly waisted and dated fifth to early seventh centuries. This type was replaced in the mid-seventh century by a type with no neck, and angular shoulders and walls (Type 183, pl. 61:1). Examples dated to the fifth and sixth centuries were found in Alexandria: Scorpan, "Origini" (supra n. 23) 165, n. 39.

86. Zemer (supra n. 33) 61, nos. 49 and 53 for early examples and no. 50 for the later type, based on the excavations at Kasserwit, in the Sinai.

87. W.M.F. Petrie, Beth-Pelet II (London 1932) pl. LXXXVI; the same handle position is seen on the Tarsus example, whose body is more like those under discussion: Goldman (supra n. 78) pl. 167.

88. Yadin (supra n. 49) 95, for an example from Masada; Aharoni, 1964 (supra n. 32) 27:9 for examples from Ramat-Rahel; Y. Aharoni, "Expedition to the Judean Desert: 1961, Expedition B - The Cave of Horror," IEJ 12 (1962) fig. 3:7 and 9.

89. Both the pointed and round-bottomed types were found in a fourth century tomb at Heletz: L.Y. Rahmani, "A Tomb from the Fourth Century A.C. in Heletz," Vediot (Hebrew) 25 (1961) 153.

90. Riley (supra n. 23) 30, n. 20 for several references; Zevulun (supra n. 20) 29. The Gaza amphoras found at Ballana were pitch-coated: Emery and Kirwan (supra n. 66) 390.

91. Zevulun (supra n. 20) 29.

92. Zemer (supra n. 33) 61. The excavators at Corinth considered this class of amphora used for the shipment of fish: Williams, 1982 (supra n. 82) 139.

93. Scorpan, "Contributions" (supra n. 23) 281.

94. This shape of amphora has been variously typed as Ballana type 6: Emery and Kirwan (supra n. 66) 390 with pl. 111:6; Caesarea type 5; Riley (supra n. 23) 23; British Bii: Thomas (supra n. 66) 11; Nubian import Type P:3: W. Adams, "An Introductory Classification of Christian


96. Examples have been found in the Wadi Natrun: W. Hautumm, Studien zu Amphoren der spätromischen und frühbyzantinischen Zeit (Fulda, Germany 1981) fig. 182; at Thebes, Abu Mina and Kellia: Egloff (supra n. 45) 112, with pl. 57:4 (no. 164). No. 166 is smaller and dated to the fifth-sixth centuries, and parallels those found at the Buceum: R. Mond and O.H. Meyers, The Buceum (London 1934) pl. 131:88.

97. At Ballana, the hourglass amphorae were second in frequency only to the local shapes: Emery and Kirwan (supra n. 66) 390, pl. 111:6; Adams (supra n. 94) 251, dated sixth to eighth centuries. Examples have also been found at Kalabshe and Sayala: Hautumm (supra n. 96) fig. 182.

98. Examples were found at Ptolemais, Libya: Egloff (supra n. 45) 112. Hourglass amphorae were the most common type found at Tocra: Tocra II (supra n. 46) 116, in the late-sixth and early seventh centuries strata; at Carthage: Carthage I (supra n. 23) in the early sixth century stratum; and at Benghazî, where it comprised about 50% of the amphorae in the early- to mid-sixth century level: Landgraf (supra n. 21) 82.

99. J.E. Quibell, Excavations at Saqqara IV (Cairo 1912) 140, pl. 48:3.

100. In Thomas (supra n. 66) 11.

101. In Landgraf (supra n. 21) 83.

102. Yassi Ada (supra n. 15) 155-57, figs. 8-1, 8-2, 8-3.

103. Riley (supra n. 23) 33.

104. J. Hayes, personal communication, October 3, 1983.
105. Zemer (supra n. 35) 76-77, nos. 63-65 for three shapes found off the coast of Israel; a sixth century example from Ashdod: Dothan and Freedman (supra n. 28) 34, fig. 14:2 and 69; in the Jerusalem area: Crowfoot and Fitzgerald (supra n. 39) pl. 14:29, dated late sixth to early seventh centuries; at Keisan: Landgraf (supra n. 21) 82; at Bethany: Saller (supra n. 34) pl. 114:1 and 2; at Mt. Nebo: Schneider (supra n. 38) pl. 149:32, and at Caesarea: Riley (supra n. 23) 31-33, where it comprised only 1% of the total amphoras. Riley postulates that it traveled west and northwest from Egypt, and not north, since so few are found in Palestine in relation to the rest of the Mediterranean Basin.

106. C. Williams (personal communication, February 3, 1984) states that it was found in several different fabrics throughout the fifth- to seventh-century strata.

107. Hayes (supra n. 44) 215, comprised 15% of the amphora fragments in the sixth- to seventh-century levels.

108. I.B. Zeest, Pottery Containers from the Bosphoros (Russian) (Moscow 1960) 175, pl. 39:98b; Lazarov (supra n. 77) 198, no. 58; from Sacidava: C. Scorpan, "Săpăturile arheologice de la Sacidava (1969-1972)," Pontica 6 (1973) 310, fig. 34 dated sixth century; from Oltina: M. Irimia, "Cuptoarele Romano-Bizantine de ars ceramică de la Oltina (Jud. Constanța)," Pontica 1 (1968) 394, fig. 14 dated fifth to sixth century; from Cernavoda, Constanța, Histria, and Dinobetia: Rădulescu (supra n. 94) 109, pls. 11 and 12.

109. Finds have been reported at 21 sites in south-west England, southern Wales, Ireland and Scotland: Thomas (supra n. 66) 11-13.

110. A possible earlier type from St. Blaise: Thomas (supra n. 66) 11; Egloff (supra n. 45) 112. They have also been found off Cap Gros: P. Fiori, "Le mouillage antique du Cap Gros," CAS 3 (1974) 87, pl. 3:8 dated to the fifth century.

111. An example from Cefalù, with a shorter body: G. Purpura, "Il relitto Bizantino di Cefalù," Sicilia archeologica 51 (1983) fig. 11.

113. Ones identical to those from Iskandil Burnu were found at Corinth: Williams (supra n. 48) 29 with pls. 11:77 and 78, dated circa A.D. 600. From underwater finds off Chios: R. Garnett and J. Boardman, "Underwater Reconnais-
sance off the Island of Chios, 1954," BSA 56 (1961) 111, fig. 11:24; in the mid-sixth century stratum in the Agora:
Robinson (supra n. 48) 115 with pl. 32 (M 333).


115. Robinson (supra n. 48) 115 with pl. 33 (M 334).

116. Williams (supra n. 44) 182-84 with fig. 3:18.

117. V. Karageorghis, Excavation in the Necropolis of Salamis I (Nicosia, Cyprus 1967) 109 with pls. 31:102 and CVII:102, from Tomb 50.

118. H.E. Winlock, Monastery of Epiphanius at Thebes I (New York 1973) pl. 38, dated sixth to seventh centuries.

119. This class of amphorae is typed Ballana 11:
Emery and Kirwan (supra n. 66) 390 with pl. 111:11;
Caesarea type 7 by Riley (supra n. 23) 33 and Type 9 by Rădulescu (supra n. 94) 107.

120. Riley (supra n. 23) 33.

121. W.M.F. Petrie, Ehnasya, 1904 (London 1905) 31, pl. 34:134-37, dated fourth- to seventh-centuries. In Egypt, these amphorae have also been found at Armant: Mond and Meyers (supra n. 45) pl. 63:88, dated late Roman; Quibell (supra n. 99) pl. 48, top row, dated to the sixth and seventh-centuries; at Medinet Habu: U. Hölscher, The Excavations of Medinet Habu V: Post-Ramesseide Remains (Chicago 1954) G'4, dated late-Roman to Coptic; Edfu, Cairo, Thebes, Esna, Amarna, Hermopolis and Kellia: Egloff (supra n. 45) 115, pls. 58:6 and 8. nos. 173-75, dated to the sixth- and seventh-centuries. In Nubia, they have been found at Ballana: Emery and Kirwan (supra n. 66) 390, pl. 111:11.

122. At Tocra and Cyrene: Tocra II (supra n. 46) 116 with n. 18. Finds were few at Carthage: Carthage I (supra n. 23) 117, dated to the sixth century and Carthage IV (supra n. 46) 46, dated to the mid-seventh century; and at Benghazi: Landgraf (supra n. 21) 83.

123. These sherds were very rare at Caesarea: Riley (supra n. 23) 33; and at Tell Keisan: Landgraf (supra n. 21) 83.
124. One late-Roman example was found at Tarsus: Goldman (supra n. 78) fig. 166:831. At Sarachane in Istanbul, only a very few sherds were found: Hayes (supra n. 44) 215.

125. Lazarov (supra n. 77) 198, no. 60, dated fifth-sixth centuries. Several variations in the shape are seen at Constanța: Rădulescu (supra n. 94) 107-108, pl. 10, all dated fourth- to sixth-centuries; Dinogetia, Ibid., 108, dated to the sixth-century.

126. "If a slip of a different clay is used, care must be taken to reproduce the composition and temper present in the vessel fabric. Otherwise, the slip may peel or flake after firing." A.L. Kelley, The Pottery of Ancient Egypt: Dynasty 1 to Roman Times I (Toronto 1976) 8.

127. Kathleen Warner Slane (personal communication, December 20, 1983) writes that she has seen similar grooves on the interior of similar thick-walled sherds from fifth-to seventh-century date at Corinth, and believes that they were produced either by temper, or dragging the edge of a tool that the potter was using to smooth the interior. The construction of a similar pot is illustrated in Franken and Kalsbeek (supra n. 14) 86-89.

128. S. Loffreda, Cafarnao II: La ceramica (Jerusalem 1974) 136-37, 149 with fig. 50.

129. Harding (supra n. 52) fig. 3, nos. 39, 61, 62.


131. I thank Sheila Matthews for this observation.


133. Harding (supra n. 52) pl. 9:7 for an example from a Roman tomb with the same basic body shape, but a thicker neck. Early first-century examples are numerous: B. Bagatti, Gli antichi edifici sacri de Betlemme (Jerusalem 1952) pl. 52:5, with a round body and concave foot; P. Bar-Adon, "Expedition to the Judean Desert, 1960 - Expedition C," IEJ 11 (1961) 28, pl. 13 with fig. 1, for a pear-shaped body with ring or concave bases; A. Biran and R. Cohen, "Aroer in the Negev," Eretz-Israel (Hebrew) 15 (1981) 270, for both flat and rounded bases.

134. Schneider (supra n. 38) 93, fig. 11:1, no. 399. Jug 400 on the same page is more cylindrical, with a concave, button base.
135. Saller (supra n. 34) 310, fig. 62:4834.

136. Netzer (supra n. 27) 77, with pl. 12:16.

137. Bennett and Northedge (supra n. 52) 28, pl. CI, 1:10.

138. Bagatti, (supra n. 73) fig. 220:12.

139. Saller (supra n. 34) 294, fig. 60:4660.

140. Personal communication of October 3, 1983.

141. Bennett and Northedge (supra n. 52) 28, pl. CI, 1:9.

142. Catling (supra n. 112) 54, figs. 7:9-13.

143. Aharoni, 1964 (supra n. 32) fig. 27:6; Fitzgerald (supra n. 52) pl. 30:124; and Saller (supra n. 34) 310, fig. 62, who illustrates the various shapes of bases found at Bethany: ring-foot, flat, rounded and concave with a button center.

144. Bennett and Northedge (supra n. 52) 28, pl. CI, 1.

145. Egloff (supra n. 45) pl. 29:14, no. 225.

146. Yassi Ada (supra n. 15) 177.


148. Kelso and Baramki (supra n. 31) pl. 27:22. The handles and base are slightly different.

149. Saller (supra n. 34) 236, fig. 46:7298; the rim and base are slightly different.

150. Bagatti (supra n. 73) fig. 224:1; handles are slightly thicker, and the base is rounder.

151. Corbo (supra n. 74) fig. 18:1; handles thinner, body with a flat, slightly convex base.

152. Zayadine (supra n. 75) fig. 24; handles thicker, base missing.

153. Aharoni, 1964 (supra n. 32) fig. 11:2.

154. R. De Vaux, "Fouilles au Khirbet Qumrân," Revue biblique A60 (1953) figs. 3:7 and 11; Petrie (supra n. 87)
pl. 84, from Beth-Pelet.

155. Macalister (supra n. 70) 226, fig. 378, for an example from Gezer; Grant and Wright (supra n. 49) pl. 69, for examples from Ain Shems.

156. For illustrations of various rim treatments, see: Smith (supra n. 40) pl. 41; Saller (supra n. 34) fig. 46; and Zayadine (supra n. 75) fig. 22. Baly (supra n. 25) pl. 56, no. 134 illustrates several rims, many of which are identical to the example from Iskandil Burnu.

157. Smith (supra n. 40) pl. 22, for examples from Pella. A ninth to tenth century example from Al-Mina in northern Syria exhibits a pointed base and horizontal handles: A. Lane, "III. Medieval Finds at Al-Mina in North Syria," Archaeologia 87 (1938) 41, fig. 5.

158. Petrie (supra n. 121) 27-28, pl. 31, from Ehnaysa; Egloff (supra n. 45) pls. 51, 52 for examples from Kellia.

159. Catling (supra n. 112) 54, fig. 7; H. Catling "An Early Byzantine Pottery Factory at Dhiorios," Levant 4 (1972) 11, fig. 7.

160. Zevulun (supra n. 20) 33. The Hebrew word, kedera, is probably derived from kdr, meaning black or dark (from the smoke-blackened bottoms). Ibid., 32.

161. Zevulun (supra n. 20) 33.

162. Zevulun (supra n. 20) 34, and illustrated in figs. 159-161; J.W. Hayes, Roman Pottery in the Royal Ontario Museum: A Catalogue (Toronto 1976), fig. 350.

163. Zevulun (supra n. 20) 33. "The talmudic sages were divided on the question of whether it is permissible on the Sabbath or on a holy day to detach the lid of an 'ilpas satum (Mishna, Eduyoth 2,5; Tosephta, Shabbath 16 (17) 13; Tosephta, Yom Tov 3, 13" Ibid., 34. The construction of a casserole pan is illustrated in Franken and Kalsbeek (supra n. 14) 89-91.

164. A. Raban, personal communication, October 19, 1983.


167. Zevulun (supra n. 20) figs. 166-71.

168. These types of lidded casserole were found at Nazareth from the first-sixth centuries, most dominant in the sixth century: Bagatti (supra n. 73) 288; at Ramat-Rahel in the late fifth- to early seventh-century strata: Aharoni, 1962 (supra n. 32); "At Jericho it appeared at the end of the Byzantine period. At Shavei Zion it is dated to the sixth century,...and at Giv'at Shaul to the fifth-sixth centuries": Netzer (supra n. 27) 76.

169. Caroline Williams, personal communication of February 3, 1984, believes that the shape of our pan is closer to a seventh-century Cypriot Red-Slip Form 11, than the sixth-seventh century Palestinian type, which normally has curved, rather than straight walls. The examples which I have seen from Cyprus are much different: Catling (supra n. 159) fig. 8.

170. Netzer (supra n. 27) pl. 12:12. A similar lid is shown in 12:11, missing its knob.

171. Aharoni, 1962 (supra n. 32) fig. 3:19; fig. 17:14 for a fifth-seventh century piece. Aharoni, 1964 (supra n. 32) fig. 8, illustrates the variety of shapes found in casserole pans in the late sixth- to early seventh-century strata.

172. Smith (supra n. 40) pl. 69:481.

173. Schneider (supra n. 38) fig. 14.

174. Corbo (supra n. 74) pl. 23.

175. Fitzgerald (supra n. 52) pl. 30:13.

176. Zevulun (supra n. 20) fig. 157 (Israel Dept. of Antiquities and Museums, no. 62-290); fig. 171 (Museum Haaretz Collection, no. MHP-476).

177. Kelso and Baramki (supra n. 32) 34. Schneider (supra n. 38) figs. 14:1 and 2. An Egyptian example from Kellia has three vent holes in the upper part of the lid: Egloff (supra n. 45) no. 349. Vent holes were of extreme importance when firing the casserole as one piece, to prevent the piece from exploding.

178. Zevulun (supra n. 20) 33-34.

179. The very faint fourth piece of clay was reported by van Doorninck.
180. These micaceous jars have been typed as Caesarea type 4: Riley (supra n. 23) 31; British type Biv: Thomas (supra n. 66) 14; and Ballana type 13: Emery and Kirwan (supra n. 66) pl. 111:13. Scorpan first called them Type O: (supra n. 23) 271, and later Type V: Scorpan, "Contributions" (supra n. 23) 273.

181. See Robinson (supra n. 48) 17, for a discussion of the development of the body shape, toes and handles.

182. At Carthage, the form was present in both the Vandal and late Roman levels: Carthage I (supra n. 23) 117; at Tocra, only six sherds were found in the mid-late sixth century stratum: Tocra II (supra n. 46) 116-17.

183. For a fifth-century example from Kellia, see: Egloff (supra n. 45) pl. 60:2, no. 181.

184. Found at Ballana: Emery and Kirwan (supra n. 66) 111:13; and Kalabsha: Hautumm (supra n. 96) 403.

185. Almost complete examples, with very long, solid toes were found at Caesarea: A. Siegelman, "A Mosaic Floor at Caesarea Maritima," IEJ 24 (1974) 219, figs. 2:4 and 5. At Beth-Shan, one is dated sixth-seventh centuries; this example is shown missing part of its neck, and with what looks like only one broken handle: Fitzgerald (supra n. 52) pl. 32:13. Several have been found off the coast of Israel: Zemer (supra n. 35) pl. 5:10, dated Byzantine; Barag (supra n. 35) pl. 26:78, dated second to fourth centuries.

186. At Saracchane, only a few examples were found: Hayes (supra n. 44) 215. An example comes from Tarsus: Goldman (supra n. 78) no. 797, figs. 162, 205. A complete one-handled example was found on the fourth-century shipwreck at Yassi Ada: G.F. Bass and F.H. van Doorninck, Jr., "A Fourth-Century Shipwreck at Yassi Ada," AJA 75 (1971) 35, pl. 2:25. The base to one of these jars was found on the seventh-century shipwreck at Yassi Ada: Yassi Ada (supra n. 15) 183, no. P 74.

187. Zeest (supra n. 108) pl. 38:95. Examples were found at Constanța: C. Chera-Mărgineanu, "Noi morminte din necropolele Tomisului," Pontica 7 (1979) 249, fig. 1 for a fourth-century example with two handles; at Dinogetia: I. Barnea, "L'incendie de la cite de Dinogetia au VIIe siecle," Dacia 10 (1966) 251, fig. 12:1, and at Histria and Capidava: Scorpan (supra n. 23) 271.

188. From Kourion: Hautumm (supra n. 96) 403. A possible example, with two basket-type handles with splayed attachment, of unknown date, was found at site 24, off Cape
189. An example was found on Thasos: Yassi Ada (supra n. 15) 183. For some later finds from the Athenian Agora, see Robinson (supra n. 48) pl. 33 (M 335); pl. 34 (M 373); pl. 40 (P 12861); pl. 41, for details of toes and handles. An example has been reported from Samos: Hautumm (supra n. 96) pl. 403.

190. Very rare on Sicily, but an example was found at Cefalù: Purpura (supra n. 111) 99, fig. 7, dated to the sixth-century.

191. A possible example has been reported in Baetica: Robinson (supra n. 48) 17.

192. The earlier one-handed forms were found at seven locations; the two-handed jars in eight locations in England and Wales: Thomas (supra n. 66) 14-15.

193. V. Grace, Amphoras and the Ancient Wine Trade (Princeton 1961); Hautumm (supra n. 96) 403, labels them as Egyptian amphoras.

194. Riley (supra n. 23) 31.

195. Thomas (supra n. 66) 14.


197. Catling (supra n. 159) 75, fig. 41, for two possible seventh-century examples.

198. Zevulun (supra n. 20) fig. 22 (Museum Haaretz Collection, MGH-51558, fifth-sixth-century) and fig. 34. (Museum Haaretz Collection, MHC-51558, dated to the sixth-century).

199. D.B. Harden, Roman Glass From Karanis Found by the University of Michigan Archaeological Expedition in Egypt, 1924-29 (Ann Arbor 1936) pl. 16.

200. I am grateful to Kathleen Warner Slane (personal communication, December 20, 1983) for suggesting that I group the pottery by fabric and techniques, and for outlining possible groupings.

201. The most commonly found location for a cabin and/or the galley area on shipwrecks is in the stern.
This agrees with the majority of artistic and literary sources. Other arrangements did exist, however, with the locations of common objects at both ends of the ship. This arrangement occurred on the wrecks of Kyrenia, Dramont D and Chretienne C.: P.A. Gianfrotta and P. Pomey, Archeologia subacqua: storia, tecniche, scoperte e relitti (Milan 1980) 292-93.

202. Yassi Ada (supra n. 15) 86; for information on the size of the fourth-century hull, see Bass and van Doorninck (supra n. 186) 29-30.

203. Yassi Ada (supra n. 15) 161.

204. Yassi Ada (supra n. 15) 161-63.

205. Yassi Ada (supra n. 15) 164.

206. Yassi Ada (supra n. 15) 86.

207. Zemer (supra n. 35) 113 believes that Gaza amphoras were stacked horizontally, but offers no evidence. He also believes (115) that the widely spaced wheel-riding on Byzantine jars was intended to prevent slippage of the ropes which bound the jars together during transport.

208. A number of the cooking pots on both the fourth- and seventh-century wrecks at Yassi Ada exhibited fire-blackened bottoms and outer walls.

209. Egyptian papyrus was in great demand through the eighth century for writing material: W.M.F. Petrie, "Egyptian Shipping," Ancient Egypt and the East (1933) 3. Palestinian figs, dates and flax were all of high quality and in demand throughout the empire: G. Downey, Gaza in the Sixth Century (Norman, Oklahoma n.d.) 41.

210. Procopius, History of the Wars, trans. H.B. Dewing (Cambridge, MA 1979) 3.13.20-25. Belisarius' wife kept their onboard water supply fresh by storing it in a wooden box filled with sand below the hold. Whether all of the ballast was actually sand is unmentioned.

211. Zemer (supra n. 35) 102.

212. J. Rougé, Recherches sur l'organisation du commerce maritime en Méditerranée sous l'empire romain (Paris 1966) 81, 84.

213. Rougé (supra n. 212) 87.
214. Rougé (supra n. 212) 33. This rule was generally followed during the Roman period, and seems to have been a rule of law during the Medieval period. In fact, navigation was prohibited in the Black Sea under heavy penalties from December to mid-March (Statute of Pera IV, 15): W. Ashburner, The Rhodian Sea Law (Oxford 1909) cxlii-cxliii.


216. Landgraf (supra n. 21) 65.


221. S.W. Baron, A Social and Religious History of the Jews II (New York 1952) 249.

222. Baron, III (supra n. 217) 69-70.


226. The location of the fusiform container on the site makes it very likely that it is not an intrusive element.
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Plate 1. Looking upslope along western edge of amphora mound.
Plate 2. Raising amphoras using a lifting bag.
Plate 3. Archaeologists examining upper part of amphora mound.
Plate 5. Large egg-shaped amphora (Amphora 1) Scale 1:4
Plate 6. Small egg-shaped amphora
(Amphora 2) Scale 1:4
Plate 7. Large cigar-shaped amphora
(Amphora 3) Scale 1:4
Plate 8. Small cigar-shaped amphora
( Amphora 4)  Scale 1:4
Plate 9. Hourglass amphora (Amphora 5) Scale 1:4
Plate 10. Large carrot-shaped amphora
(Amphora 6) Scale 1:4
Plate 11. Small carrot-shaped amphora (Amphora 7) Scale 1:4
Plate 12. Squat amphora (Amphora 8) Scale 1:2
Plate 13. Juglet (Jug 1) Scale 1:2
Plate 14. Juglet (Jug 2) Scale 1:2
Plate 15. One-handed jug (Jug 3) Scale 1:2
Plate 16. One-handled jug (Jug 4) Scale 1:2
Plate 17. Two-handled pot (Cook Ware 1) Scale 1:2
Plate 18. Closed casserole (Cook Ware 2) Scale 1:2
Plate 19. Fusiform container (Misc. 1) Scale 1:2
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