

THE PANTANO LONGARINI SHIPWRECK: A REANALYSIS

A Thesis

by

SARAH MARIE KAMPBELL

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

MASTER OF ARTS

August 2007

Major Subject: Anthropology

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ABSTRACT

The Pantano Longarini Shipwreck: A Reanalysis. (August 2007)

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A late antique shipwreck was excavated in the Pantano Longarini marsh in the southeastern corner of Sicily in the 1960s. Despite its excellent preservation, problematic circumstances surrounding its excavation and publication have resulted in scholars ignoring or misinterpreting it. The majority of the data, including original field notes and documentation, are lost, and the drawings, plans, and photographs that remain are sometimes inconsistent and incomplete. My research reanalyzes the remains of this ship to determine how the Sicilians adapted to their marine and economic conditions within the turbulent socio-economic and political climate of late antiquity.

The Pantano Longarini shipwreck demonstrates early stages in a shift from the tradition of plank-based construction to the modern system of reliance on an internal framework for structural support. Contemporary wrecks provide parallels, but unique elements distinguish this ship from those typically studied. Extremely thick timbers, a relatively flat bottom and bow and stern ramps argue that the Pantano Longarini ship was designed to carry bulk loads. Although the ship was originally reported as an extremely advanced ship, the present analysis points to a different type of watercraft: a coastal barge. Correctly identifying the Pantano Longarini ship allows us to gather

information about the needs of its builders, as well as extends our knowledge of shipping and ship construction in the seventh century.

To my parents, Ted and Marie Kampbell.

Thank you for always supporting me...

...even when you don't understand what it is that I'm doing.

ACKNOWLEDGEMENTS

I wish to acknowledge the many people who have aided in the production of this thesis, from discussing ideas and offering critiques to providing documentation long thought lost.

Gerhard Kapitän has given considerable time and effort in not only answering questions and offering advice, but also in providing photographs of, and documents about, the excavation. He provided valuable insight into some of the lingering questions. Without his help the history of this shipwreck would still be clouded in the shrouds of time. He has not only been willing to share, but has been actively involved in tracking down lost material.

Johan Reinhard and Laina Swiny, both members of the excavation team, have been kind enough to share images and memories. Much lost data has been recovered due to their efforts. I am truly indebted to David Baker for so graciously providing me with his unpublished research. The information he has shared sheds light into the darkness of seventh century Sicily.

Lorenzo Guzzardi, the Soprintendenza of Siracusa, was kind enough to offer his hospitality during my stay in Sicily and provided answers to many questions.

Lilia Campana and Dante Bartoli were invaluable in not only translating, but also assisting my understanding of Italian culture. They have done everything possible to aid this work.

I am indebted to Justin Leidwanger who has provided advice, support, theories, critiques and more articles than I could possibly read; to Sam Koepnick for his hours of

answering “How do I...?” software questions; to Matthew “Johnson” Labbe for taking time away from his own thesis to illustrate mine; to Leanne Gordon who spent many hours reviewing the manuscript, she improved not only the written presentation, but also provided valuable advice and suggestions for the content. All mistakes in this manuscript are entirely my own.

Special thanks are due to Filipe Castro, who not only encouraged this project, but also took an active role in supporting me. With his help and constant encouragement I have learned how to draw boats instead of bananas, to think critically about my own and others work, and to debate everything from the Pantano Longarini wreck to politics to movies, all with a smile.

All uncredited photographs are the work of the author.

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CHAPTER I

INTRODUCTION

In 1965, Peter Throckmorton and Gerhard Kapitän completed the terrestrial excavation of a seventh century C.E. shipwreck in the Pantano Longarini marsh. This marsh, located in southeastern Sicily, lends its name to the vessel. Many questions surround this shipwreck, perhaps the most important regarding the type of vessel and what that may indicate about the local contemporary economy. In the forty years that have passed since the publication of two preliminary reports about the Pantano Longarini shipwreck, additional wrecks of that period have been located and studied around the Mediterranean.¹ Although shipwrecks from the second half of the first millennium C.E. remain rare, there is now a significantly larger body of evidence pertaining to Mediterranean shipwrecks from this period and a more thorough publication of that information. Yassiada A, a seventh century wreck off the southwest coast of Turkey, was the first complete excavation carried out underwater and provides arguably some of the best construction technique comparisons. This wreck and the Pantano Longarini shipwreck were excavated virtually simultaneously, although the Yassiada A final report was not published until 1982.² This thesis intends to be a revision of what we know about the Pantano Longarini shipwreck in view of the influx of additional data from the previous four decades.

This thesis follows the style and format of the *American Journal of Archaeology*.

¹ Seventh century wrecks excavated and published in the Mediterranean: Bass and van Doorninck 1982, The Yassiada Seventh Century Wreck; Kahanov 2003a, The Dor D Wreck; Kahanov, Royal, and Hall 2004, The Ainse St. Gervais Wreck; Rieth 2000, The Port Berteau II Wreck.

² Bass and van Doorninck 1982, title page.

Scholars often turn to the Pantano Longarini shipwreck for *comparanda*. As a result it is incorporated in many publications including *A History of Seafaring* (1971)³ and *Sixth-Century AD Shipwreck Off the Carmel Coast, Israel* (2002).⁴ Many websites discussing this ship can be found with a cursory internet search, including links to the lecture notes of the Marine Archaeology Department at the University of Southampton.⁵ Appendix A contains a list of materials that reference the Pantano Longarini shipwreck, although it is by no means complete. The obvious interest in this shipwreck justifies a re-study and the publication of a new reconstruction to be available to scholars.

This is especially important as little is currently known about seventh century Sicilian history, with few articles on maritime connections published. The Pantano Longarini ship was built during the flashpoint of cultural exchange between the emerging Arab caliphate and the remnants of the Roman Empire. An accurate understanding of this ship size, construction and function is made even more important as the lacuna of evidence surrounding Sicily in this period has created a virtual black hole. In the European tradition the majority of scholarly studies on the early Byzantine period focus on the East, while those exploring the changes in the West focus on mainland Europe. This has virtually erased Sicily's history from the main theater of events, and the importance and impact of this island are generally reduced to mere footnotes.

Being large and complex artifacts, shipwrecks provide significant information about the societies that created them, and often they yield smaller artifacts related to the daily use of those who built and operated them. Several shipwrecks have been identified

³ Bass and van Doorninck 1971, 70-72, 144, 146, 157-8.

⁴ Kingsley 2002, 20.

⁵ <http://cma.soton.ac.uk/HistShip/shlect47.htm> Sept. 16 2005.

in the waters off of southeastern Sicily including the roughly contemporary sixth century C.E. Marzamemi “Church” Wreck,⁶ the early third century C.E. Cape Ognina Wreck,⁷ the Plemmirio B wreck also dated to the third century C.E.,⁸ and the late second century C.E. Terrauza Wreck.⁹ These shipwreck sites yielded only cargo material. As a result they provide information about aspects of continued traffic and trade in the region; with little or no surviving timber, they do not demonstrate construction solutions or enlighten the history of ship technology.

The Pantano Longarini wreck, on the other hand, lacked cargo and personal remains, but it can directly inform us of technological aspects of its hull construction. While this circumstance may appear to diminish the vessel’s importance in the archaeological record, this is not the case. For a society dependent on waterborne trade, ships are the apogee of technological achievement. The hull is an artifact that reflects cultural and technological methods of ship construction, and often incorporates the most advanced technology of the time. Scholars often repeat that ships were the most complex and advanced objects created by man before the industrial revolution.¹⁰ It is important to restate this point to ensure that hull remains and the social history of these vessels receive the scholarly attention that they deserve.

In fact, the construction method of this shipwreck aids researchers in understanding how people solved some of the problems encountered during this turbulent time. Shipwrights had to contend with piracy, geography, environmental conditions and

⁶ Kapitän 1969, 122, 125.

⁷ Kapitän 1974, 150.

⁸ Gibbins 1989, 1, 3.

⁹ Parker and Squire 1974, 27-8.

¹⁰ Muckelroy 1980, 24.

the weather patterns of Sicily, all while working within the constraints of the vessel's purpose and the owner's economic resources. Fashion and personal choices must not be excluded when we try to reconstruct a ship's conception and construction.

The nature of the environment where the Pantano Longarini hull remains were found suggests that it is probably a different type of watercraft than scholars typically study, which provides insight into an alternate aspect of the economy. It demonstrates local needs and adaptive behaviors as well as broader technological methods utilized in the seventh century Mediterranean.

The Pantano Longarini wreck is a clear example of the use of the transitional construction techniques of its time, showing early stages of a shift from shell to skeleton construction, which is the shift of the primary reliance for structural support from the hull planks to an internal framework. It is not known where this theoretical change took place, where it began, or when it was extended throughout the Mediterranean world. The Pantano Longarini shipwreck exhibits similarities with contemporary excavated wrecks but also significant differences. It presents an interesting and uncommon structural solution, even though it was designed for a far different purpose than other vessels studied from the same period.

The Pantano Longarini ship was originally reported as a seagoing merchantman bearing the only surviving example of an advanced type of construction based on the unusual assembly of timbers at the stern.¹¹ Current evidence, based on the more advanced ship reconstruction techniques available today, points to a different type of watercraft: a coastal barge.

¹¹ Throckmorton and Throckmorton 1973, 262-3.

Misidentified in the preliminary reports, the Pantano Longarini wreck often introduces error into discussions of shipbuilding technology and trade in the seventh century. Correct identification as a coastal barge is essential to determine its possible cargo, as well as to understand the economic context in which it was built and operated.

All shipwrecks require reevaluation as time and progress warrant. The correct identification of the Pantano Longarini as a coastal barge allows us to gather information about its builders and their needs as well as extends our knowledge of shipping and ship construction. Needless to say, in the period and region under study, this shipwreck provides indirect evidence for the local Sicilian economy during the seventh century.

CHAPTER II

HISTORICAL BACKGROUND

In the sixth through the eighth centuries C.E. the Byzantine Empire faced constant danger. Constantinople, the Eastern provinces and the North African provinces were initially in danger from the Persian Empire, followed by the emerging Arab caliphate (fig. 2.1). At the same time, the Avars and Visigoths were attacking the Northern Mediterranean provinces. This period has been described as a time of “profound military and political troubles and economic decline”¹² across the Mediterranean. Despite this turmoil, Sicily was not directly affected for much of the period under study.

TERMINOLOGY AND SOURCES

Debate over the proper terminology for the period from 330 to 1453 C.E., which is the shift of the capital to Constantinople until the fall of the Byzantine Empire, continues today. The focus of this study is the sixth through the eighth centuries, consequently discussion will be limited to this period. “Roman Period” can be applied because the Roman Empire relocated its capital but did not disband. Indeed, the eastern citizens remained linked with the western provinces because of their shared “Roman” identity.¹³ Mark Whittow suggests that the period from 300 to 600 C.E. is “Late

¹² Laiou 2002a, 691.

¹³ Haldon 1990, 60; see also Whittow 1996, 299.



Fig. 2.1 Extent of the Byzantine Empire and the surrounding kingdoms under Justinian, 565 C.E. (after Stearns 2001).

Roman” and after the mid-seventh century terms it “Byzantine.”¹⁴ Georgije Ostrogorsky, whose *History of the Byzantine State*, is considered a classic,¹⁵ suggests that the Roman Empire ended in 610 C.E. with the fall of Emperor Phocas.¹⁶ He believes that Hellenization truly began when Heraclius made the official language Greek,¹⁷ marking the change from the Latin Roman Empire to the Greek Byzantine Empire. Peter Brown limits the “Late Antique Period” to approximately 200 to 700 C.E. based on differences between it and “Classic” Rome.¹⁸ In addition, he states that the limits of late antiquity are marked by significant social, economic and religious changes driving into the Byzantine (Eastern Mediterranean) and Medieval (Western Mediterranean) periods.¹⁹ Late Roman, late antique, early Byzantine and early medieval are all designations used by historians; there is no consensus. Because no single term is accepted, and Sicily does not cleanly fit any definition, for this study the sixth through the eighth centuries C.E. are called “late antiquity.” This term was chosen because it describes a period of swift cultural change in the Mediterranean. Sicily did not have the same culture as the Byzantine East, nor had it absorbed other conquering cultures; rather, Sicily is unique in having not yet established a strong cultural identity. In the seventh century C.E., life in Sicily was not drastically altered, but the people surrounding Sicily had already experienced many changes.

¹⁴ Whittow 1996, 96-97.

¹⁵ Hussey 1957, Translator’s Note.

¹⁶ Ostrogorsky 1957, 78.

¹⁷ Ostrogorsky 1957, 95.

¹⁸ Brown 1971, 7.

¹⁹ Brown 1971, 7.

There are greater challenges than simply dealing with an ill-defined period.

Although the late antique Empire was a literate society, few records survive, creating a large documentation gap.²⁰ As Whittow succinctly states, “Byzantium is an obscure and ill-recorded world,”²¹ with the seventh century even called the “dark age of Byzantium.”²² The study of the social and political history of late antiquity is necessarily limited by the lack of historical documents.²³ Much of the evidence that does survive has a clear bias, as demonstrated in the religious genre of the Saints Lives.

Notwithstanding, there are sources available for study, provided biases are accounted for. The *Chronikon Paschale* thoroughly documents the events leading up to 628 C.E.²⁴ There is a large gap between the end of this document and others which record the end of the seventh century, albeit written centuries later: Nikephoros’ *Historia Syntomos* and Theophanes’ *Chronographi*.²⁵ Other documents of varying age and genre are also available,²⁶ but they are neither histories nor complete. Because of the overall lack of documentary evidence, scholars must turn to the fields of archaeology, numismatics, art history,²⁷ sphragistics²⁸ and ceramics to truly understand late antiquity. Only a limited number of excavations focus on the Byzantine Empire, severely limiting the supporting evidence from archaeology. Most archaeological information was

²⁰ Whittow 1996, 1; see also Haldon 1990, xvii.

²¹ Whittow 1996, 1.

²² Ostrogorsky 1957, 79.

²³ Whittow 1996, 3.

²⁴ Whittow 1996, 7; see also Haldon 1990, xvii.

²⁵ Whittow 1996, 7.

²⁶ Haldon 1990, xix-xxi.

²⁷ Whittow 1996, 1.

²⁸ Ostrogorsky 1957, 16.

obtained through the efforts of archaeologists attempting to reach the Classical periods below the Byzantine layers in the archaeological record.²⁹ Nevertheless, archaeology, together with the other traditional historical sources, must be accounted for to arrive at appropriate conclusions on the factors affecting the construction and use of the Pantano Longarini ship. Therefore, a brief survey of late antiquity is required.

EASTERN EMPIRE

Constantinople and Persia fought several wars in the sixth century, from 502-505, 527-532, 540-562 and 572-590 C.E.³⁰ Despite these nearly continuous efforts, neither side achieved significant gains.³¹ The Byzantine Emperor Justinian (r. 527-565) is renowned for restoring many of the lost western territories, including North Africa and Sicily, as well as being responsible for major legal reforms.³² He was also responsible for the erection of many buildings, including Hagia Sophia in Constantinople.³³ Justin II succeeded him, scaling back Byzantine support for many of the newly conquered territories due to financial difficulties.³⁴ Tiberius Constantine, ruling from 574 to 582 C.E., is said to have drained the treasury with fiscal irresponsibility, including decreasing taxes.³⁵ Maurice succeeded him and reigned for the next 20 years, during which he reorganized the political and administrative structure of the Empire, placing Sicily and Ravenna under an administrator (Exarch) with both military and political

²⁹ Whittow 1996, 14.

³⁰ Whittow 1996, 41.

³¹ Whittow 1996, 41.

³² Evans 2005, xiv, 65.

³³ Evans 2005, 59-60.

³⁴ Sarris 2002, 51.

³⁵ Norwich 1997, 86.

power.³⁶ Maurice was eventually removed from power partly due to his alleged frugality, which included supplying reduced military rations, refusing to ransom prisoners, and wintering his armies in enemy territory.³⁷ Maurice and his family were murdered and the military leader Phocas seized power.³⁸ Distrust of Maurice's supporters drove him to remove the best military commanders, enabling a Persian invasion of Byzantine territory.³⁹ By 608 C.E., the Persians were in close proximity to Constantinople.⁴⁰

The location of the invading Persians was not the most threatening problem for the Imperial capital. There were food shortages due to blocked grain shipments from a 608 C.E. African revolt led by the future emperor Heraclius and the capture of Egypt in 609 C.E. by his cousin Nicetas.⁴¹ Extremely harsh winters were reported to have frozen the seas,⁴² further complicating Constantinople's predicament. The result of this successful revolt was that in 610 C.E. Emperor Heraclius inherited a country that was at its economic, military and political breaking points. The previous wars had exhausted the empire, draining both human and territorial resources.⁴³ During the revolt led by Heraclius, the Persians continued to advance across the Eastern Mediterranean and by

³⁶ Norwich 1997, 87.

³⁷ Norwich 1997, 87.

³⁸ Norwich 1997, 88.

³⁹ Norwich 1997, 89.

⁴⁰ Norwich 1997, 89-90.

⁴¹ Norwich 1997, 89-90; see also Stratos 1968, 78.

⁴² Theophanes 1982, *Annus Mundi* 6101.

⁴³ Ostrogorsky 1957, 83.

614 C.E. they had conquered Egypt, terminating cereal shipments to Constantinople and again causing famine.⁴⁴

It was not until 622 C.E., that Heraclius began a vigorous military campaign against the Persians, largely funded by the Orthodox Church,⁴⁵ although his army's departure was delayed until 624 C.E. due to Avar advances in the north of the empire.⁴⁶ In June of 626 C.E., the Avars and Persians launched a joint attack on Constantinople that failed,⁴⁷ in large part because the Byzantine navy prevented the Persian armies from crossing the Bosphoros.⁴⁸ Only one year later, the Persians surrendered.⁴⁹

Following Heraclius's death in 641 C.E.,⁵⁰ there was a minor power struggle. After the early death of Constantine in the same year, his son Constans II became emperor.⁵¹ It was Constans II who shifted emphasis from the eastern provinces back to the West.

WESTERN EMPIRE

The Eastern Empire was not the only territory battling foreign people throughout late antiquity. Justinian led a series of wars to recapture territory lost to the Vandals and Ostrogoths and in 533 C.E. Africa rejoined the Empire.⁵² He quickly captured Sicily in

⁴⁴ Norwich 1997, 90.

⁴⁵ Norwich 1997, 91.

⁴⁶ Whittow 1996, 78.

⁴⁷ Norwich 1997, 92-93.

⁴⁸ Whittow 1996, 125.

⁴⁹ Norwich 1997, 94.

⁵⁰ Norwich 1997, 97.

⁵¹ Norwich 1997, 98.

⁵² Whittow 1996, 38.

535 C.E. and began reconquering mainland Italy, which was only completely captured from the Ostrogoths in 561 C.E.⁵³ Soon after, in 568 C.E., the Lombards moved south from Austria and began settling in Italy.⁵⁴ Nevertheless, by 600 C.E., the majority of mainland Italy was still in Byzantine hands, including the Po Valley, southern Italy all the way north to Ravenna and Rome, as well as Sicily, North Africa, Corsica, Sardinia and Cartagena.⁵⁵ Unlike the rest of the Byzantine provinces, Sicily had nearly 100 years of peace from 535 C.E.⁵⁶

Although some battles are well-documented, the western provinces, like those in the East, have few recorded details from early seventh century life.⁵⁷ What is known is limited to the mainland. For example, a 615 C.E. revolt in Ravenna was joined by Southern Italian cities but was quickly put down in 616 C.E.⁵⁸ In the early 620s, Italy reportedly suffered from bouts of the plague and severe earthquakes.⁵⁹ Despite mainland changes affecting neighboring Sicily, there is little mention of the island in major works of the period.

It was not until 662 C.E., that Sicily reappeared on the world stage. Fearing the loss of the western provinces, Constans II left Constantinople and made Syracuse his home from 663-668 C.E.⁶⁰ He chose Sicily for its strategic position between Italy, under

⁵³ Whittow 1996, 38.

⁵⁴ Norwich 1997, 85, see also Whittow 1996, 38.

⁵⁵ Norwich 1997, 85, see also Whittow 1996, 38.

⁵⁶ Finley, Mack Smith, and Duggan 1986, 48.

⁵⁷ Stratos 1968, 338.

⁵⁸ Stratos 1968, 121.

⁵⁹ Stratos 1968, 122.

⁶⁰ Norwich 1997, 100.

attack by the Lombards, and North Africa, under attack by the Arabs.⁶¹ After the death of Constans II, the court moved back to Constantinople where his son resided,⁶² Sicily returned to its territorial status, and the West returned to obscurity.

ARAB ADVANCE

After the Persian surrender to Byzantium, while both empires were still severely weakened, the region gained yet another foe. Both empires had previously organized the Arab territories, largely under Christian rule at that time, into kingdoms; a strategy that helped protect their borders.⁶³ After the war, Byzantium and Persia loosened their hold on the Arabs, who quickly turned to a new religion: Islam. The Arab wars began after only a few years of peace.⁶⁴ In 633 C.E. the Muslims began attacking both the Persian and Byzantine Empires, by 639 C.E. they had conquered Damascus, Jerusalem and Syria.⁶⁵ Within a decade Egypt and Armenia fell, within two decades the Persian Empire collapsed, and by the 660s the Arabs were in control of Afghanistan and the Punjab.⁶⁶ In 674 C.E., Constantinople was under siege, as it would be for the next five years, and is said to have been saved only by the use of “Greek fire.”⁶⁷ In 711 C.E., the Muslims occupied the entire coast of North Africa and started the invasion of Spain, crossing the Pyrenees into France in 732 C.E.⁶⁸ For much of the seventh century,

⁶¹ Ostrogorsky 1957, 110.

⁶² Ostrogorsky 1957, 110.

⁶³ Stratos 1968, 313.

⁶⁴ Whittow 1996, 82.

⁶⁵ Norwich 1997, 94-95.

⁶⁶ Norwich 1997, 94-95.

⁶⁷ Norwich 1997, 101.

⁶⁸ Norwich 1997, 95.

Byzantine emperors were concerned with the survival of the capital, and the western provinces were largely ignored.

It is difficult to understand why the Byzantine East fell so quickly to the advancing Arab armies. Whittow suggests that it is because the Arabs, already noted as excellent warriors, had a large Arab presence in the Eastern states. Consequently, part of the advance of Islam was less of an invasion and more of a revolution.⁶⁹ However, these points do not explain the rapid Arab expansion westward. Whatever the factors leading to the swift movement, the seventh century was a time of political upheaval and military expenditure across the majority of the Mediterranean world.

Sicily was not immune to the Arab advances. There is some debate among historians over a raid of Sicily in 652 C.E. This date has been suggested as the first Arab attack,⁷⁰ while Andreas Stratos contends that no invasion occurred.⁷¹ Denis Mack Smith compromises between these two positions advocating that an Arab force landed for only a short time in that year.⁷² Regardless, most historians agree that the Arabs attacked Sicily in the late seventh century, and continued to do so until 859 when more than half of the island was conquered.⁷³

ECONOMY

Archaeological evidence provides much of the data for an economic study of this

⁶⁹ Whittow 1996, 87.

⁷⁰ Barker 1966, 248.

⁷¹ Stratos 1976, 73.

⁷² Mack Smith 1968, 3.

⁷³ Stratos 1976, 64, see also Whittow 1996, 305.

period. Copper coins were widely used; moreover, they were often devalued and an extensive search was not required for every lost coin.⁷⁴ Largely because of this, copper coins are found in many sites and are a useful and practical way to judge the strength of the economy.⁷⁵ The disappearance of copper coins from the western provinces, but their continued presence in archaeological excavations at the eastern provinces indicates a recession in the early seventh century in the former, but not in the latter.⁷⁶

Pottery studies also illustrate the state of the economy by revealing the amount, quality and extent of trade. It is possible to identify many pottery fragments and produce a narrow timeline. During the early seventh century, one of the principal finewares in the Mediterranean was African Red Slip ware, although Red Slip pottery was also produced on Cyprus, Egypt, and Asia Minor.⁷⁷ African Red Slip ware is found throughout the Byzantine Empire attesting to its significance.⁷⁸ The extent of its use suggests that trade networks were extensive, with sufficient demand for continued production.⁷⁹ African Red Slip pottery was traded from Africa to the Aegean “by way of Crete,”⁸⁰ presupposing that the trade route had already crossed the Mediterranean at Sicily. Trade moved from the East to the West as well. Palestinian wine and amphoras continued to be exported up to the middle of the seventh century and are found in Carthage, Naples and Marseille.⁸¹ Cross-Mediterranean trade continued in late antiquity.

⁷⁴ Whittow 1996, 60.

⁷⁵ Whittow 1996, 60.

⁷⁶ Whittow 1996, 60.

⁷⁷ Whittow 1996, 61.

⁷⁸ Morrison and Sodini 2002, 210.

⁷⁹ Whittow 1996, 61.

⁸⁰ Morrison and Sodini 2002, 210.

⁸¹ Kingsley 2003, 88.

Although trade continued, the tumultuous times necessarily altered the extent of trade and local prosperity. Persian advances had rendered useless much arable land in the East and the Lombards did the same in Italy, severely damaging the Byzantine economy.⁸² By the second half of the seventh century, the richest provinces of the Eastern Empire remained prosperous, yet under Arab control.⁸³ This prosperity did not extend beyond Arab territories, however. Copper coins virtually disappear in Imperial territories.⁸⁴ When Heraclius took power he found an empty treasury and a changing economic base.⁸⁵ In 615 C.E., he minted new silver currency at half of its previous worth.⁸⁶ In 618 C.E., Heraclius permanently ended the *dole*, previously known as the *annona*, when Persian advances ended the import of Egyptian grain.⁸⁷ While the changing financial situation indicates a severe recession, it does not signify a complete economic collapse as the state continued to collect taxes and pay salaries with gold.⁸⁸ Perhaps as much as 95% of the state's income came from land taxes and assessments.⁸⁹ Agriculture remained the basis of the financial system indicating that there was not an economic revolution.⁹⁰

Pottery studies support this picture of economic decline. Red Slip wares and Late Roman amphora types disappear from the archaeological record.⁹¹ This implies

⁸² Stratos 1968, 99-100.

⁸³ Whittow 1996, 89.

⁸⁴ Whittow 1996, 90.

⁸⁵ Stratos 1968, 99.

⁸⁶ Stratos 1968, 100.

⁸⁷ Stratos 1968, 100-101.

⁸⁸ Whittow 1996, 91, 94.

⁸⁹ Haldon 1990, 26.

⁹⁰ Cameron 1993, 87.

⁹¹ Whittow 1996, 90-91.

that production centers were either significantly diminished or had ceased production. Recycled amphoras have been found on several shipwrecks in the Eastern Mediterranean;⁹² this reuse suggests either that production was not sufficient to keep up with demand, or more likely, that recycling saved money and labor. Income suffered an estimated loss of 75% from the sixth to the seventh century.⁹³ The economy was in sharp decline due to pressure from territory losses, military spending, population shifts and many other factors.

One of the economic pressures at this time resulted from the Black Plague, which struck the Mediterranean in the sixth century.⁹⁴ The disease started in Egypt and spread quickly killing 5,000 to 10,000 people per day in Constantinople according to contemporary sources.⁹⁵ Not yet fully understood, this epidemic returned regularly until the eighth century.⁹⁶ Most scholars believe that this devastated the Mediterranean economy as it traveled along trade and communication routes, greatly affecting coastal areas.⁹⁷ The plague distressed cities as well, possibly wiping out as much as 40% of the population of Constantinople. It also affected rural areas where the remaining workers demanded wages double or even triple their previous pay⁹⁸ as there was now more demand for labor than people to work the fields. Due to war and recurring plague outbreaks, it has been suggested that the population of Rome dropped to 25,000 or

⁹² van Doorninck 2002, 901; see also Kingsley 2003, 88.

⁹³ Haldon 1990, 10.

⁹⁴ Whittow 1996, 66.

⁹⁵ Procopius 1914, II.xxii.6, II.xxiii.1.

⁹⁶ Whittow 1996, 66.

⁹⁷ Laiou 2002c, 49; see also Morrison and Sodini 2002, 193-4.

⁹⁸ Laiou 2002c, 49-50.

30,000 in the seventh century.⁹⁹ Trade necessarily decreased with the loss of so many people, but it did not stop.

Despite the ominous picture indicated by the economic recession, epidemics and population decline, Sicily seems to have emerged from this period relatively unscathed. Sicilians continued to export wheat in the sixth and seventh centuries to Constantinople and other areas suggesting that it was an important agricultural producer.¹⁰⁰ In the early seventh century, the prefect of Illyricum even sought provisions from Sicily.¹⁰¹ Archaeological excavations dating to this century in Sicily have yielded abundant gold and copper coins.¹⁰² The text “Life of Pankratios of Taormina,” records Sicilian imports of carpets, olive oil, incense and wine in the eighth century, although this may be a memory of an earlier period.¹⁰³ Sicily appears to have continued functioning without major economic upheaval.

DISCUSSION

While Byzantium faced constant danger during the seventh century, Sicily remained relatively secure and safe. Constantinople, the Eastern provinces and the North African provinces were in danger from the Persian armies, followed by the Arab armies. During this time the Avars and Visigoths repeatedly attacked the provinces along the northern borders of the Mediterranean. Although this region experienced

⁹⁹ Morrison and Sodini 2002, 172.

¹⁰⁰ Morrison and Sodini 2002, 196, 209.

¹⁰¹ Morrison and Sodini 2002, 210.

¹⁰² Grierson 1982, 130.

¹⁰³ Laiou 2002b, 708.

severe military, political, economic and social difficulties, it was not until the second half of the seventh century that Sicily was directly affected by raiding armies.

Sicily was strategically important due to its location between North Africa and Europe, just three km from Italy across the Straits of Messina and a mere 160 km crossing to Africa,¹⁰⁴ as compared to 1,300 km to distant Constantinople.¹⁰⁵ Due to its geographic location, Sicily was more strongly influenced by the Italian mainland, although it was ruled by the Byzantine Empire for much of this period.

While Byzantium experienced a recession, the local Sicilian economy suffered little during this period. Sicily continued to export its products, such as grain, which supports the theory that there was continuity of trade around the Mediterranean, although the amount was likely much reduced due to population decline. Sicily's distance from Constantinople allowed it to develop strong local customs, although it remained tied to the fortunes of the Byzantine Empire. In the seventh century, many refugees from the Levant fled west, settling in Sicily and Italy.¹⁰⁶ By the second half of the same century, the Sicilian church was following Eastern, not Roman, protocols.¹⁰⁷ Local populations chose cultural, religious and political systems from those practiced in neighboring cultures, as well as those used in Constantinople, forging new customs in the process.

In many ways it is unfortunate that Sicily was often neglected by its rulers in Constantinople; however, this may well have allowed a century of peace and relative

¹⁰⁴ Finley, Mack Smith, and Duggan 1986, 1.

¹⁰⁵ McCormick 1998, 17, note 1.

¹⁰⁶ McCormick 1998, 31-2.

¹⁰⁷ Finley, Mack Smith, and Duggan 1986, 47.

economic stability. With the focus of the Byzantine Empire on the East, Sicily was not greatly interfered with. In addition, because it is literally in the middle of the Mediterranean, it did not suffer from invasions as North Africa and the South European provinces did.

CHAPTER III

HISTORY OF THE SHIPWRECK

A reevaluation of the Pantano Longarini shipwreck requires more than simply reconstructing the vessel. To gather the information needed, research into the shipwreck, and the current location and condition of supporting documentation is essential. A review of the site as well as of the formation processes reveals data previously thought lost.

DISCOVERY

In the winter of 1963-1964, workers digging an irrigation trench on land owned by Francesco Spatola discovered a shipwreck in a now silted-in ancient anchorage located on the western side of Cape Passaro (fig. 3.1). Initially, the workers believed that the wood was unimportant and perhaps even the remains of an Allied landing craft from World War II,¹⁰⁸ but they quickly realized the vessel was ancient. Fearing an investigation would interfere with construction, the find was not reported.¹⁰⁹ Some of the workers brought samples to the local shipyard at Marzamemi hoping to sell the large and well preserved timbers. Once there, Kapitän and Andrea Patania, a naval architect, recognized their age¹¹⁰ and set about finding the location of this ancient shipwreck.¹¹¹

¹⁰⁸ G. Kapitän, ms, The Pantano Longarini Wreck Story, Gerhard Kapitän papers, Siracusa, 1.

¹⁰⁹ G. Kapitän, ms, The Pantano Longarini Wreck Story, Gerhard Kapitän papers, Siracusa, 1.

¹¹⁰ Throckmorton and Kapitän 1968, 185.

¹¹¹ G. Kapitän, ms, The Pantano Longarini Wreck Story, Gerhard Kapitän papers, Siracusa, 1.

At the outset, the workmen refused to reveal the site, but it was eventually found. With some effort Kapitän and Patania were able to convince Spatola to report the find to the Department of Antiquities in Syracuse.¹¹²

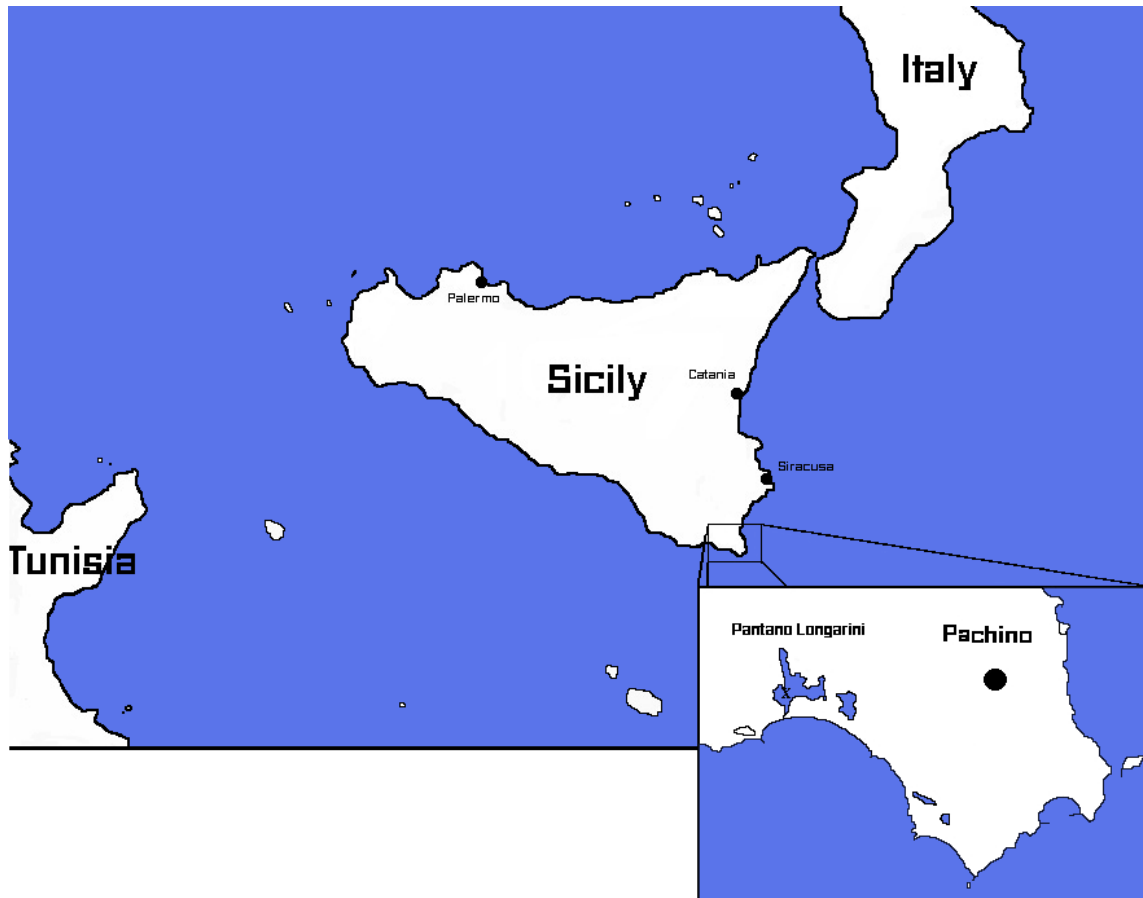


Fig. 3.1. Sicily in relation to Italy and Africa. Inset: Location of Pantano Longarini west of Cape Passaro with the approximate location of the wrecksite (after Terrametrics 2006).

PRELIMINARY SURVEY

In February of 1964, Kapitän dived in the ditch to determine the extent of the

¹¹² Throckmorton and Kapitän 1968, 183, 185, also G. Kapitän, ms, The Pantano Longarini Wreck Story, Gerhard Kapitän papers, Siracusa, 1.

wreck.¹¹³ Due to low visibility in the muddy water, he oriented himself along the planks by touch.¹¹⁴ Realizing that the ship reached beyond the already open trench, Kapitän, with a team of German divers, drew and photographed beams, planking and other timbers uncovered by a small land excavation on August 6.¹¹⁵ This work was completed under the supervision of Luigi Bernabò Brea, who allowed Kapitän and Heinz Wilms-Posen, then the director of the Marzamemi Church Wreck, to collect several wood samples.¹¹⁶ Upon completion of the survey, Kapitän realized he could not raise the funds for a complete excavation and recommended the site to Peter Throckmorton.¹¹⁷

THROCKMORTON EXCAVATION

Throckmorton and Kapitän returned to excavate the remaining timbers the following year, supported by an emergency grant from the University of Pennsylvania Museum. The dredger dislocated and destroyed what was later identified as the forward, starboard side of the ship.¹¹⁸ Damage continued as workers and villagers burned approximately two thirds of the vessel; only 9.1 m of the stern from an estimated original 30 m survived.¹¹⁹

Throckmorton and Kapitän built a dam and excavated the ship more efficiently on land. Although the excavators had no terrestrial experience, they applied their

¹¹³ Throckmorton and Kapitän 1968, 185.

¹¹⁴ Throckmorton and Kapitän 1968, 185.

¹¹⁵ G. Kapitän, ms, The Pantano Longarini Wreck Story, Gerhard Kapitän papers, Siracusa, 1-2.

¹¹⁶ Throckmorton and Kapitän 1968, 185.

¹¹⁷ G. Kapitän, ms, The Pantano Longarini Wreck Story, Gerhard Kapitän papers, Siracusa, 2.

¹¹⁸ Throckmorton and Throckmorton 1973, 255.

¹¹⁹ Throckmorton and Throckmorton 1973, 244, 260, 265.

underwater knowledge and skills.¹²⁰ They began by uncovering the wreck while maintaining the wet conditions vital for wood preservation (fig. 3.2).¹²¹ The team attached a waterproof tag to each timber using a nonlinear naming pattern to avoid suggesting sequential connections where none existed.¹²² Timber locations were trilaterated with water levels, drawn at a 1:1 scale including nail holes and tools marks, and photographed.¹²³ Despite the good fortune of having the dam, the work was frustrated by a limited schedule, inclement weather and minimal funds.¹²⁴ These adverse conditions prevented the team from recording all timbers, the assumption being that unrecorded and recorded elements were similar.¹²⁵ When the excavation ended, a horse-drawn crane and wagon removed the remains which were subsequently stored in a tank used in Spatola's freshwater irrigation system (fig. 3.3).¹²⁶ Throckmorton planned to use the irrigation tank temporarily,¹²⁷ until he procured conservation funds, which proved more difficult than expected.

¹²⁰ J. Throckmorton, letter to Froelich Rainey, 10 November 1965, University of Pennsylvania Museum Archives, Philadelphia, 1.

¹²¹ Throckmorton and Kapitän 1968, 185.

¹²² Throckmorton and Throckmorton 1973, 246-8.

¹²³ Throckmorton and Throckmorton 1973, 248-9.

¹²⁴ Throckmorton and Kapitän 1968, 185; see also Throckmorton and Throckmorton 1973, 248-9.

¹²⁵ Throckmorton and Throckmorton 1973, 251.

¹²⁶ Throckmorton and Kapitän 1968, 186; see also Throckmorton and Throckmorton 1973, 265-6.

¹²⁷ P. Throckmorton, letter to David Baker, 4 December 1966, INA Archives, 2.



Fig. 3.2 A worker watering the wreck with a bucket (courtesy INA Archives).



Fig. 3.3 A horse-drawn crane and wagon moving timbers from the site to Francesco Spatola's irrigation tank (courtesy INA Archives).

In 1966, J. Throckmorton¹²⁸ noted the possibility of inhibiting growth on the timbers by adding chemicals to the water, and that Fleurasil BS or Basilit NT may damage plants, requiring Spatola to build another tank.¹²⁹ It does not appear that either happened. Spatola's active use of the irrigation system caused water to run across the wood¹³⁰ for at least part of the year, instead of soaking in stagnate water, which benefited the timbers. As they were probably stacked in the tank unsupported,¹³¹ they most likely settled level with their resting surface, flattening any surviving original curvature (fig. 3.4).



Fig. 3.4 Workers moving a timber into the irrigation tank (courtesy INA Archives).

¹²⁸ Joan, wife of Peter Throckmorton, was second author of a preliminary report. Unless noted as J. Throckmorton, the use of “Throckmorton” refers to Peter.

¹²⁹ J. Throckmorton, letter to David Baker, 9 June 1966, INA Archives, 1.

¹³⁰ J. Throckmorton, letter to David Baker, 9 June 1966, INA Archives, 1.

¹³¹ L. Swiny, letter to author, 9 March 2007, INA Archives.

2001 DOCUMENTATION

During the summer of 2001, Filippo La Fauci studied some of the Pantano Longarini ship timbers. He photographed and documented them before their removal from the irrigation tank for conservation. His findings have not yet been published.

CURRENT STATUS

The timbers recovered by Throckmorton and Kapitän in 1965 and stored in Spatola's irrigation tank from the Pantano Longarini ship are currently undergoing conservation in Polyethylene Glycol under contract with a team from Noto, Sicily.¹³² Although the author has not viewed the timbers, they are probably in poor condition because they have been exposed to oxygen and sunlight which are the necessary ingredients for decay and warpage. In addition, they lay in a tank for over forty years, possibly unsupported, in unknown conditions. Although most pieces appeared to be in fairly good shape in 1965, as shown in figures 3.2, 3.3 and 3.4, it is unlikely that this is still the case. The majority of the timbers were immediately moved to the irrigation tank; however, some were not. In a 1965 letter to Kapitän, Throckmorton suggests taking additional samples from "the log which is covered with canvas in Spatolas [sic] yard."¹³³ The timbers that are now in conservation have been moved at least three times: from the site, for La Fauci's work and to the conservation facilities where they are now. The likelihood of damage increases with each move as weak timbers may break, the

¹³² Personal communication Lorenzo Guzzardi, May 17, 2006.

¹³³ P. Throckmorton, letter to Gerhard Kapitän, 1 March 1966, INA Archives, 1.

surface may flake off when touched, and temperature and humidity changes increase degradation.

SURVIVING MATERIAL

With the passage of so many years, reports and samples from various agencies that performed testing and analysis are now lost. Much of the original field material has also been misplaced, thus what remains needs to be thoroughly examined as to its reliability and current state of preservation. The Institute of Nautical Archaeology (INA) archive has some drawings, an incomplete model and a limited number of photographs donated by Throckmorton. Unfortunately, not all of the excavation notes, scantling lists, site plans and timber drawings were donated to INA's archives. This has led to several problems. For instance, brief descriptions of strange cuts have been published,¹³⁴ but no further information was provided and no documentation remains.

Illustrations

The INA Archives house some original illustrations, including site plans, reconstructions, section constructions, line drawings and early versions of published drawings. Unfortunately, many of these pages are yellowing, becoming brittle and shrinking. As of 2004, the scale in one of the drawings has shrunk approximately 1.75%, although it is unknown if it is the same at the center as at the extremities where the scale is located.¹³⁵ All of the material has now been digitized for preservation.

¹³⁴ Throckmorton and Throckmorton 1973, 249.

¹³⁵ The original scale was 1:25 (4 cm = 1 m), the 2004 scale shows 1:25.64 (3.93 cm = 1 m). All drawings have shrunk at the same rate.

Many illustrations are undated and/or unnamed, causing confusion in identifying final drafts. While studying this material it became clear that not all hull elements are represented on all illustrations. Some planks appear and disappear depending on the draft or intent of the drawing and often are drawn with different sizes (fig. 3.5). Without excavation reports or field notes, the author will analyze only the timbers present in published illustrations. Although the archived drawings have aged, they are still useful to determine timber sizes with a recalculated scale.

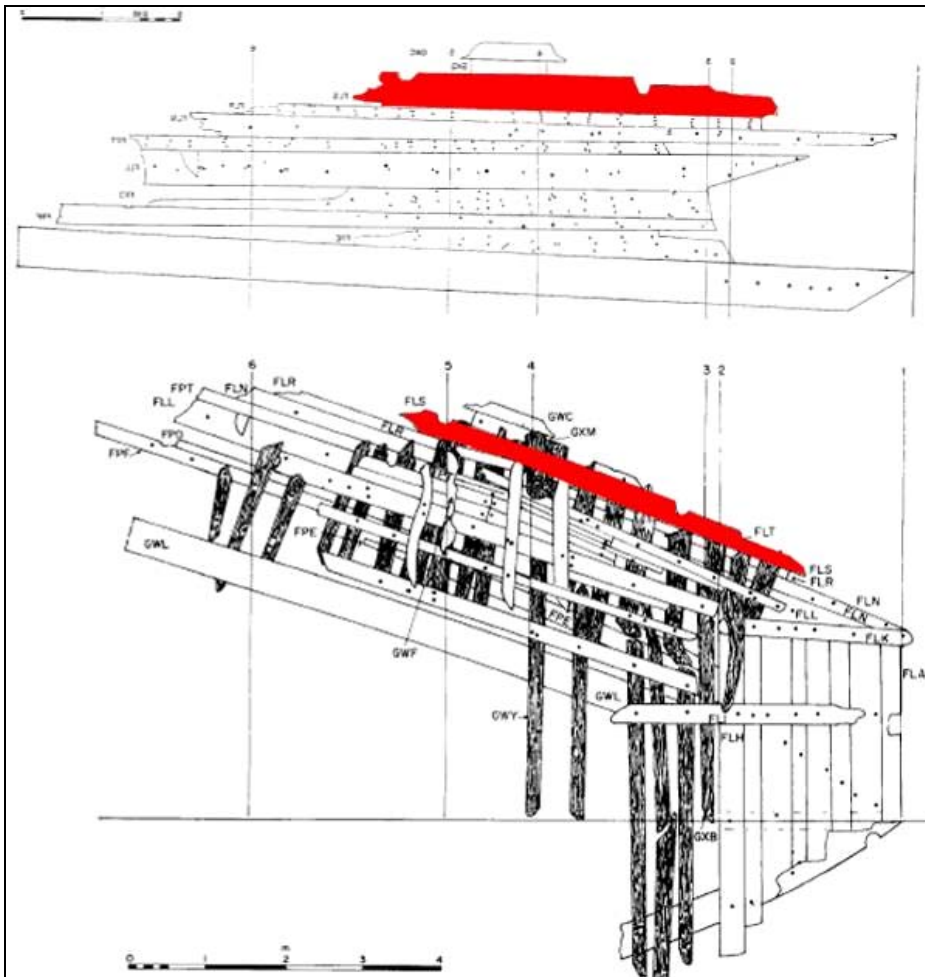


Fig. 3.5 Wale FLS (red) demonstrates differences in size, length and shape as drawn on the planking and site plan (after Throckmorton and Throckmorton 1973, fig. 4 (above), fig. 9 (below)).

Photographs and Contact Sheets

Throckmorton also donated black and white photographs, color slides and contact sheets. The slides have been scanned and are now comparable to photographs. These materials provide additional information about the excavation and timber storage.

1:10 Scale Model

Throckmorton built a 1:10 scale model in an effort to determine the ship lines and aid his reconstruction by verifying that the fastening holes lined up, thus maintaining the original ship curves.¹³⁶ While this model was helpful for determining the stern shape, its current poor condition reduces its usefulness today.

Originally constructed in Greece, the model was later shipped to the United States of America onboard the *Elissa*.¹³⁷ Once in the United States, the model was retained by the Texas Historical Foundation before being transferred to the Texas Seaport Museum in 1991.¹³⁸ At some point after 2000, it was donated to INA.¹³⁹ The model has suffered; several pieces are missing and others have broken off, including two pieces for which the original locations are unknown. In addition, the paper template glued to the wood is peeling, obscuring and destroying the original surface labels. As the illustrations do not clearly depict every timber, some identifications are now lost.

The original decisions made in creating the model are no longer known. Some timbers do not match the scale drawings or the photographs and it is unclear why.

¹³⁶ Throckmorton and Throckmorton 1973, 252, 257.

¹³⁷ Personal communicat Kurt Voss, 14 March 2007.

¹³⁸ Personal communicat Kurt Voss, 14 March 2007.

¹³⁹ Personal communicat Kurt Voss, 14 March 2007.

These changes may have been made for several reasons. Perhaps Throckmorton was preoccupied with determining hull curvature and alignment, reducing the importance of accurate measurements for timber dimensions. In recreating the lines and the model, it was not necessary to include all of the timbers. Specifically mentioned as missing are two large stringers and several light stringers.¹⁴⁰ Comparison of all available sources reveals that ceiling planks, riders, and through-beams are not represented either. It is therefore challenging to determine correct timber dimensions.

Simply stated, the model, photographs and illustrations do not agree. In the published photograph of the model, wale FLS continues beyond the “transom,” a piece that has since broken off (fig. 3.6). The illustrations and photographs reveal FLS broken off before the end of the transom (fig. 3.5). Although the port side did not survive, illustrations depict identical port and starboard sides. The model, however, was reconstructed with two slightly different sides. The origin of this discrepancy is unknown. Were there additional surviving fragments not discussed in the articles? Was this necessary for the structural integrity of the model? Were these alternative solutions?

There are many challenges in utilizing this scale model. At this time it is difficult to determine if the curves remain accurate. Additionally, not all timbers are represented and there are notable differences between sources. Nevertheless, used in combination with the illustrations and photographs the model does supply otherwise inaccessible information.

¹⁴⁰Throckmorton and Throckmorton 1973, 252.

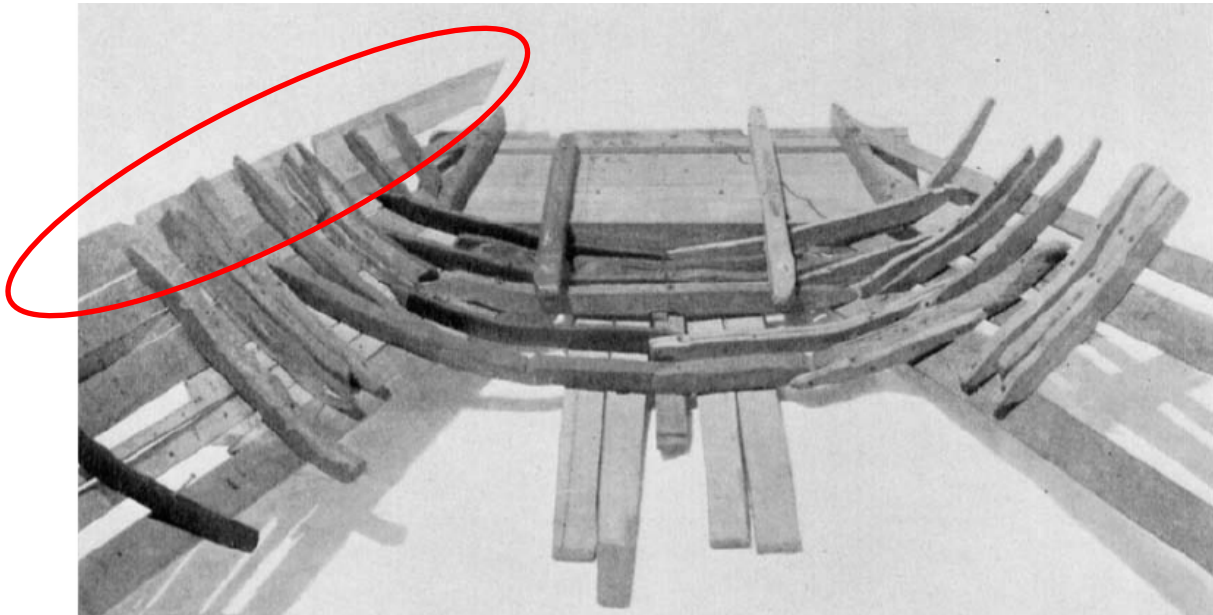


Fig. 3.6 The model showing wale FLS extending beyond the transom (after Throckmorton and Throckmorton 1973, fig.10).

ADDITIONAL RESOURCES

Additional information has been recovered. The Pantano Longarini excavation was underwritten by the University of Pennsylvania Museum and they retain two reports in their archives. The first is a summary by Throckmorton of the excavation and covers the period from 25 September to 25 October, 1965.¹⁴¹ The second letter, from J. Throckmorton, explains the state of the timbers and also mentions a lack of artifacts.¹⁴² It also notes that iron concretions were removed from the wreck and that there were future plans to cast them in Bodrum, Turkey,¹⁴³ although these did not come

¹⁴¹ P. Throckmorton, letter to Froelich Rainey, 1965, University of Pennsylvania Museum Archives, Philadelphia, 5-6.

¹⁴² J. Throckmorton, letter to Froelich Rainey, 10 November 1965, University of Pennsylvania Museum Archives, Philadelphia, 1.

¹⁴³ J. Throckmorton, letter to Froelich Rainey, 10 November 1965, University of Pennsylvania Museum Archives, Philadelphia, 1-2.

to fruition.¹⁴⁴

David Baker, an amateur archaeologist stationed with the United States Navy on Sicily in the mid 1960s, has provided valuable information about the wreck and the immediate vicinity. This includes letters, an unpublished manuscript, maps and figures. It also provides a glimpse into the post-excavation plans and problems.

Laina Swiny and Johan Reinhard, who participated in the excavation, have been kind enough to answer questions, relate stories and search personal archives for materials. This has unearthed additional images that depict otherwise unknown construction elements.

The U.S. Department of Agriculture Forest Products Laboratory identified wood samples sent by Throckmorton in 1965. While current employees were unable to locate the original samples or reports, the notes of the analyst, B.F. Kukachka, have been found.

Finally, Kapitän has kindly provided copies of original photographs taken by Wilms-Posen in 1964 and by Throckmorton in 1965. He has also allowed the author access to correspondence and personal notes about the shipwreck.

LOCATION

The location of the shipwreck has often been described as an ancient anchorage, whose name is unclear. Throckmorton and Kapitän first published the Pantano

¹⁴⁴ Personal communication, Dr. Cemal Pulak, 3 July 2006.

Longarini as “Edissa-Porto Ulysses.”¹⁴⁵ The Throckmortons identified the area as the possible location of the Greek harbor Odissea; which was known to the Romans as Port Ulysses and to modern Sicilians as Marza.¹⁴⁶ As reported, Kapitän originally believed this wreck indicated the position of Port Ulysses, a location which Cicero mentions as a safe-haven for pirates.¹⁴⁷ He now suggests that the Pantano Marza, farther west, is the correct location.¹⁴⁸ This is slightly different from the Throckmortons’ suggestion, as they incorrectly suggested the Pantano Longarini is also called Marza. The ruins of a town were reported in the area in the 10th century.¹⁴⁹ In addition, a pedestrian survey of the Pantano Longarini revealed no evidence for harbor facilities; however, dense overgrowth obscured the ground and the surrounding region is covered in tomato fields and cannot be surveyed (fig. 3.7).

Ancient sources mention ports along the Sicilian coast by name. It is very difficult to determine the location of each or to associate an ancient with a modern location. Pliny places *portus Ulixis* between the three rocks of the Cyclops and Catania¹⁵⁰ where there is a modern harbor with the name Porto Ulisse.¹⁵¹ A reef east of the Pantano Longarini and a shallow, open coastline west of Marza also share this name. Multiple sites along the Sicilian coast are now called Port Ulysses, complicating the identification of one location, if any, is the ancient port.

¹⁴⁵ Throckmorton and Kapitän 1968, 183.

¹⁴⁶ Throckmorton and Throckmorton 1973, 243.

¹⁴⁷ Cic, *Verr.* II.v.34.

¹⁴⁸ G. Kapitän, ms, The Pantano Longarini Wreck Story, INA Archives, Siracusa, Sicily, 2.

¹⁴⁹ Personal communication, Gerhard Kapitän, 23 May 2006.

¹⁵⁰ Pliny *HN*, III.viii.89.

¹⁵¹ Castagnino 1994, 49.



Fig. 3.7 View along the Pantano Longarini revealing dense overgrowth of the land and the still, open waters.

Regardless of whether the Pantano Longarini is Port Ulysses or another ancient anchorage, the location was excellent for coastal traffic to await favorable winds before sailing around Cape Passaro. This is especially true as different winds affect sailing conditions in different seasons. Summer winds are typically North/Northeast,¹⁵² blowing directly against ships attempting to round the cape west to east, but favoring those traveling east to west (fig. 3.8). The winter winds, widely known as the *sirocco* or *scirocco*, are dry and hot.¹⁵³ Originating in Eastern Algeria they cross Sicily and Italy,¹⁵⁴

¹⁵² Branigan and Jarrett 1969, 36.

¹⁵³ Branigan and Jarrett 1969, 38.

¹⁵⁴ Branigan and Jarrett 1969, 38.

creating the opposite problem as the summer winds: aiding those sailing west to east, but impeding the travel of those sailing east to west (fig. 3.9).

It is clear that many ships did not safely make the passage around the cape, as Piero Gargallo and Kapitän discovered a significant number of artifacts on the seabed offshore, including an unpublished marble wreck.¹⁵⁵ Many captains may have waited in the Pantano Longarini for summer winds to shift before safely sailing east.

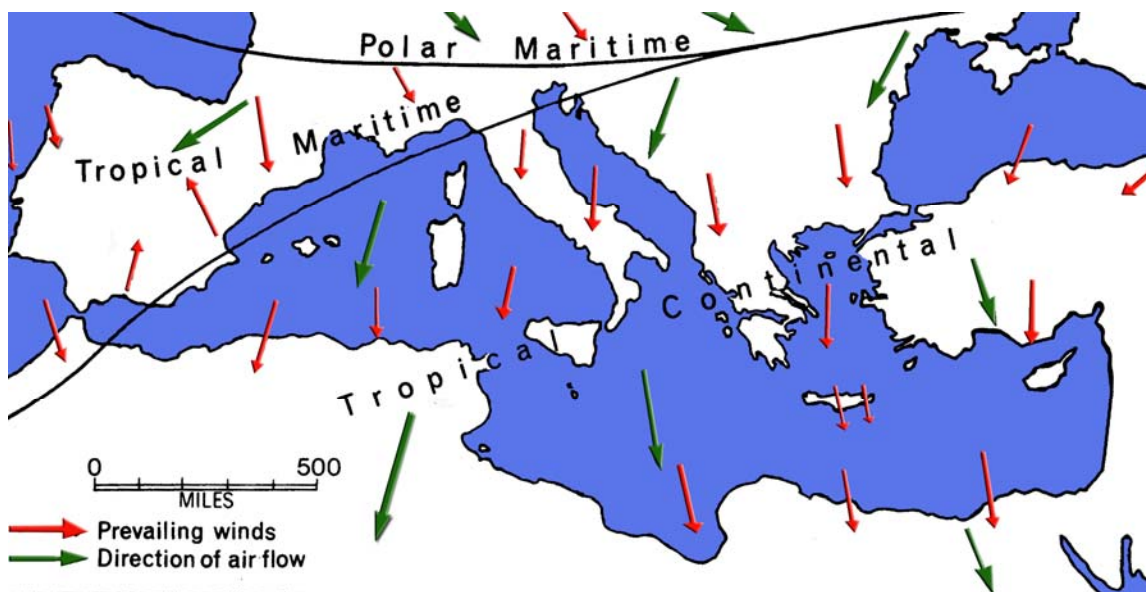


Fig. 3.8 Summer winds and airflow direction in the Mediterranean (after Branigan and Jarrett 1969).

¹⁵⁵ David Baker, ms, Preliminary Studies at Port Ulysses, INA Archives, 3.

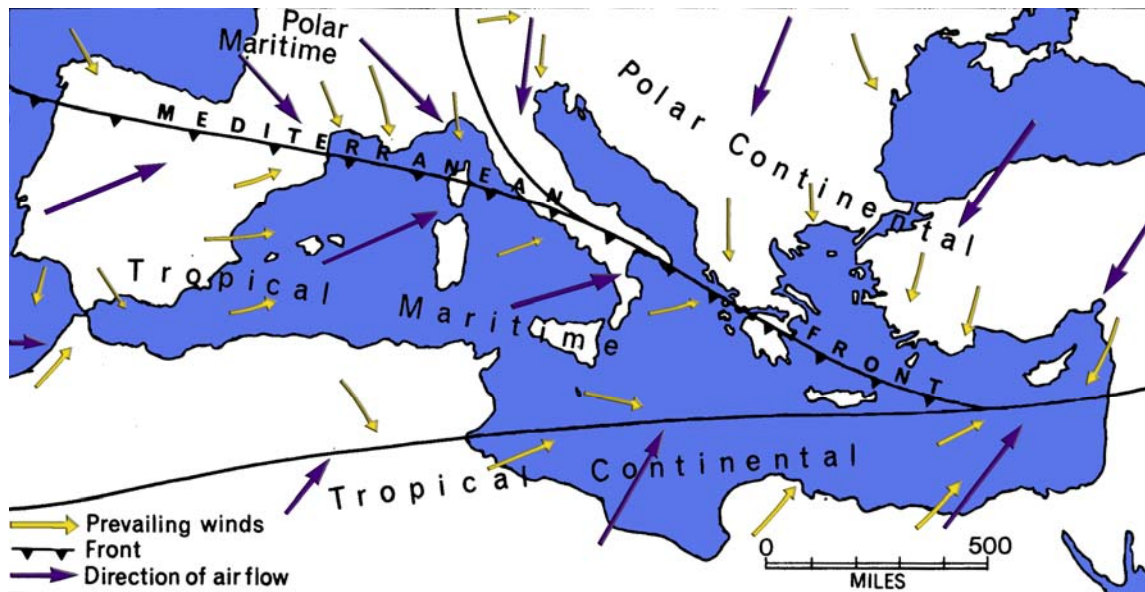


Fig. 3.9 Winter winds and airflow direction in the Mediterranean (after Branigan and Jarrett 1969).

SITE FORMATION PROCESSES

A now dried up river once flowed through the Pantano Longarini, originating in the interior of the island.¹⁵⁶ Where the marsh drained into the Mediterranean, the ancient anchorage was positioned,¹⁵⁷ although its exact shape is unknown. Through processes of alluviation and deposition common in this region,¹⁵⁸ the anchorage silted in, and even now the sea has been pushed back far from the excavation site.

Much of the deposition in this area is caused by the mountains and hills of Sicily. Their height creates relief precipitation in an often dry landscape. This rain collects in numerous, rapid-flow streams which erode the mountains providing the material released in slower moving waters.¹⁵⁹

¹⁵⁶ David Baker, ms, Preliminary Studies at Port Uysses, INA Archives, 3.

¹⁵⁷ David Baker, ms, Preliminary Studies at Port Uysses, INA Archives, 3.

¹⁵⁸ Judson 1963, 899.

¹⁵⁹ Basile 1941, 109-110.

This process is clear at the Pantano Longarini. Kapitän described the shipwreck as embedded in an archaeological level that corresponded to sea sand, over which was a layer of yellow sand transported by winds from dry dunes (fig. 3.10).¹⁶⁰ The rate of deposition was quite fast as the wreck was located under approximately 3 m of sand¹⁶¹ which had built up over almost 1,300 years. The walls of the excavation display distinct stratigraphy demonstrating that the ship came to rest in a marine environment, and was quickly and completely covered. At some point, this marine environment experienced a significant change, as there is a dark horizon in the marine silt in figure 3.10, although this appears to be a single event. As there are no descriptions of the stratigraphy, it is not clear what comprised this incident. Shortly thereafter, the area was covered by fine, dry sand. It was supposed by Throckmorton and Kapitän that the ship broke up further out to sea, and this section of the ship washed into shallower waters, where ancients salvaged some of the remains.¹⁶² Minor damage to the bottom planking¹⁶³ and the highly preserved timbers supports the published theory that the ship wrecked during a storm.

DISCUSSION

Although many of the original field notes, reports and plans are now lost, it is still possible to learn a significant amount about the excavation and the ship from the remaining materials. By piecing together the history of the location, the probable cause

¹⁶⁰ G. Kapitän, ms, *The Pantano Longarini Wreck Story*, Gerhard Kapitän papers, Siracusa, Sicily, 2.

¹⁶¹ *Interessante scoperta a Pachino* 1964, 5.

¹⁶² Throckmorton and Kapitän 1968, 186.

¹⁶³ Throckmorton and Kapitän 1968, 186.

of the wreck and the site formation processes, it is easy to understand how so massive a vessel survived in such good condition. While access to the original materials would be helpful for a reconstruction, it is possible to make a reconstruction based upon the information that has already been gathered.



Fig. 3.10 On the left, yellow dune sand is layered above grey, marine silt (courtesy INA Archives).

CHAPTER IV

DATE AND ORIGIN

When a shipwreck is found one of the first things determined is its date. When was it built? used? sunk? By looking at evidence immediately available, including the strata in which it lays, its artifacts and the ship itself, archaeologists suggest a preliminary date. It is now routine to take samples for radiocarbon or dendrochronological dating as well. While the excavation is on-going, and during the research that typically follows, investigators attempt to establish the vessel's origin and route. The home port is usually identified by personal items, such as galley wares, while the route and possible destination are determined by the cargo and the sinking location. Because the excavation of the Pantano Longarini shipwreck was an emergency situation, the dig and the post-excavation research were limited. The very early date of the Pantano Longarini excavation in the then infant field of nautical archaeology also affected the excavators' research questions and the tools available to determine the ship's date and origin. Also, the total lack of cargo severely limited the evidence to suggest and support conclusions.

DATING

The Pantano Longarini wreck has been widely accepted as an early seventh century vessel. It was originally radiocarbon dated to C.E. 500 ± 150 (uncalibrated)¹⁶⁴

¹⁶⁴Throckmorton and Kapitän 1968, 185.

by H. Schwabedissen for Wilms-Posen in the 1960s.¹⁶⁵ Experts identified sherds found under frames as late Roman or early Byzantine combed-ware amphoras similar to those found on Yassiada A.¹⁶⁶ The excavators claimed that the similarity of the construction method to the latter vessel was the most convincing dating evidence.¹⁶⁷ Therefore, Throckmorton and Kapitän chose a date in the early seventh century, towards the end of the established 14C range.

Construction Methods

Dating shipwrecks by their construction is now known to be extremely unreliable due to the non-linear transition in methods across the Mediterranean from the fourth through eleventh centuries C.E. While certain features found on the Pantano Longarini ship do match the Yassiada A ship construction, other features match earlier and later shipwrecks, making it difficult to understand which elements are important for dating purposes. J. Richard Steffy notes that ships may never give as reliable a date as pottery and coins due to the complexity and variation in ships.¹⁶⁸ Furthermore, the chronology of the mortise-and-tenon joint transition is not sufficiently understood to firmly date a shipwreck. We do know the transition away from these joints had already begun with the less frequent and looser joints evident in the fourth century Yassiada wreck,¹⁶⁹ and this pattern continued into the 11th century.

¹⁶⁵ Personal communication, Gerhard Kapitän, 23 May 2006.

¹⁶⁶ Throckmorton and Throckmorton 1973, 262.

¹⁶⁷ Throckmorton and Throckmorton 1973, 262.

¹⁶⁸ Steffy 2001, 552.

¹⁶⁹ van Doorninck 1976, 122; see also Bass and van Doorninck 1971, 31.

Comparing elements other than the construction technique is just as unreliable. The Yassiada A and Pantano Longarini ships do share certain transitional elements such as split half logs for internal stringers and wales¹⁷⁰ in addition to mortise-and-tenon joints used to the first waterline wale.¹⁷¹ Earlier hulls, such as that found at Cefalù off the northern coast of Sicily, and dating to the fifth or sixth century C.E., had roughly finished frames¹⁷² like those on the Pantano Longarini ship.¹⁷³ Although it was not fully excavated, the Anse Saint Gervais B wreck, dated to the early seventh century, on the other hand, has shown evidence that suggests a more advanced transitional form, with caulking between the hull planks and few mortise-and-tenon joints, save at the extremities.¹⁷⁴ If construction features are to be used for dating, these points must also be considered. The variation in construction method and timber choice demonstrates the complexity of the dating issue.

The non-linear nature of the development of ship construction techniques cannot be emphasized enough. Several authors have attempted to date shipwrecks via construction methods. This includes Giulia Boetto, who disregarded a second century radiocarbon date in favor of a fourth to fifth century date based on the mortise-and-tenon joints used to construct Fiumicino 1.¹⁷⁵ The diversity of solutions presented by the archaeological record, however, makes it difficult to defend a linear evolution of shipbuilding methods in the Mediterranean. The author believes that of the two dating

¹⁷⁰ Throckmorton and Throckmorton 1973, Fig. 13-15; see also van Doorninck 1982, 60-1.

¹⁷¹ Throckmorton and Throckmorton 1973, 263; see also van Doorninck 1982, 55.

¹⁷² Parker 1992, no. 292.

¹⁷³ Throckmorton and Throckmorton 1973, 244.

¹⁷⁴ Jezegou 1989, 139-40.

¹⁷⁵ Boetto 2000, 99-100.

methods presented, radiocarbon dating remains far more accurate. Overlapping and lingering techniques obscure the picture when dating ships by construction features alone as shipwrights adopted new techniques and adapted old ones at various rates across the Mediterranean, making it difficult or impossible to date a vessel by its construction.

Pottery

Throckmorton and Kapitän thought that sherds found under frames, now lost, were in situ finds.¹⁷⁶ The analysis of the ceramic materials by experts assigned a broad date to the ship; unfortunately, the experts involved in this study were not identified, and as a result no further information is available. The preliminary reports state only that the sherds are from combed-ware amphoras and, although discolored by iron corrosion, they are similar to the globular amphoras found on the seventh century wreck at Yassıada.¹⁷⁷ No additional description, photographs or drawings could be found. Globular, combed ware amphoras were distributed across the Mediterranean in contexts ranging from the fourth to the late seventh centuries C.E.,¹⁷⁸ although plain globular amphoras are known as early as the first century C.E.¹⁷⁹ Amphoras similar to the sherds found on the Pantano Longarini shipwreck were produced across the Mediterranean,¹⁸⁰ including the Aegean, Black Sea Region¹⁸¹ and North Syria.¹⁸² Without access to the original sherds, it is not

¹⁷⁶Throckmorton and Throckmorton 1973, 262.

¹⁷⁷Throckmorton and Throckmorton 1973, 262.

¹⁷⁸Arthur 1998, 168-169.

¹⁷⁹Peacock and Williams 1986, 136.

¹⁸⁰Morrison and Sodini 2002, 212.

¹⁸¹Peacock and Williams 1986, 182.

¹⁸²Peacock and Williams 1986, 185-186.

possible to limit the date or origin of the vessel based upon the surviving descriptions.

Radiocarbon Dating

The 14C date should be revisited in hopes of establishing a more refined and accurate chronology. In 1970, Barbara Lawn of the University of Pennsylvania Museum tested wood samples provided by Throckmorton. This yielded a date of C.E. 622 \pm 48,¹⁸³ making the Pantano Longarini wreck roughly contemporary with Yassiada A, Anse St. Gervais II, Dor D and a few other seventh century shipwrecks across the Mediterranean. Although the results by Lawn and Schwabedissen were probably taken from different timbers, the most recent result provides a more precise window around the timber cut-date. This establishes a tighter social and historical context for the wreck allowing a better understanding of the vessel's function. The new 14C date points to a relatively peaceful and prosperous time in Sicily.

ORIGIN

Determining the origin of the Pantano Longarini vessel is complicated by the lack of personal possessions that usually identify a home port. Furthermore, the absence of cargo raises difficulties in learning the vessel's destination and route. The excavators assumed that the vessel came from the Aegean or Eastern Mediterranean based on Greek letters on the naming device.¹⁸⁴ Supporting this assumption, the cypress, oak and *Pistachio sp.* woods utilized in the hull, are widely available today in any of these areas.

¹⁸³ Lawn 1970, 585.

¹⁸⁴ Throckmorton and Throckmorton 1973, 263.

Naming Device

Salvatore Garifolo, a worker digging the irrigation system, spoke with Throckmorton about the discovery. He described an item burned by workers as “a plaque with Greek letters and a horse’s head above the letters, about 1.20 m long.”¹⁸⁵ He went on to say that the plaque was “metallic and banana coloured” which Throckmorton suggests may have been gilt.¹⁸⁶ Kapitän retains in his archives information that suggests this description was not accurate. He records that the naming device was simply four Greek letters either carved into a plain wooden plaque or directly onto a throughbeam.¹⁸⁷ For a full discussion of this naming device and ship naming see Appendix B.

The Greek letters suggested to the excavators that the ship *must* have originated in Greece. However, this is not automatically true as the Greeks colonized and Hellenized eastern Sicily from the second half of the eighth century B.C.E. onwards.¹⁸⁸ Greek remained the dominant language in Sicily through Roman times.¹⁸⁹ Local languages and cultures continued to thrive throughout the Roman Empire alongside the use of Latin for military and official documents.¹⁹⁰ Greek inscriptions in fifth century Syracusan Christian catacombs outnumber Latin by a ratio of 10:1.¹⁹¹ Sicilians were speaking Greek when the nameplate was created; therefore it is not *required* to look outside of the island for the origin of the vessel.

¹⁸⁵ Throckmorton and Throckmorton 1973, 260.

¹⁸⁶ Throckmorton and Throckmorton 1973, 260.

¹⁸⁷ G. Kapitän, ms, The Pantano Longarini Wreck Story, Gerhard Kapitän papers, Siracusa, Sicily, 2.

¹⁸⁸ Finley, Mack Smith, and Duggan 1986, 6.

¹⁸⁹ Finley, Mack Smith, and Duggan 1986, 36, 47.

¹⁹⁰ Boatwright, Gargoal, and Talbert 2006, 216-7.

¹⁹¹ White 1936, 2.

Wood Analysis

In December of 1965, Throckmorton submitted 11 wood samples to the US Department of Agriculture Forest Products Laboratory in Madison, WI.¹⁹² Kukachka determined that the frames were cut from oak trees, the tenons were *Pistachia sp.*, and the planking, wales and stringers from cypress (table 4.1).¹⁹³ Kukachka also recorded pine samples,¹⁹⁴ which were later determined to originate in the Torre Sgaratta wreck.¹⁹⁵ He noted that cypress and oak were commonly used timbers for shipbuilding, but also that the *Pistachia sp.* was “most unexpected.”¹⁹⁶ To the author’s knowledge, this is the only use of pistachio in ship construction. It is no longer known what ship elements several of these labels represent, as the remaining documentation does not illustrate and/or label them.

Table 4.1. Wood species identified in the hull (After B.F. Kukachka letter to Peter Throckmorton, 8 December 1965).

Hull Element	Wood Species
Hull Planking 2	<i>Cupressus sempervirens</i>
In. Sheating 2	<i>Cupressus sempervirens</i>
GXO 2	<i>Cupressus sempervirens</i>
GXM 2	<i>Cupressus sempervirens</i>
GWL 2	<i>Cupressus sempervirens</i>
FLA	<i>Cupressus sempervirens</i>
GWF 2	White Oak Type (typified by <i>Quercus robur</i> or <i>Quercus petraea</i>)
GXU 2	White Oak Type (typified by <i>Quercus robur</i> or <i>Quercus petraea</i>)
GUY 2	Live Oak type (typified by <i>Quercus ilex</i>)
GWE 2	<i>Pistachia sp.</i>

¹⁹² B.F. Kukachka, notes on report 53705, 1965.

¹⁹³ Throckmorton and Kapitän 1968, 187.

¹⁹⁴ B.F. Kukachka, Notes on Report 53705, 1965; see also B.F. Kukachka letter to Peter Throckmorton, 8 December 1965, Gerhard Kapitän papers, Siracusa.

¹⁹⁵ B.F. Kukachka letter to Peter Throckmorton, 8 December 1965, Gerhard Kapitän papers, Siracusa.

¹⁹⁶ B.F. Kukachka letter to Peter Throckmorton, 8 December 1965, Gerhard Kapitän papers, Siracusa.

Recent studies have suggested that several analyses of ship timbers in the 1960s and 1970s returned incorrect identifications, raising the possibility that the identified wood species for the Pantano Longarini shipwreck were not accurate.¹⁹⁷ This is supported by the original report from Kukachka, which specifically notes difficulties in cutting, preparing and identifying the wood.¹⁹⁸ Until better data is available, those published for the Pantano Longarini shipwreck are the only ones available for discussion.

Cypress, oak, and pistachio trees were common in the Mediterranean at the time the Pantano Longarini ship was constructed. Documentation from the sixth century demonstrates that cypress was available in the large sizes and quantities necessary for shipbuilding in Italy¹⁹⁹ and that cypress had spread to Asia Minor, Greece, and Italy by the seventh century.²⁰⁰ Oak is also common throughout much of the Mediterranean. Pliny lists four types of oak in Italy, all of which grew in the Middle East and Greece as well.²⁰¹ Pistachio also seems to have been readily available as it is known in Italy in the first century C.E.²⁰² Charles Daubeny has noted that while the Pistachio nut was not indigenous to Sicily, *Pistachio lentiscus* is, and *Pistachio terebinthus* is indigenous to southern Europe.²⁰³ By the ninth and tenth centuries, the Pistachio nut was “economically relevant” in Sicily.²⁰⁴ Regis Miller of the U.S. Department of Agriculture

¹⁹⁷ Personal Communication, Cemal Pulak, 3 July 2006.

¹⁹⁸ B.F. Kukachka letter to Peter Throckmorton, 8 December 1965, Gerhard Kapitän archives, Siracusa.

¹⁹⁹ Meiggs 1982, 152.

²⁰⁰ Meiggs 1982, 46.

²⁰¹ Meiggs 1982, 45.

²⁰² Fabbri and Valenti 1997, 43.

²⁰³ Daubeny 1865, 77-78.

²⁰⁴ Fabbri and Valenti 1997, 43.

Forest Products Laboratory reviewed Kukachka's analysis, and confirmed that the samples must have originated in the Middle East or Mediterranean,²⁰⁵ but he could not narrow the location any further.

The timber trade, which has substantial evidence, further complicates the issue. There are many instances of this trade, such as the Classical Greeks establishing Sicilian colonies to access its rich forests,²⁰⁶ and the Roman Republic importing timber from the Caucasus.²⁰⁷ There were even merchants at Ostia in the second century C.E. who specialized in shipping timber.²⁰⁸ This trade was more active in the Eastern Mediterranean than in the West,²⁰⁹ yet after the deforestation of the previous centuries,²¹⁰ late antique society would have had great demand for wood for heating the baths, cooking, warming themselves in the winter, let alone construction and metallurgical works.

DISCUSSION

The seventh century date assigned to the vessel is correct. Although the ship was dated by comparing the construction method to that used on Yassıada A, which is now known to be highly unreliable, the more accurate radiocarbon date supports that theory. Cypress and oak were used for shipbuilding in many areas of the Mediterranean,

²⁰⁵ Personal communication, Regis Miller, 1 December 2004.

²⁰⁶ Semple 1919, 25.

²⁰⁷ Vergil *Georgic II.* 440-443

²⁰⁸ Meiggs 1982, 338-9.

²⁰⁹ Semple 1919, 19.

²¹⁰ Semple 1919, 40.

including Sicily, in the early seventh century, and therefore cannot narrow the vessel's origin. Because of the span in both distribution and period of use, the pottery is inconclusive. Analysis of the known data does, however, weaken the excavators' claim that the ship *must* have originated in the Aegean or Eastern Mediterranean. It is much more likely that it was built in Sicily. This region has a long history of shipbuilding, beginning with the maintenance of large fleets for the ancient tyrants.²¹¹ Heavy forests in south central Sicily provided plentiful timber,²¹² and construction probably took place in the local shipyard at Catania just to the north of the Pantano Longarini.²¹³

²¹¹ Semple 1919, 34.

²¹² Finley, Mack Smith, and Duggan 1986, 1.

²¹³ Finley, Mack Smith, and Duggan 1986, 42.

CHAPTER V

CONSTRUCTION METHOD

Upon analysis, the Pantano Longarini ship seems to be a typical shell-built vessel, although it presents a number of features that place its construction in the early stages of the technological shift of the first millennium C.E., which placed increasing reliance on the framing structure for strength, as opposed to the planks. The assembly of this vessel, however, has not been conclusively reconstructed, although several solutions have been proposed. Nevertheless, there is enough evidence of the stern from the illustrations, photographs, and the model built by Throckmorton to reconstruct the ship.

CONSTRUCTION TECHNIQUE

In the late antique Mediterranean, shipwrights transitioned from an ancient method of building, known as shell-first, to a modern method, known as skeleton-first. This not only involved a change in technique, but also in the shipwright's conception of the vessel. While this change is well established by the archaeological record, the timeline in which it occurred is not. Shipwrecks provide much of the evidence of this transformation; yet they do not represent all regions during all periods, nor has the shipyard for each wreck been identified. What is important for this study is not the shift itself, but the ramifications for other aspects of hull construction, including strengthening elements.

In shell-first construction, shipwrights conceived of the shape of the boat as emerging from the planking. The boat was built plank by plank, and only after this was completed were internal framing elements added. The shell not only determined the shape of the vessel, but it was an important component of the ship's strength. Shell-first construction is generally identified by the use of edge-fasteners such as mortise-and-tenon joints, although edge-fasteners are not a requirement for this type of construction. Mortise-and-tenon joints solidly connect the planks giving the hull most of its strength; in fact, the connections are so strong that early vessels did not require a strong and regular framing system.

Archaeologists must, however, consider this shell-first vs. skeleton-first taxonomy carefully. Shell-first can mean that a ship's strength relies mainly on its hull planking or that it was built by assembling the planking first, and reinforcing it with frames later. Moreover, an important role of the frames can be to provide support for the shipwright to bend the planks over, and therefore many intermediary solutions can be found in the archaeological record.

Patrice Pomey adds to this discussion by suggesting that a ship could be conceived of one way, such as shell-first, but in practice built skeleton-first.²¹⁴ He suggests that the construction principle is what is most important, and the building practice or construction sequence (shell-based vs. skeleton-based) is simply a solution to meet that principle.²¹⁵ Therefore, shipwrights may have changed their conception of a

²¹⁴ Pomey 1988, 402.

²¹⁵ Pomey 1994, 128, 130.

boat prior to changing their actual method of construction. This is difficult to prove, as the conception is not necessarily evident in the construction of the boat. Regardless, the construction method and assembly sequence of a vessel can demonstrate a shipwright's solution to the practical problem of constructing a ship, even if the construction principle is not clear.

The Pantano Longarini ship employed loose, unpegged mortise-and-tenon joints below the lower wale, but not above it.²¹⁶ While this suggests that the skin of the vessel was laid prior to at least part of the framing, the shipwright did not rely entirely on the planking or the framing system for support. As Steffy notes, ancient floor timbers and futtocks tended to wander across the planking; they did not maintain a centerline as hull support, not strength, was the main goal.²¹⁷ The Pantano Longarini ship's frames share this irregular pattern. The floors, half-frames and futtocks were neither regularly spaced nor shaped. Steffy observed that at Tantura Lagoon, Israel, one of the ships excavated by Shelley Wachsmann yielded a frame that was hardly worked, still retaining its bark and original round shape.²¹⁸ This same lack of craftsmanship can be found on the Pantano Longarini wreck. One of the timbers appears, at first glance, to be merely dunnage or a misplaced branch; however, upon closer examination it is clearly a floor timber in situ (fig. 5.1). The framing elements along the sides of the hull most clearly demonstrate a wandering pattern and erratic shape (fig. 5.2). Despite this irregularity, the frames were laid extremely closely, suggesting a reliance on the internal framing for

²¹⁶ Throckmorton and Throckmorton 1973, 263.

²¹⁷ Steffy 2001, 556-558.

²¹⁸ Steffy 2001, 558.

support. This is particularly well established in the side planks, which are not edge-fastened above wale GWL, but are instead nailed to the half-frames and futtocks. This shift towards skeleton-first in the construction sequence is accompanied by a shift towards skeleton-based principles, as shown by the bolting of frames to the keel, which provides additional strength.

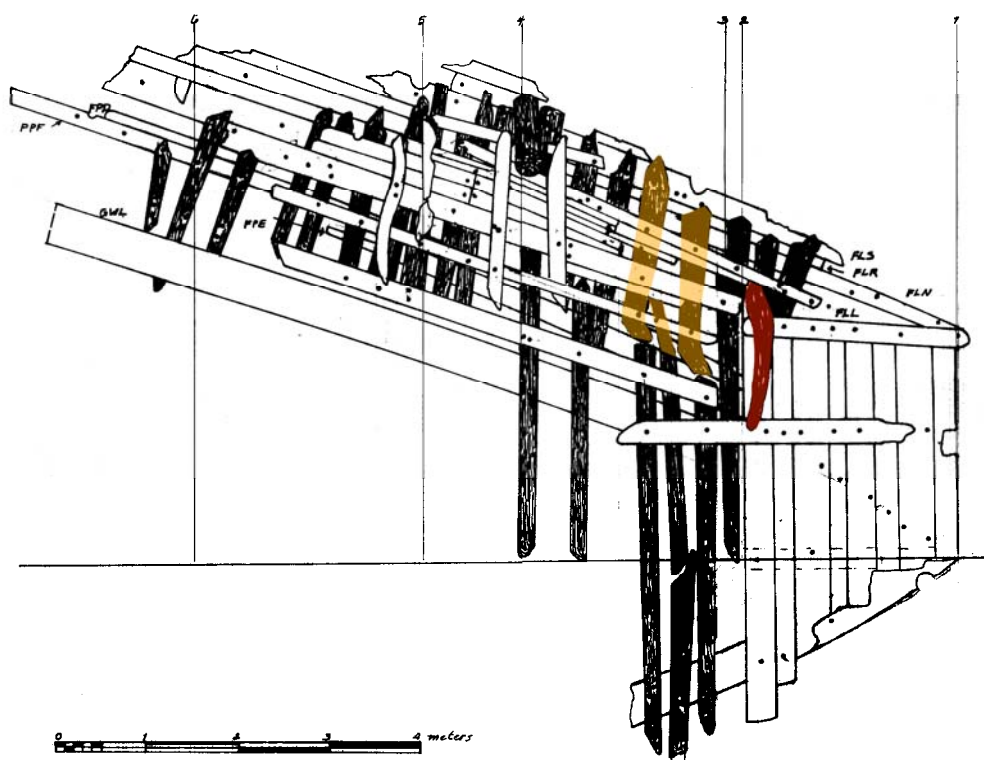


Fig. 5.1 In situ frame with irregular shape (red) and additional irregularly shaped framing elements (orange) (after Throckmorton and Throckmorton 1973, Fig. 4).



Fig. 5.2 Irregularly shaped, closely spaced framing elements (courtesy INA Archives).

Like many other ships across the Mediterranean from the fifth through ninth centuries C.E., the Pantano Longarini ship was built using mixed construction both in principle and construction sequence (table 5.1).²¹⁹ This presumption plays an important role in determining the assembly sequence both in principle and construction as well as the patterns and elements to select for the reconstruction where no evidence survives. These choices vary based on the reliance, or lack thereof, on the framing elements for support.

²¹⁹ The data in the tables in chapters V and VI are from the following citations: Medas 2003; Mor and Kahanov 2006; Kahanov 2000; Barkai and Kahanov 2007; van Doorninck 1982; Kahanov 2003a; Kahanov and Royal 2001; Kingsley 2002, 2003; Throckmorton and Kapitän 1968; Throckmorton and Throckmorton 1973; Jezegou 1989; Kahanov, Royal, and Hall 2004; Rieth 2000, 2003; Harpster 2002.

Table 5.1 Shipwrecks analyzed in chapters V and VI.

SHIP	DATE	COUNTRY	REGION	CONSTRUCTION
Parco di Teodorico	5th	Italy	Western Mediterranean	Shell-based
Dor 2001/1	5th/6th	Israel	Eastern Mediterranean	Skeleton (?) -based
Tantura A	6th	Israel	Eastern Mediterranean	Mixed
Yassiada A (7th Century)	7th	Turkey	Eastern Mediterranean	Mixed
Dor D	7th	Israel	Eastern Mediterranean	Mixed
Pantano Longarini	7th	Sicily	Western Mediterranean	Mixed
Anse St. Gervais (Fos-sur-mer)	7th	France	Western Mediterranean	Unclear
Port Berteau II	7th	France	Atlantic	Skeleton-based
Tantura F	8th	Israel	Eastern Mediterranean	Mixed
Bozburun	9th	Turkey	Eastern Mediterranean	Mixed
Tantura B	9th	Israel	Eastern Mediterranean	Mixed

CONSTRUCTION DETAILS

The shipwright seems to have conceived and built the Pantano Longarini ship with cost and labor reduction in mind. Split half logs were used for wales and stringers instead of squared timbers. Although the round stringers may make it more difficult to load and balance some types of cargo than flat ceiling planks, they were certainly cheaper to obtain. Additionally, many of the ship's frames were only roughly adzed into shape.²²⁰ Moreover, the reduced use and increased size and spacing of mortises certainly lowered the labor costs of this vessel. Only very general information about the mortise-and-tenon joints has survived: they were unpegged and spaced approximately 1 m apart with undersized tenons.²²¹ Throckmorton discusses their similarity to those from the Yassiada A ship, which are slightly closer together (0.90 m) at midships.²²² Although

²²⁰ Throckmorton and Throckmorton 1973, 244.

²²¹ Throckmorton and Throckmorton 1973, 263.

²²² van Doorninck 1982, 55.

building with quality construction, the shipwright employed inexpensive materials and labor saving techniques.

ASSEMBLY ORDER

Three assembly orders have been proposed; the first two address slightly different questions about the nature of the shipwreck, while the third addresses the construction method and vessel type. Throckmorton described the following assembly order for the Pantano Longarini ship, with the names and locations of timbers highlighted in figure 5.3. The keel, stem and stern post were laid first. Then, the bottom planking was attached with mortise-and-tenon joints up to, but not including, the first wale. Next, the shipwright installed the half frames, floors, and futtocks, followed by the lower wale labeled “GWL.” Throckmorton suggests that the next logical step was attaching wale GWC and then the midships planking. Since the “transom” timbers (hereafter referred to as “ramp”) sat directly on GWL, and the strakes above were fitted into rabbets in this ramp, these timbers were added next. Wale FLN was then slotted into frame GXB. Finally, the shipwright installed the remaining timbers as seen in figure 5.3.²²³

²²³ Throckmorton and Throckmorton 1973, 263.

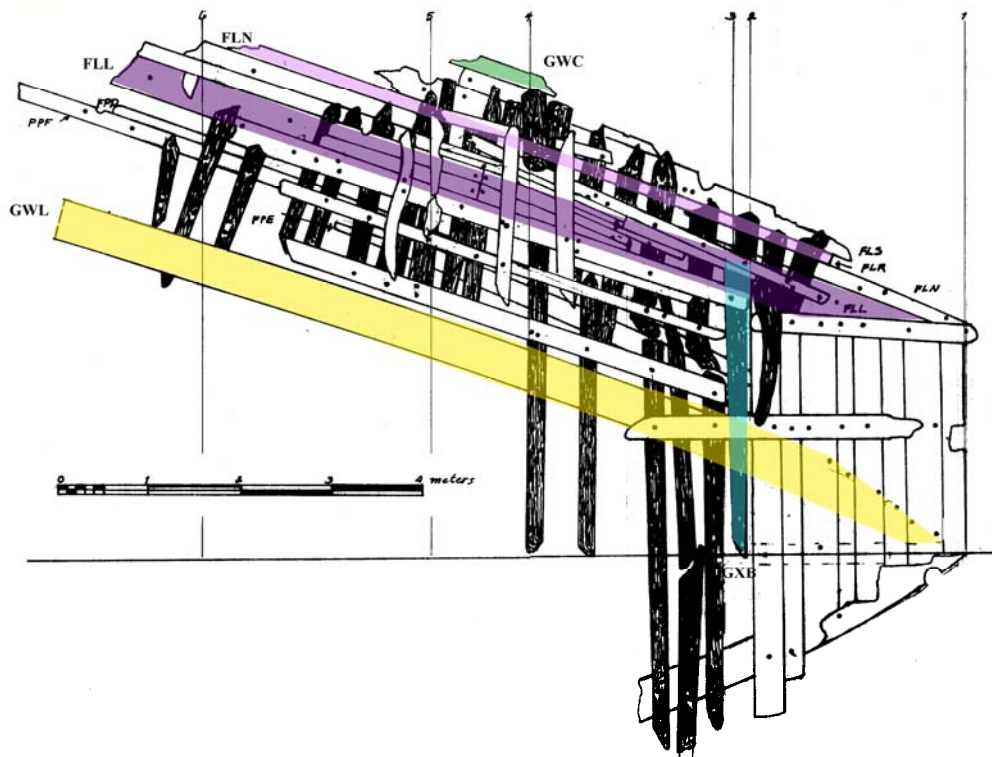


Fig. 5.3 The wales and through-frame highlighted in the site plan. Wales: GWL, yellow; FLL, dark purple; FLN, light purple; GWC, green and through-frame GXB in aqua. Dimensions are approximate where obscured by overlying timbers (after Throckmorton and Throckmorton 1973, Fig. 4).

Carlo Beltrame and Mauro Bondioli have proposed a different construction sequence. They agree that the keel and posts were laid first, but advocate that some of the frames were installed before the wales were attached to the “knee” or turn of the bilge (GWL).²²⁴ The bottom planking was subsequently filled in.²²⁵ Upon completion of the bottom planking, the half-frames and additional wales were nailed in place until the sides were completed.²²⁶ They suggest that the floor timbers determined the shape of

²²⁴ Beltrame and Bondioli 2006, 91-2.

²²⁵ Beltrame and Bondioli 2006, 91-2.

²²⁶ Beltrame and Bondioli 2006, 92.

the ship,²²⁷ making this a skeleton-first construction, as opposed to shell-first.

A third sequence of assembly also seems possible. Again, the keel and posts were laid first. Then the planks up to, but not including, GWL were erected (fig. 5.4). It seems unlikely that all framing elements were installed simultaneously as Throckmorton advocates. Rather, the shipwright may have bolted in the floor timbers and then laid wale GWL, which was naturally bent in order to give the ship's bottom its shape. The half-frames could have been installed thereafter (fig. 5.5). The keelson was bolted in place after the floors and half-frames were installed. The mast step, if separate from the keelson, was also inserted at this juncture. The shipwright assembled the horizontal ramp timbers after GWL was in place on both sides because this had to be completed prior to the erection of the remaining planks and wales, which rest on the ramp. The longitudinal beams upon the ramp could be inserted anytime as no other structurally significant timbers depend on them. Since the futtocks were secured higher than the GWL level there was nothing to fasten with at this point. The three futtocks near section 6 in the site plan are disturbed as they lie beneath GWL (fig. 5.6); thus they are not considered as evidence in this discussion. After the ramp construction, the remaining planks and wales were installed, with the through-beams placed between layers where appropriate. After planking the half frames, the futtocks could be installed with additional planking and wales thereafter. Once the futtocks were in place, the stringers, ceiling planking and riders were laid followed by a full deck and weather fencing.

²²⁷ Beltrame and Bondioli 2006, 92.

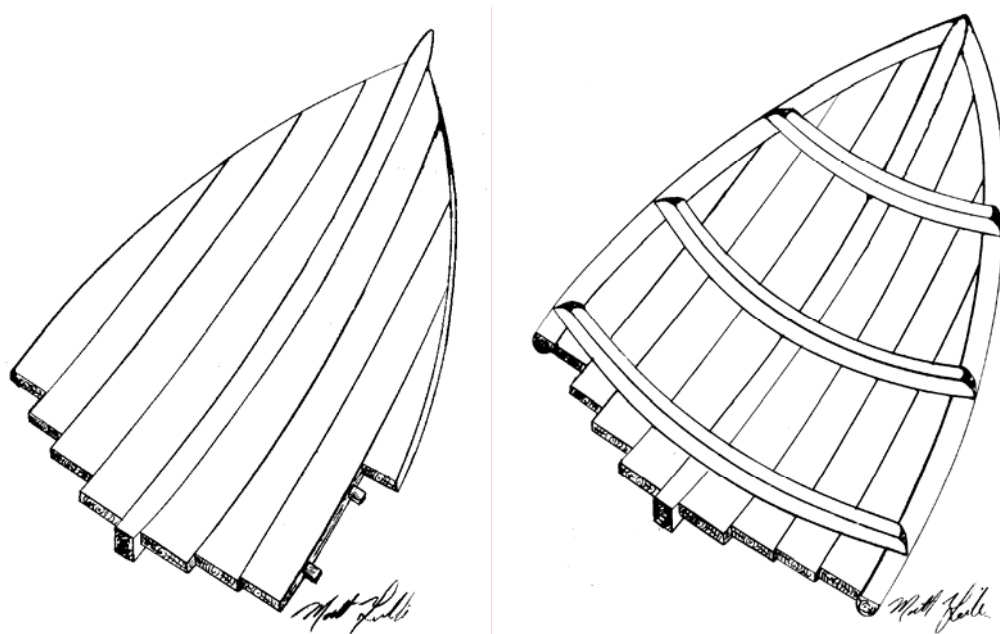


Fig. 5.4 Stages 1 and 2 of the proposed assembly process. Stage 1: the keel and planks are laid. Stage 2: wale GWL and the floors are installed (Drawings: Matthew Labbe).

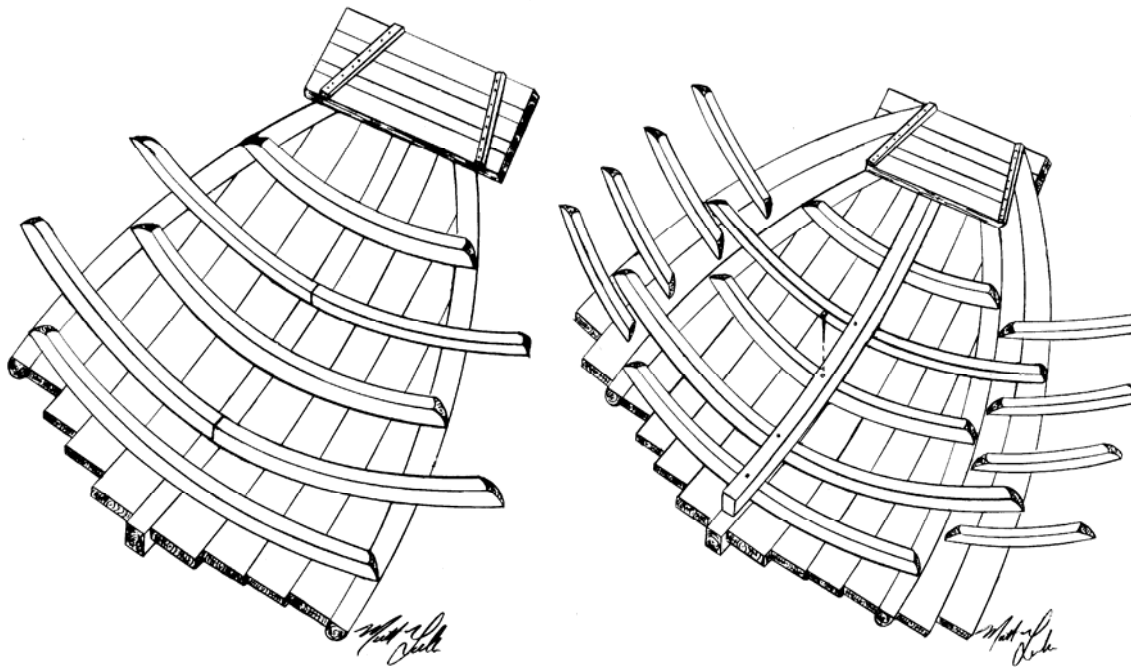


Fig. 5.5 Stages 3 and 4 of the proposed assembly process. Stage 3: the ramp and half frames are erected. Stage 4: the keelson, futtocks and additional planking are installed (Drawings: Matthew Labbe).

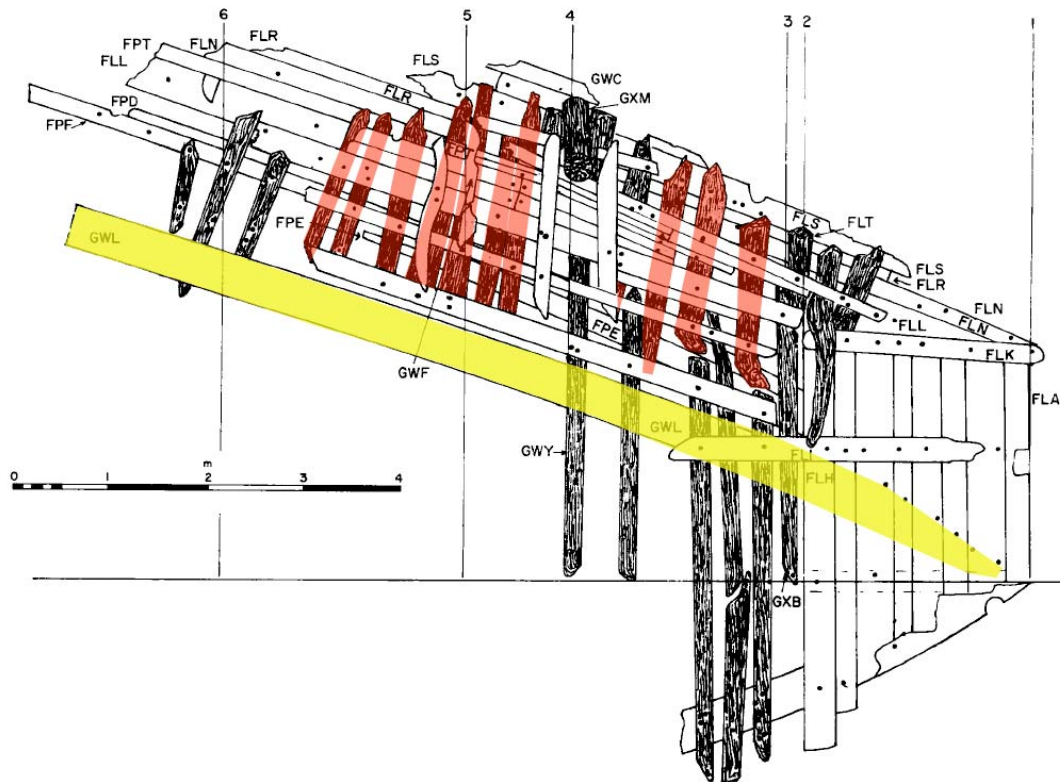


Fig. 5.6 Wale GWL (yellow) and the surviving visible in situ futtocks (red) (after Throckmorton and Throckmorton 1973, Fig. 4).

The third sequence of construction of the Pantano Longarini ship does not assign an active role to the transverse structures in the shaping of the hull. It argues that upon completion of the bottom planking, the run of the wales was defined by eye, perhaps with the help of a ribband, and the outer edge of the bottom was cut along the natural run. The wales were then added and secured with the floor timbers.

RECONSTRUCTION

Even assuming the plausibility of the construction sequence proposed above, the shape of the vessel remains unknown and the Pantano Longarini wreck's type and

purpose cannot be determined before a reconstruction of its hull shape is achieved. The vessel has been reconstructed using a combination of lines drawing and the *Rhinoceros*® 3D 3.0 SR3 program.

The reconstruction began by reducing Throckmorton's construction sections to a 1:20 scale in order to allow the design of a set of best fit lines drawings.²²⁸ They are based on at least some surviving timbers, yet some are incomplete. The flat ramp helped to draw the curves of sections 5 and 6 with some certainty. Section 4 may have little error since it is positioned just 0.06 m forward of section 5. Section 3 was taken at a half frame hence it probably also has a quite accurate curve. Nevertheless, it is possible in this section that the weight of the overburden and the opening up of the wreck may have altered the shape. Throckmorton created hypothetical curves for sections 1 and 2, which had no surviving bottom timbers. He also tried to make the sides "stand up"²²⁹ to match a seagoing ship, although sections 1 and 2 visibly resist this effort.

As changes to the bottom curvature were anticipated, rather than rely on Throckmorton's baseline, all sections were correlated using a design waterline, which is not the same waterline visible in the author's final reconstruction. The curves of the frames and wales were traced onto the body plan, then plotted onto the sheer plan. The curve of the uppermost wale (GWL) and the heights of the sections determined the sheer. Some of the section heights were slightly modified. The sections were then

²²⁸ The sections published in Throckmorton and Throckmorton 1973 are numbered opposite of the sections given in this paper.

²²⁹ Throckmorton and Throckmorton 1973, 255.

plotted in reverse onto the half breadth plan. Sections 2 through 6 required some fairing and alterations.

Next, the keel was added. Previous publications established the use of a skeg on this vessel,²³⁰ yet this is an unnecessary addition. A skeg was not utilized here although a rockered keel was, given the probably shallow nature of the coast and the suggestion that this barge may be beached so that the ramp could be used to load and unload cargo. The last step in creating the keel was determining the shape of the bow. Garifalo reported a stem which he drew for Throckmorton.²³¹ It seems strange that a mechanic would be able to identify a stem among the exposed timbers; indeed, it looks suspiciously like the heavy ramp beams. No sound evidence for a stem or stern post exists. With no compelling reason to think otherwise, this reconstruction proposes a double-ended craft without posts.

Once the first set of lines was ready and faired, the sheer, stern and keel lines were traced onto a new sheet of paper. The body plan was completed and the buttock and water lines added and faired. The fairing of these lines demanded a wider beam and greater depth in hold than in Throckmorton's lines.

Although no other timbers were found aft of the ramp, Throckmorton noted ax marks from salvaging in antiquity (fig. 5.7).²³² The aftmost timber on the ramp has notches cut into the aft end, most likely to secure longitudinal beams. It appears that the beams on top of the ramp continued aft of the last timber and that the planks and wales

²³⁰ Throckmorton and Throckmorton 1973, Fig. 5.

²³¹ Throckmorton and Throckmorton 1973, 260.

²³² Throckmorton and Kapitän 1968, 186.

narrowed towards the end of the ramp. The extension of plank FLS in the model supports this theory. The reconstruction therefore includes two additional timbers. Unlike the planks and wales, the ramp does not narrow towards the end.



Fig. 5.7 The port side of the ramp demonstrates salvaging in antiquity, as well as reveals timber shaping to interlock with wale GWL and the overhang of the ramp (Photograph: Johann Reinhard).

Upon completion, the second set of lines was scanned and the images were imported into *Rhinoceros*®. With the help of this software the bottom of the vessel was further flattened to match the natural shape of the vessel. *Rhinoceros*® worked well to ensure that points were in the correct location; however, the “FAIR” command moves all of the points in the line, and there is no way to lock a point in space in the software version available. Because of this, the points were placed in their correct locations, but the lines were not faired and were printed out at a 1:50 scale. The points were then traced on a fresh sheet of paper and the lines were faired, after which they were inked.

C. Wayne Smith of the Wilder Digital Imaging Laboratory at Texas A&M University determined that the angle at the turn of the bilge is approximately 33 degrees

based on the frame from figure 5.8. Unfortunately, there is not enough data to add this precision into the lines.



Fig. 5.8 The image used by C. Wayne Smith to extrapolate the 33 degree angle turn of the bilge (photograph: Johann Reinhard).

DISCUSSION

The Pantano Longarini ship is a tubby barge, lacking the draft and perhaps the upperworks to sail the Mediterranean Sea (fig. 5.9). It has a maximum beam of 10.3 m and a beam of 5.75 m at the ramp as reconstructed. The overall length of the vessel is 31.5 m, with a keel length of approximately 25.6 m, and a midships depth in hold of 2.7 m. Unlike the Yassiada A, the Pantano Longarini ship was not built for speed, but for capacity.

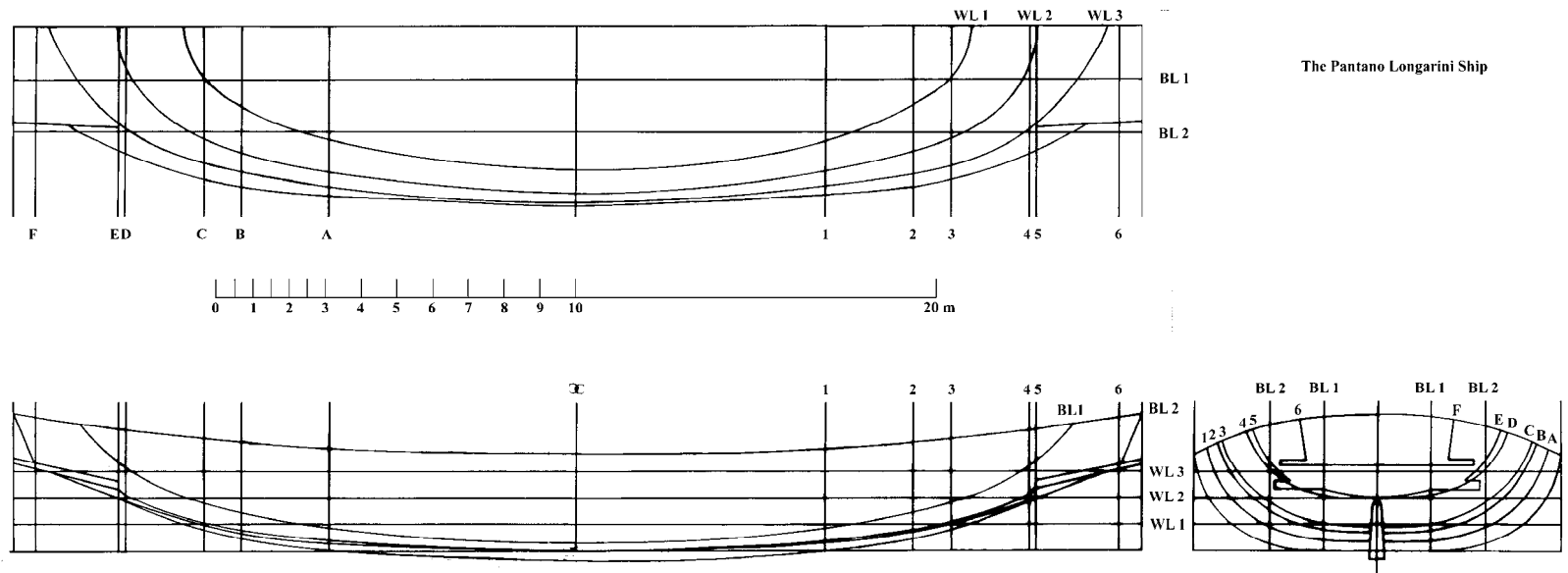


Fig. 5.9 The reconstructed lines (Lines Sarah Kampbell, Inking Matthew Labbe).

The Pantano Longarini ship was not designed to carry just any cargo. The location of the beams are at a height that a human would have to duck underneath each throughbeam, or step over the through-frame. This would make it extremely difficult to load cargo, or even move about. The use of curved stringers also suggests that the hold of this vessel was not meant to carry cargo. The ship most likely transported its freight on deck. The deck-level ramp certainly would have facilitated this function.

The shape of the lines clarifies that this is not a seagoing vessel, but a cargo carrying coastal barge. The ramp overhangs the wales that it rests on, which reduces the stability of the ship, especially if the vessel were to encounter high waves. The sixth century Digest of Justinian notes that some ships are “freighters or ‘coasters’,” and that they are confined to a certain stretch of sea.²³³ This roughly built workboat is most probably an example of just such a coaster. Built with thick wales, planking, stringers, riders and close set framing,²³⁴ it was employed to transport heavy cargos along the coast of Sicily, without being able to travel out to sea. When we consider its heavy scantlings it seems plausible to suppose that this workboat was meant to carry heavy loads.

DIMENSIONS

Maximum Length: 31.5 m

Length of Keel: 25.6 m

Maximum Beam: 10.25 m

Depth in Hold: 2.7 m

²³³ Justinian 1985, XIII.12.

²³⁴ Throckmorton and Throckmorton 1973, 244, Fig. 4.

CHAPTER VI

SUPPORTING EVIDENCE

As mentioned in the previous chapter, three reconstructions have been presented for the Pantano Longarini ship, each addressing slightly different aspects. Throckmorton and Throckmorton propose a seagoing merchantman, while the author presents a coastal barge. Beltrame and Bondioli propose a skeleton-first assembly as opposed to the generally accepted mixed construction without proposing a vessel type. The merits of each of these arguments must be further addressed. Ships are the result of a number of human and natural factors: the purpose for which they were built, its means of propulsion, the materials, tools, and technology available, the shipbuilder's knowledge and skills, tradition, and taste.²³⁵ In addition, it is difficult to determine which major and minor ship elements were originally included in the ship because no full scantling list survives. There is limited or no evidence to determine with any detail which construction elements were employed for many elements of the ship.

RECONSTRUCTION ANALYSIS

Throckmorton reconstructed the Pantano Longarini wreck as a seagoing merchantman (fig. 6.1). He based this design not only on the extant timbers and model curves, but also from a workman's description of the ship's discovery.²³⁶ Figure 6.1

²³⁵ Englert 2000, 3.

²³⁶ Throckmorton and Throckmorton 1973, 260.

highlights the sections of the illustration with surviving timber. The majority of the reconstruction is not based on evidence, but is based on the limited shipwreck data that was available in the 1960s and 1970s. To explain the odd timbers at the stern, Throckmorton compared the Pantano Longarini shipwreck to a mosaic from the Antiquarium del Celio that shows a seagoing vessel with a high transom supporting a stern structure (fig. 6.2).²³⁷ Since much of the data currently available had not yet been studied at the time of his investigation, Throckmorton based his reconstruction on a preconceived notion of the ship's possible structure. As already noted, he attempted to make the sides of the ship "stand up" to fit the shape of a seagoing merchantman.²³⁸

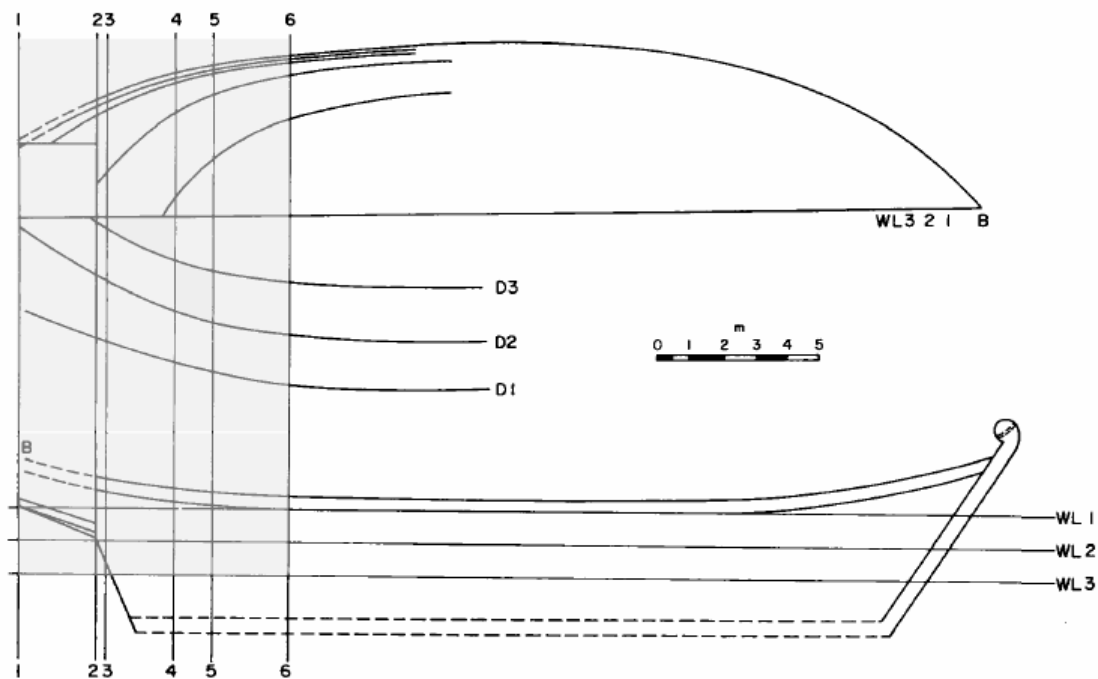


Fig. 6.1 Throckmorton's reconstruction of a seagoing vessel. The shaded areas are based upon surviving ship remains (after Throckmorton and Throckmorton 1973, Fig. 16).

²³⁷ Throckmorton and Throckmorton 1973, 254, 262-3.

²³⁸ Throckmorton and Throckmorton 1973, 255.



Fig. 6.2 Mosaic from the Antiquarium del Celio depicting a seagoing vessel with a high transom supporting a stern structure, Museo Civiltà Romana.

A seagoing vessel requires a deep draft to resist lateral drift. Thus, it was assumed that the Pantano Longarini ship had either extensive deadwood or a wineglass hull similar to the Kyrenia ship.²³⁹ The extant bottom planking shows minimal deadrise, ruling out the wineglass shape. Had the shipwright utilized deadwood as in Throckmorton's reconstruction, one would have expected at least some of the timbers to be preserved. Although the port side was lost in antiquity,²⁴⁰ workmen who saw the remains before they were burned reported that "nothing existed below the waterline wale [GWL]."²⁴¹ Throckmorton acknowledges that cuts in the half frames, floors, and

²³⁹ Steffy 1994, Fig 3-38.

²⁴⁰ Throckmorton and Throckmorton 1973, 265; see also Throckmorton and Kapitän 1968, 186.

²⁴¹ Throckmorton and Throckmorton 1973, 265.

planking left a distinct gap for the keel (fig. 6.3).²⁴² If so, there could be no deadwood underneath the floor timbers. In addition, as this vessel has no sternpost, and therefore no place to attach a stern rudder, there is no need for additional deadwood. Finally, neither rudders nor deadwood were in use in the Mediterranean at this time, as the first known appearance of the rudder is dated to 1150 C.E. in English iconography.²⁴³

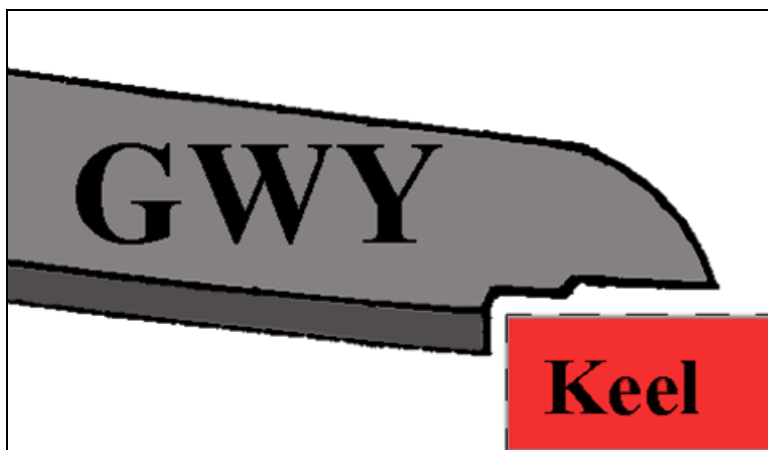


Fig. 6.3 Notch in half-frame GWY to fit over the keel (after Throckmorton and Throckmorton 1973, Fig. 15).

In addition to the deadwood, Throckmorton's reconstruction assumes that a sternpost was attached forward of the ramp. The bottom planking and wales would then attach at a nearly 90 degree angle, creating an extremely weak and unprotected joint.²⁴⁴ This reconstruction solution is not even possible given that the bottom planking has survived in this area and would not allow for a sternpost, or deadwood extending below the keel. In his reconstruction, Throckmorton moved the keel lower to meet the bottom

²⁴² Throckmorton and Throckmorton 1973, 255.

²⁴³ Mott 1997, 106.

²⁴⁴ Personal communication with Clive Chapman.

of the sternpost, thus implicitly disagreeing with his own decision to call the gaps in the framing the keel's location. Figure 6.4 displays the bottom planking runs into the stern, but more importantly confirms the lack of a sternpost. The inset demonstrates the shape of the aft end of the keel. The damage to the planking gives the appearance that the keel itself was ripped out with great force. The Pantano Longarini ship could not have looked like the seagoing merchantman reconstructed by Throckmorton. While he did a good job with the information available, the addition of so much new data has drastically changed conceptions of ships and the various types present in the late antique world.

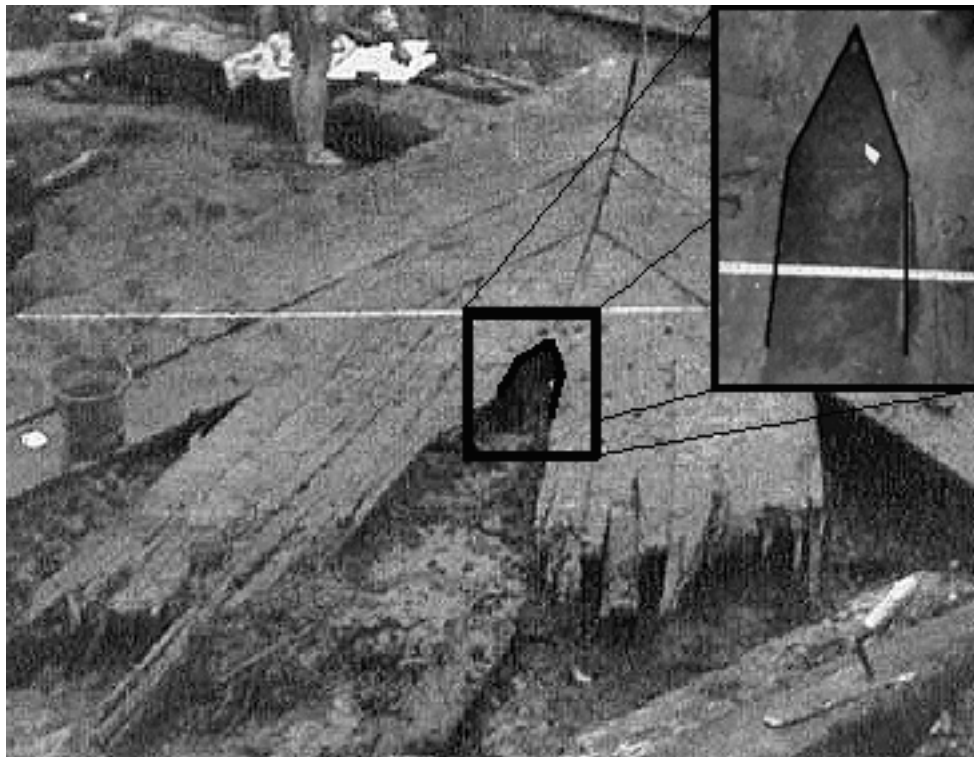


Fig. 6.4 Bottom stern timbers reveal the planking pattern, ripped planks, and a hole for the keel. Inset: detail of the keel shape (after Throckmorton and Throckmorton 1973 Fig. 5, inset Fig. 7).

The reconstruction proposed by Beltrame and Bondioli is more plausible. Nevertheless, while their theory seems sound and well-researched, its application to this ship is difficult to sustain in light of the new data available. The Pantano Longarini ship may have affinities to the “three swords method” of shipbuilding, but this theory requires shaped and squared floors to base the design of the vessel upon. The frames on the Pantano Longarini shipwreck are anything but straight. They are roughly hewn with a tendency to wander across the planking, without maintaining a strong center line. The irregular framing pattern contradicts the regular framing necessary to shape a hull. In this particular instance, the theory is further contradicted by the existence of the ramp. It is not possible for the floors to dictate the shape of the vessel, as there are no floors for the forward- and aft-most areas. The horizontal timbers create the shape with the wales and planks building upon the ramp, but never meeting at the extremities.

While neither proposed reconstruction seems fully accurate for this vessel, they are valid attempts. Throckmorton worked with limited archaeological information about ancient ships and shipping. Beltrame and Bondioli have proposed a highly probable hypothesis, yet it is based on later and more advanced ship types. This theory cannot be presumed to be retroactive. The Pantano Longarini ship was a coastal barge with mixed construction technique, where aspects of both shell-first and skeleton-first techniques were combined, although its hull strength relies primarily on its frames and wales.

PARALLEL EVIDENCE

While attempting a preliminary reconstruction, it quickly became obvious what questions needed to be asked about several construction elements. As no scantling list survives, a comparative analysis of contemporary vessels can provide probable solutions to questions raised by missing evidence. A large comparison base is necessary to ensure that timbers are correctly restored on the vessel. A survey of the 11 excavated, and, most importantly, well published shipwrecks from the fifth through the ninth centuries C.E. is required to understand what techniques were used, when and where. Although not all of the examples maintain the same level of accuracy in excavation and publication, they all provide evidence of the construction techniques available to shipwrights in the seventh century, and enlighten a period of transitional hull construction. Because there are no exact parallels for the Pantano Longarini ship, a wider understanding of available techniques draws out missing information and clarifies the nature of the vessel. While these ships are roughly contemporary, they do represent several different types of vessels, construction methods, regions and functions. All of the evidence for each element must be analyzed carefully to determine what was available to the shipwright at the time, and what was appropriate for the vessel type under analysis.

While some of the information about the Pantano Longarini shipwreck was well recorded, several features required further investigation. Understanding how the ship was built and how that impacts its other structural elements aids in determining what has not survived the wrecking, burial and excavation processes as well as explains

uncommon features. In addition, it is difficult to determine which major and minor ship elements were originally included and how that impacted the shipwright's conception of the ship.

Keelson

No evidence for a keelson was noted on the Pantano Longarini shipwreck by the excavators. Seven of the 11 contemporary shipwrecks either retained an original keelson or provided sufficient evidence to support the conclusion that one had been aboard the vessel (Table 6.1). The presence or absence of the keelson does not appear to be related to the construction method, the date or the vessel type. The Pantano Longarini excavation occurred early in the field of nautical archaeology; hence certain elements may not have been sought or identified. Today excavators can recognize evidence for such things as a keelson by fastening holes or wear patterns, even if the element itself is lost. This ship was very strongly built, with many longitudinal strengthening elements including heavy wales and stringers. Consequently, it is possible that the shipwright would know about, and utilize, a keelson-like timber to further support the ship and to prevent hogging and sagging, at least at its extremities.

Keelson dimensions range considerably on the published wrecks. The keelson on Tantura B measures from 12.2 to 20.2 cm sided and 15.7 to 18 cm molded.²⁴⁵ It was attached with nails at each frame and was notched to fit over the frames.²⁴⁶ A long timber is likely to have a natural taper with changing dimensions over its length. Taking

²⁴⁵ Kahanov, Royal, and Hall 2004, 119.

²⁴⁶ Kahanov, Royal, and Hall 2004, 119.

this into account, if there was a keelson on the Pantano Longarini ship, it was probably similar to that from Tantura B as both are lengthy vessels utilizing mixed construction. Although a keelson was fundamental in the probably rowed Tantura B long ship, it was by no means necessary in a barge with such a large number of bottom stringers.

Limber Holes

No limber holes were recorded on the Pantano Longarini shipwreck remains, although three floors and half frames were recovered which extend to or cross the keel. Limber holes are not always found or recorded during excavations (Table 6.2). This may be because no frames remained, the limber holes were simply not recorded or there were no limber holes present but this was not specifically noted. Six of the shipwreck publications under analysis do not have limber holes mentioned, including the Pantano Longarini shipwreck. Photographs and site plans suggest that no limber holes were found in the surviving framing. Limber holes were recorded for five shipwrecks, all with one set adjacent to the keel. Three of these wrecks have yet another set recorded further outboard.

There are several possible explanations for this apparent gap in technology on the Pantano Longarini shipwreck. When the lower faces of the frames are not entirely regular, and especially in a flat-bottomed barge, limber holes may not be necessary to let the water drain longitudinally, along the length of a vessel. Or, because the surviving frames are from the extreme end of the ship, they may not have required limber holes. Another possibility is that the keel was recessed slightly inboard. This would leave

Table 6.1 Ship type in comparison to keelson use.

SHIP	DATE	TYPE	CONSTRUCTION	KEELSON-LIKE TIMBER/MAST STEP
Parco di Teodorico	5 th	Coastal Lighter	Shell	Present
Dor 2001/1	5th/6 th	Barge?	Skeleton	Present
Tantura A	6 th	Coastal Lighter	Mixed	Not Found
Yassiada A (7 th Century)	7 th	Seagoing Merchant	Mixed	Not Found, Believed Present
Dor D	7 th	Seagoing Merchant	Mixed	Present
Pantano Longarini	7 th	Coastal Lighter	Mixed	Not Found
Anse St. Gervais (Fos-sur-Mer)	7 th		Unclear	Present
Port Berteau II	7 th	Fluvial/Coastal Lighter	Skeleton	-----
Tantura F	8 th	Fishing	Mixed	Present*
Bozburun	9 th	Seagoing Merchant	Mixed	Not Found
Tantura B	9 th	Seagoing Merchant	Mixed	Present

* Tantura F did not have a proper keelson, it had two longitudinal support timbers.

Table 6.2 The shipwrecks and necessary data to compare limber holes and framing pattern.

SHIP	DATE	TYPE	FRAMING PATTERN	LIMBER HOLES
Parco di Teodorico	5 th	Coastal Lighter	Floors	-----
Dor 2001/1	5th/6 th	Barge?	Alternating Floors and Half Frames*	1 set
Tantura A	6 th	Coastal Lighter	Not Found	2 sets
Yassiada A (7 th Century)	7 th	Seagoing Merchant	Alternating Floors and Half Frames	1 set
Dor D	7 th	Seagoing Merchant	Not Found	-----
Pantano Longarini	7 th	Coastal Lighter	Alternating Floors and Half Frames	No
Anse St. Gervais (Fos-sur-Mer)	7 th		Alternating Floors and Half Frames	-----
Port Berteau II	7 th	Fluvial/Coastal Lighter	-----	-----
Tantura F	8 th	Fishing	Alternating Floors and Half Frames*	2 sets
Bozburun	9 th	Seagoing Merchant	Floors	-----
Tantura B	9 th	Seagoing Merchant	Alternating Floors and Half Frames	2 sets

* The framing pattern changes at the mast step, where only floors are used.

space between the planking and the frames thus making a limber hole redundant.

Although this last option is contrary to the contemporary evidence, it does follow with the images as demonstrated in figure 6.3. The keel was probably not inboard of the ship between the extremities, thus the frames would have required one set of limber holes on either side of the keel for most of its length. Both Tantura F and Tantura B have rabbetted keels,²⁴⁷ which suggests that the keel is rockered and would begin to move inboard of the planking at the extremities. While some ships had two sets of limber holes, it is unlikely that the Pantano Longarini ship would require a second set, as the vessel is not flat-bottomed, but gently curving, causing water to naturally flow towards the center.

Planking Scarfs

The type of scarfs used by the shipwright building the Pantano Longarini ship were not identified in the publications and are now lost. Examining the illustrations and photographs has led to the tentative identification of four types of scarfs in the connections between planks. Nevertheless, it is possible that some of these scarfs may be breaks in the planks. If this is the case, then the ship had longer plank lengths and a different planking pattern than previously thought. Nevertheless, it appears that the shipwright building the Pantano Longarini boat utilized butt scarfs, diagonal scarfs, curved 'S' scarfs and three-planed 'Z' scarfs in the connections between planks (fig. 6.5). This seems unusual as the majority of the ships excavated during the period under review solely used butt or diagonal scarfs (Table 6.3).

²⁴⁷ Barkai and Kahanov 2007, 23; see also Kahanov 2000, 151.

When scarfs are compared to the excavation region a pattern emerges. It seems that most of the ships excavated in the Eastern Mediterranean, and in all likelihood built there, tend towards using one type of scarf, typically either a butt or diagonal scarf. On the other hand, the Pantano Longarini ship and the Parco di Teodorico ship, both built in the Western Mediterranean, utilized multiple scarfs. Those found on the Parco di Teodorico ship were identified from a figure, and were not described, so the same note of caution stands regarding the fact that breaks may have been misidentified as scarfs. Nevertheless, both ships show ‘Z’ scarfs, which would be difficult for a break to replicate.



Fig. 6.5 Pantano Longarini planking in situ (Photograph: Johann Reinhard).

The only other shipwreck of the group under analysis using more than one scarf type is Tantura B. All other wrecks, especially those dated to the same century, seem to have been built using only one type of scarf in planking connections. It seems likely that

eastern and western Mediterranean shipwrights employed different plank scarfing patterns, although more data from both regions is necessary to substantiate or disprove this point.

Table 6.3 Planking scarfs by region and ship type.

SHIP	TYPE	Region	PLANK SCARFS
Parco di Teodorico	Coastal Lighter	Western Med	Three-planed 'Z' Scarf, Butt, (?)
Dor 2001/1	Barge?	Eastern Med	Butt
Tantura A	Coastal Lighter	Eastern Med	Butt
Yassiada A (7th Century)	Seagoing Merchant	Eastern Med	Diagonal
Dor D	Seagoing Merchant	Eastern Med	Diagonal
Pantano Longarini	Coastal Lighter	Western Med	Butt, Diagonal, Curved 'S' Scarf, Three-planed 'Z' Scarf
Anse St. Gervais (Fos-sur-mer)		Western Med	-----
Port Berteau II	Fluvial/Coastal Lighter	Atlantic	-----
Tantura F	Fishing	Eastern Med	Butt
Bozburun	Seagoing Merchant	Eastern Med	-----
Tantura B	Seagoing Merchant	Eastern Med	Butt, L-Shaped, Diagonal

Deck Supports and Decks

Major dilemmas in reconstructing the Pantano Longarini shipwreck involved the number and position of through-beams, deck beams, as well as the possible location of deck(s). One through-beam and the probable location for another (based on the location of rider timbers) were found. No specific deck beams or evidence for decking were located. A through-frame, an apparently unique timber, was also found.

Through-beams

Very few contemporary shipwrecks have evidence for decks or decking, and even fewer excavators have published their ideas on probable upperworks (Table 6.4). There are three shipwrecks of this period, other than the Pantano Longarini, that provide

evidence of through-beams. The Port-Berteau II boat, also built in the early seventh century, provides some construction parallels to the Pantano Longarini ship.²⁴⁸ This was a small French freighter built with a total of five through-beams: two forward, two aft and one middle through-beam, perhaps acting as a mast partner.²⁴⁹ These through-beams were shaped similar to GXM, the only remaining through-beam on the Pantano Longarini shipwreck. A recess was deliberately cut in the planking, the through-beam was laid over this recess and then the next layer of planking was raised above it (fig. 6.6). The beam was carved down at this location to ensure it did not slip back through the recess (fig. 6.7).²⁵⁰ The forward and aft beams on the Port-Berteau II ship not only provided transverse strength, but they also acted as deck beams, supporting fore and aft decks and leaving an open cargo hold amidships.²⁵¹

Table 6.4 Evidence for through-beams, deck beams and decking.

SHIP	Through-beams	Deck Beams	Decked
Parco di Teodorico	-----	Yes	Fore and Aft
Dor 2001/1	-----	-----	-----
Tantura A	-----	-----	-----
Yassiada A (7th Century)	Yes	Yes	Full
Dor D	-----	-----	-----
Pantano Longarini	Yes	-----	-----
Anse St. Gervais (Fos-sur-mer)	-----	-----	-----
Port Berteau II	5	Through-beams	Fore and Aft
Tantura F	-----	-----	-----
Bozburun	-----	-----	-----
Tantura B	-----	-----	-----

²⁴⁸ Rieth 2003, 113.

²⁴⁹ Rieth 2000, 227.

²⁵⁰ Rieth 2000, 227, Fig. 4, 5.

²⁵¹ Rieth 2000, 227.

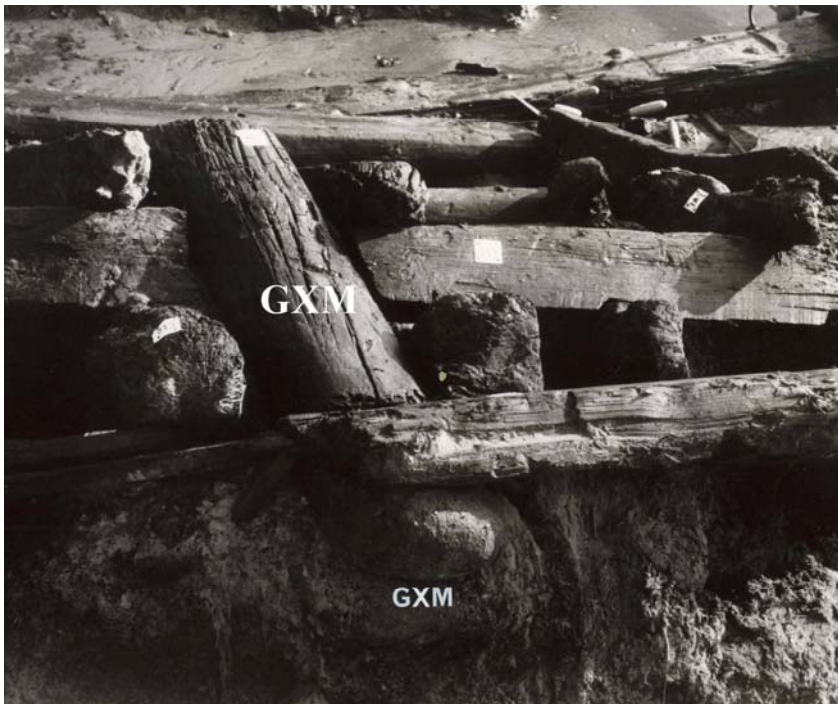


Fig. 6.6 The Pantano Longarini ship's throughbeam GXM in situ (courtesy INA Archives).



Fig. 6.7 The Pantano Longarini ship's through-beam GXM shaped to fit in the planking and wales (after Throckmorton and Throckmorton 1973, Fig. 22).

The Yassiada A wreck also had through-beams acting as deck beams. The one surviving timber was not sufficiently preserved to determine if it was notched,²⁵² although it most likely was. Due to fastening holes and other diagnostic timbers, it was determined that hanging knees and stanchions probably supported some of the additional deck beams.²⁵³ This ship was fully decked with hatches to access the hold.²⁵⁴

Although no through-beams were located on the Parco di Teodorico shipwreck, it provides evidence for deck beams as the gunwale had carved out hollows to support “the heads of plank shaped beams.”²⁵⁵ These beams in turn provided the base for fore and aft decks.

Deck Structure

Placement of a deck on the Pantano Longarini is somewhat difficult as a deck could not have been laid directly on the surviving large through-beam, flush with the hull, because riders extend above the level of the beam (fig 6.8). In the model and in most illustrations, the futtocks do not continue above the through-beam, although the photographs and one illustration confirm them doing so. The perspective of the drawings and the incomplete nature of the model may account for the difference. The extension of the frames and riders makes it impossible to rest one or more deck planks on the through-beam directly at the sides of the ship.

²⁵² van Doorninck 1982, 61.

²⁵³ van Doorninck 1982, 62.

²⁵⁴ van Doorninck 1982, 63.

²⁵⁵ Medas 2003, 45.

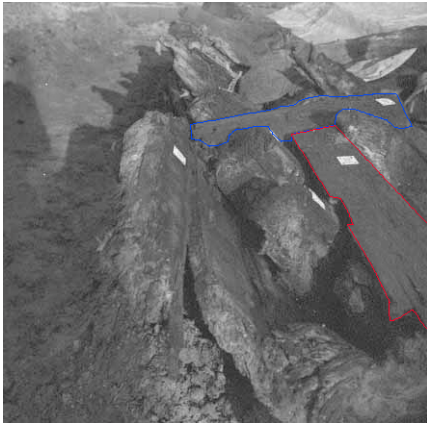


Fig. 6.8 Crenellated stringer (outlined in red), through-beam hidden by futtock and rider (outlined in blue) on the Pantano Longarini shipwreck (courtesy INA Archives).

Several possibilities remain. The through-beams may not have served as deck beams, in which case deck beams may have been located higher in the ship, or the ship may not have been decked at all. Or, should the through-beams have acted as deck beams, and the decking rested upon them, it may have been notched to fit around the rider timbers, as the stringer shown in figure 6.8. This was the solution found in Tantara B ship, in which a single crenellated ceiling plank,²⁵⁶ showed that this method was utilized on other vessels. Romans commonly used through-beams as deck beams,²⁵⁷ suggesting that the vessel was decked with through-beams supporting its deck or decks.

A full deck was not necessarily required in a barge like this one. Many ships carried fore and aft decks, leaving the central hold open. Nevertheless the proposed reconstruction has a full deck resting on the through-beams for the Pantano Longarini barge. It most likely extended to the transverse timber lying across the ramp, enabling heavy cargo to be loaded and unloaded without being lowered into the hold.

²⁵⁶ Kahanov 2000, 153.

²⁵⁷ van Doorninck 1982, 52.

Determining a tentative solution to the deck structure is not enough for the ship's reconstruction; the total number of beams needs to be addressed. This wreck has yielded good evidence at the stern for two through-beams. Previous reconstructions have placed through-beams evenly along the entire length of the hull.²⁵⁸ The Yassiada A wreck was reconstructed with seven beams, partially based on parallels with the Pantano Longarini wreck.²⁵⁹ As already noted, the Port-Berteau II vessel was equipped with five through-beams, two forward, two aft and one near midships.²⁶⁰ Given its length, the Pantano Longarini ship probably had six or seven through-beams: two forward, two aft and two central beams. A seventh beam may have supported a mast, although that is conjectural. The forward beams probably mimicked the location and spacing of the two at the stern. Considering the wide beam of this vessel, stanchions were a likely addition as they would aid in supporting the deck between the through-beams.

Through-frame

The use of a through-frame on the Pantano Longarini wreck is intriguing. Directly forward of the ramp, the first pair of half frames are tucked over a large wale and under a smaller one (fig. 6.9). The author has been unable to find through-frames on any other wreck of the same period, making this a unique lateral support, used to add strength at the junction of the ramp and floor.

²⁵⁸ Throckmorton 1987, 95.

²⁵⁹ van Doorninck 1982, 52, Construction Plan.

²⁶⁰ Rieth 2000, 27.

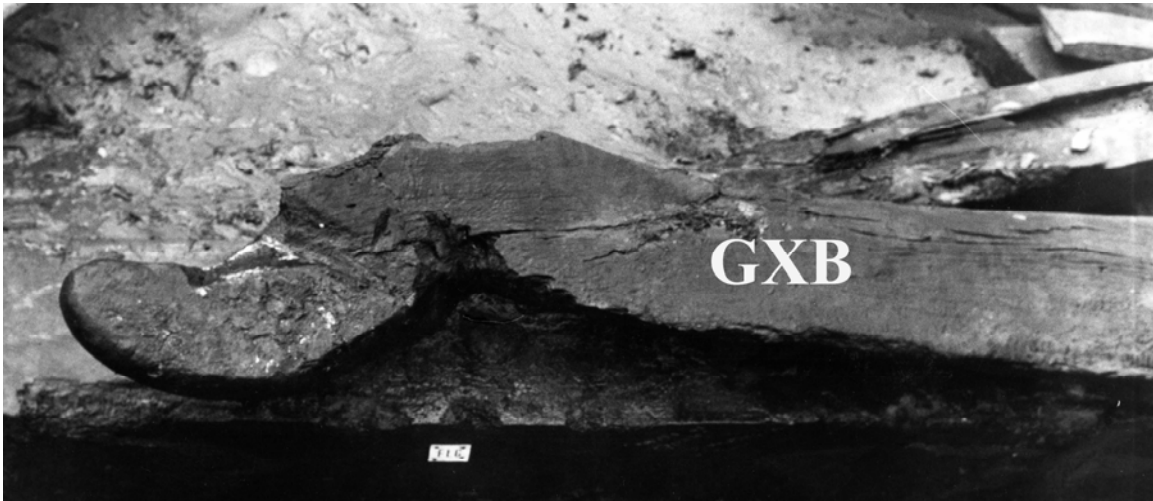


Fig. 6.9 Through-frame GXB (after Throckmorton and Throckmorton 1973, Fig. 14).

Ramp

The ramp structures at the bow and stern of the Pantano Longarini ship are also unique in the archaeological record. There are no known parallels at any time in the Mediterranean for this vessel. Having no stem and stern-post is also a unique feature for the period. Instead of planking running into posts, wale GWL meets at the extremities. The set of planking laid directly below GWL also meets in a V-shape arrangement, while the remaining bottom planks have straight runs (fig. 6.4). The stability of the ramp is based on the configuration of the wales, and also of the supporting timbers between the wales and the ramp. The wales meet in a butt end and are bolted together (fig. 6.10). The central section of the vessel, aft of the keel, has a central split, where the timbers meet. To support this extremely weak joint, additional transverse beams were installed (figs. 6.10-6.11). While there are no images or illustrations depicting the fastening method of these beams to the hull, it appears that they were either nailed or bolted in place to the wales, as concretion stains are visible on the tops of the transverse

beams (fig. 6.11). These beams would have acted as an internal post, although the transverse position reminds one of a frame as well. They supported the bottom planking as well as the ramp timbers. Notched to fit over the wale, the ramp timbers were locked in place (fig. 6.12). They were unable to slide laterally, and the iron bolts through the ramp prevented them from sliding forward or aft.



Fig. 6.10 Throckmorton and the workmen disassembling the ramp. A bolt hole is circled, to the right of it a possible concretion for a bolt hole is visible (Photograph: Johann Reinhard).



Fig. 6.11 The top ramp timbers have been removed, revealing supporting timbers between the ramp and the bottom planking (Photograph: Johann Reinhard).



Fig. 6.12 Supporting transverse timbers are revealed during the disassembly of the ramp (Photograph: Johann Reinhard).

There are several reasons why the shipwright may have decided on this design. First, the ramp could have been a steering or poling platform. Second, the forwardmost two ramp timbers are longer than the others and have rounded ends. They may have been used to tie up or tow the vessel, as happened with the Greek *holkades*.²⁶¹ Finally, the ramp could have served as a loading platform along a river, quay or sailing vessel. Heavy cargoes could be transferred here, which would have been a weak point if not for the robust supports.

Steering

Steering is another unresolved issue. Nothing found on the Pantano Longarini shipwreck supports any theories about steering methods. Very few shipwrecks provide evidence of steering, although much can be found in iconography. Again, the Yassiada

²⁶¹ Casson 1971, 169.

A and the Port Betreaux II shipwrecks are the only ones providing contemporary archaeological evidence for this point.

The Yassiada A wreck has 55 cm spacing between two stern through-beams that create a steering box on each side for quarter rudders, which van Doorninck contends the Pantano Longarini ship also could have had.²⁶² While a box-like steering structure is seen in the mosaic from the Antiquarium del Celio (fig. 6.2),²⁶³ there is no evidence for such a structure on this ship. The end of the through-beam on the Pantano Longarini is not only rounded, but no notches or fastening holes are evident. As the beam does not extend far beyond the hull, little room is left for a quarter rudder. Interestingly, the Port Betreaux II wreck has a surviving “side rudder beam,” with a length of 1.65 m that extends through the planking.²⁶⁴ This provides further archaeological evidence for the use of beams to aid in steering, but it also suggests that the through-beams from the Pantano Longarini were not adequate to support a quarter rudder. The Pantano Longarini ship probably employed a central steering oar. Even without a steering structure, the helmsman could have steered from the ramp.

Propulsion

Propulsion is another important and unsolved problem. There are several possibilities. At this time in late antiquity, vessels could be propelled by poles (punting), towed, rowed, paddled or sailed. Punting is useful in extremely shallow waters, so it is an unlikely candidate for coastal areas, where deeper water may be encountered.

²⁶² van Doorninck 1982, 52.

²⁶³ van Doorninck 1982, 52.

²⁶⁴ Rieth 2000, 227.

Towing is typically reserved for river craft or ships entering a harbor, not as the primary propulsion method at sea or in coastal waters. Paddling is an archaic form not typically used in the Mediterranean in this period. In addition, the height of the vessel above the water precludes paddling.

While poling, towing and paddling are unlikely forms of propulsion for the Pantano Longarini ship, rowing and sailing are the two most likely candidates. No locations for the rowers to sit or stand were found, nor were any tholepins or wear on wale GWC identified. This is not surprising considering how little of the upper works survived. Rowing is typically practiced in a more central location, rather than the extremities, which are all that survives of the Pantano Longarini ship. As the bow and midships are missing, there is no evidence for a mast or mast step, yet many contemporary ships were sailed. It is highly probable that a mast step was placed one third of the length of the vessel aft from the bow. Propulsion probably depended on the weather and location. It is possible that the Pantano Longarini ship sailed when the winds were favorable, but for maneuvering in port it may have been rowed or towed. Indeed, the Portus lighters were propelled by oars in addition to sails.²⁶⁵

DISCUSSION

While several reconstructions and assembly methods have been proposed, it is clear that the Pantano Longarini ship was built using mixed construction, and the shipwright was experimenting with these new building techniques and designs. Until the

²⁶⁵ Casson 1971, 336-7.

surviving timbers of the Pantano Longarini are available for study, or the original documentation is located, there will be no concrete proof of the missing or unusual construction features on this wreck. By comparing this ship with multiple contemporary vessels, it is possible to draw educated conclusions. Although the Pantano Longarini ship is of a type not yet found elsewhere, major hull features are similar to those used on other ships. These wrecks can provide evidence as to what was available to the shipwright at the time of construction. This is especially true as many shipwrecks in this study are from the early seventh century C.E. They were in service at or very near the same time.

There are several unusual features in the Pantano Longarini ship that have not been detailed in other reports. The first is the through-frame, which is a unique type of transverse support. The lack of posts is also unusual for a vessel of this size. And the ramp, with its supporting timbers, is unique to the Pantano Longarini ship, and was used for the loading and unloading of heavy cargo.

CHAPTER VII

BARGES

The Pantano Longarini shipwreck is a unique example of a coastal barge. It is not, however, the only one surviving from antiquity. Barges, also classed as lighters, are ubiquitous in Northern Europe, whereas relatively few have been excavated in the Mediterranean. There are some similarities among these vessels, such as a flat or relatively flat bottom, but there are significantly more differences. A major problem in comparing barges across regions is that those originating in the Mediterranean and those in Northern Europe were constructed using different techniques for diverse environmental, political and social conditions. Another means of studying the Pantano Longarini shipwreck is not to consider construction technique, origin, or even period, but to compare shape. The 14th century C.E. *rascona* excavated in Venice²⁶⁶ shares some superficial similarities with the Pantano Longarini ship.

NORTHERN EUROPEAN BARGES

An unusually high number of barges have survived in Northern Europe, leading scholars to class them as the “Zwammerdam-type” barge.²⁶⁷ In this region shipwrights building in late roman and early medieval Northern Europe were exposed to two traditions: the Mediterranean mortise-and-tenon construction and the native Romano-

²⁶⁶ Fozzati 2002-2003, 13.

²⁶⁷ de Weerd 1990, 75.

Celtic tradition.

Many vessels were built with the Romano-Celtic construction tradition, with alterations to fit the function and environment of the vessel. The tradition includes inland and coastal Northern Europe²⁶⁸ in the first few centuries C.E.²⁶⁹ This construction technique uses carvel planking,²⁷⁰ which is also employed in the Mediterranean shipbuilding tradition. The former, unlike the latter, does not edge-fasten the planks.²⁷¹ A ship built with the Romano-Celtic construction technique has planks fastened to frames with clenched iron nails and caulked seams.²⁷² Internal strength comes from alternately placed “knee- or forke-ended ribs” which increase transverse strength without increasing longitudinal rigidity.²⁷³

In addition to the native tradition, the Mediterranean practice of edge-fastening was brought north with the Roman military and colonists. Mortise-and-tenon joints were rarely used in Northern Europe. Softwoods were often chosen for planks in the Mediterranean, while extremely hard woods were utilized in the North, making mortise-and-tenon joinery more labor intensive and thus unaffordable. Edge-fastening never became dominant for a number of reasons, among which is it that it was a technologically difficult and intrusive tradition.

²⁶⁸ Arnold 1978, 31.

²⁶⁹ McGrail 1995, 139.

²⁷⁰ de Weerd 1978, 15.

²⁷¹ de Weerd 1978, 15.

²⁷² de Weerd 1978, 15-6.

²⁷³ de Weerd 1978, 15.

Although two construction traditions were available, M.D. de Weerd, the excavator of the Zwammerdam boats, now suggests that the Zwammerdam-type barges do not fall under the Romano-Celtic construction;²⁷⁴ even though in 1978 the construction was published as “native in origin but the size is in fact Roman.”²⁷⁵ These barges, which began appearing in the archaeological record after the first century C.E.²⁷⁶ are typified by several construction elements, because they were all built to serve a similar purpose. They tend to have a very low freeboard and are long and narrow,²⁷⁷ ranging in length from 18-34 m,²⁷⁸ with a beam from 2.8-4.4 m.²⁷⁹ All of these flat-bottomed river vessels are built with hard chines, often with an additional plank added for height.²⁸⁰ The planks are attached to transverse frames with large iron nails.²⁸¹ The Zwammerdam-type barges have a bilge chine strake or girder, which results in a nearly 90 degree angle at the turn of the bilge resulting in a boxy, U-shaped cross-section. Many vessels have been identified as belonging to the Zwammerdan type of barges, including New Guy’s House (second century C.E.²⁸²), Blackfriars 1 (2nd century C.E.²⁸³), Kapul-Avezaath (second century C.E.²⁸⁴), Zwammerdam 2,4,6 (second century C.E.²⁸⁵), Bruges (second to third centuries C.E.²⁸⁶), Pommeroeul (first through third

²⁷⁴ de Weerd 1990, 75.

²⁷⁵ de Weerd 1978, 16.

²⁷⁶ de Weerd 1990, 75.

²⁷⁷ de Weerd 1978, 15.

²⁷⁸ de Weerd 1978, 17; see also de Boe 1978, 25.

²⁷⁹ de Weerd 1978, 16-17; see also Lehman 1990, 77.

²⁸⁰ de Weerd 1978, 15.

²⁸¹ de Weerd 1990, 75.

²⁸² Marsden 1990, 66.

²⁸³ Marsden 1967, 47.

²⁸⁴ Lehman 1990, 80.

²⁸⁵ de Weerd 1978, 15.

²⁸⁶ Marsden 1976, 23.

centuries C.E.²⁸⁷), Bevaix (first or second century C.E.²⁸⁸), Yverdon (first or second century C.E.²⁸⁹), Druten (second century C.E.²⁹⁰) and Mainz (first to second centuries C.E.²⁹¹).²⁹² While these vessels have been extensively published, the goal of this paper is not to examine each ship individually, but rather to consider a well-documented construction type in relation to the Pantano Longarini shipwreck.

Without a keel and with a shallow draft the barges were largely restricted to river navigation.²⁹³ The cargo capacity was maximized while speed was minimized. The Rhine was a vital trade artery in the ancient world, with goods often being trans-shipped from river barges to seagoing merchantmen on the way to London.²⁹⁴ In this context, the Zwammerdam class of ships filled the need to transport cargo for trade and to support the Roman military.

MEDITERRANEAN VESSELS

A small number of Mediterranean barges have also survived from antiquity, although there are far fewer than the ones from the North Atlantic world. As with the Rhine cities, trans-shipment also occurred in the Tiber, although the barges that carried cargo to Rome were significantly different.²⁹⁵ Prior to the construction of the imperial

²⁸⁷ de Boe 1978, 22.

²⁸⁸ Egloff 1974, 82.

²⁸⁹ Weidman and Kaenel 1974, 73.

²⁹⁰ Lehman 1990, 77.

²⁹¹ Hockmann 1993, 126.

²⁹² Arnold 1978, 31; see also de Weerd 1990, 75.

²⁹³ Milne 1990, 82.

²⁹⁴ Milne 1990, 82-3.

²⁹⁵ Milne 1990, 82.

harbors at Ostia there was a need for lighters, or small barges, to move cargo from shore to the ships, and vice-versa, as many merchant ships were too big to make it into port (fig. 7.1).²⁹⁶ These tenders may have been called *lenunculi auxiliarii*.²⁹⁷



Fig. 7.1 Augustan mosaic of two merchant vessels from Ostia with a dolphin, Museo Civiltà Romana.

After the first harbor was built at Portus, river barges were in high demand.²⁹⁸ The Claudian Harbor at Ostia yielded the remains of two of these ancient river barges, Fiumicino 1 (2nd century C.E.²⁹⁹) and Fiumicino 2 (2nd century C.E.³⁰⁰).³⁰¹ It has been suggested that these two boats are *naves caudicariae* and would have been towed up the Tiber,³⁰² either by oxen³⁰³ or through human effort as seen in figure 7.2.

²⁹⁶ Casson 1965, 32.

²⁹⁷ Casson 1965, 32.

²⁹⁸ Casson 1965, 34.

²⁹⁹ Boetto 2000, 99.

³⁰⁰ Boetto 2000, 99.

³⁰¹ Boetto 2000, 99, 101.

³⁰² Boetto 2000, 101-2.

³⁰³ Morrison and Sodini 2002, 209.



Fig. 7.2 Towed river boat, Museo Civiltà Roman.

As already noted, the dating of these vessels is problematic. Boetto has tried to date them to the fourth to seventh centuries based on their construction method and associated material,³⁰⁴ while C14 analyses have placed them around the 2nd century C.E.³⁰⁵ Only the Fiumicino 1 ship will be discussed here as it has the greatest preservation and therefore allows a better analysis and discussion. Nevertheless, the Fiumicino 2 ship is very similar.

As it was found, the Fiumicino 1 shipwreck was 13.83 m in length, had a surviving height of 1.47 m, and a maximum beam of 4.57 m.³⁰⁶ This ship type has a rounded stern, elongated stem and a towing mast with cleats stepped forward.³⁰⁷ Fiumicino 1 was built with widely spaced unpegged mortise-and-tenons, with iron nails fastening the garboard to the keel and the planks to the frames.³⁰⁸ This type of

³⁰⁴ Boetto 2000, 99.

³⁰⁵ Boetto 2000, 99.

³⁰⁶ Boetto 2000, 99.

³⁰⁷ Boetto 2000, 102.

³⁰⁸ Boetto 2000, 100.

construction is not typical of the Mediterranean, although it has similarities with the Gallo-Roman tradition.³⁰⁹

The shape of the Fiumicino 1 is boxy with a rounded turn of the bilge. The lines show that it is a very different ship from the Pantano Longarini ship.³¹⁰ Indeed, it was less than half the length, and it had posts, not ramps.

Another river vessel has also been discovered in the delta of the Po River, near Venice. It is known as the Comacchio or Po Delta shipwreck. As found, this ship had a length of 21 m and a beam of 5.62 m.³¹¹ It was built differently from other Mediterranean vessels. Again, its planks and frames were secured by sewing and lashing.³¹² The floor timbers were extremely regular and regularly spaced, and there were no half frames present.³¹³ Despite the different construction method, this vessel also has a rounded, yet boxy cross-section.³¹⁴ Once again this vessel has posts, and no ramps, making it a different type of barge than the Pantano Longarini. Probably due to their similar functions, the Comacchio wreck and the Fiumicino lighters have very similar hull shapes, although with different construction methods.

Another barge different from those discussed above was also built in the Mediterranean region; Caligula's Nemi barges were built and sailed on an inland lake. They were not designed to carry cargo, but were flat bottomed as well, certainly to reduce draught. Designed to carry civic buildings including temples, they were

³⁰⁹ Boetto 2000, 101.

³¹⁰ Boetto 2003, Fig. 12.2.

³¹¹ Bonino 1990, 39.

³¹² Berti 1990a, Fig. 2, 10.

³¹³ Berti 1990b, Fig. 2.

³¹⁴ Bonino 1990, Fig. 1.

luxurious and profusely decorated.³¹⁵ The Nemi Barges were massive, boat 1 with a width of 20 m and a length of 71.3 m³¹⁶ and boat 2 with a width of 11.8 m and length of 65 m,³¹⁷ and, while built in the shell-first tradition,³¹⁸ presented many additional hull elements to add strength. Both of these vessels had three keelsons and employed cross-beams that did not fully penetrate the hull.³¹⁹ In addition to having radically different types of timbers, these vessels had a different method of propulsion; they were rowed.³²⁰ The lines drawings show an extremely wide beam, a concave bow and a convex, incurving stern.³²¹ The Nemi barges were constructed to withstand major stresses from the weight of the temples they carried. The shape and construction reflect at the same time their luxurious use, and the calm waters they were rowed in.

Despite these obvious differences, Mediterranean vessels showed some common features. They were built significantly different than their northern counterparts. These vessels did not have a hard chine, but were more rounded, although still retaining flatter bottoms than seagoing merchantmen. The cargo-carrying barges were boxy and designed to carry large loads. All three of these vessel types were built with a stem and stern post. The Nemi barges and the Fiumicino lighters were built in the mortise-and-tenon shipbuilding tradition, while the Comacchio vessel was sewn. The Pantano Longarini ship does not share its shape or construction features with these vessels

³¹⁵ Bonino 2001, 105.

³¹⁶ Ucelli 1950, tav V.

³¹⁷ Ucelli 1950, tav X.

³¹⁸ Bonino 2001, 99.

³¹⁹ Bonino 2001, 103.

³²⁰ Bonino 2001, 104-105.

³²¹ Ucelli 1950, Ricostruzione Della Prima Nave.

beyond being a rounded, flat-bottomed vessel.

RASCONA

While the Mediterranean barges share similar construction techniques with the Pantano Longarini ship, they do not have a similar shape. To find a closer parallel, based upon shape alone, one must travel to Venice 600 years later.

Around 1300 C.E. two ships were sunk outside of Venice, near the island of San Marco in Boccalama; one was a galley, the other a rascona.³²² Rascone were flat-bottomed lighters that rarely went to sea, instead traveling in the rivers and canals around Venice as well as in the lagoon.³²³ Iconography shows that the rascona had a high stern where the helmsman worked the rudders.³²⁴ The prow was turned in and up like a peak.³²⁵

The archaeological remains of the double-ended rascona found at Boccalama,³²⁶ provides supplementary evidence to the iconography. The framing is straight and regular; floor timbers cross the flat bottom of the vessel and end at the turn of the bilge.³²⁷ Futtocks are placed extremely low, beginning inboard of the turn of the bilge and continuing up the side of the vessel with a very hard chine.³²⁸ There is no keel. Instead there is a wide central plank less than half of the width of the planks on either

³²² Fozzati 2002-2003, 13-15.

³²³ Pizzarello 2002-2003, 44.

³²⁴ Pizzarello 2002-2003, 44.

³²⁵ Pizzarello 2002-2003, 44.

³²⁶ D'Agostino and Medas 2002-2003, 48, 53.

³²⁷ D'Agostino and Medas 2002-2003, 48, 53.

³²⁸ D'Agostino and Medas 2002-2003, 48, 53.

side. The bottom is completed with another large plank on each side of those.³²⁹ Another large plank is joined next, although narrowing at the extremities.³³⁰ All of the bottom planking has straight runs and there does not appear to be a post installed at either end, rather, the vessel simply curves upwards and narrows.³³¹ Interestingly, the archaeological evidence found at Boccalama does not match the description of the curving prow and high stern shown in the iconography.

The Pantano Longarini ship has some affinities to the rascona. It is certain that there are similarities between these two ships, but they are not enough to support this argument in a conclusive manner. Both are coastal barges and have straight runs of bottom planking. Moreover, the immediate impression one gets when looking at the bottom planking of a rascona is that a central plank and the wider outer planks meet at the extremities as the wales (GWL) at the turn of the bilge and the keel on the Pantano Longarini ship do, or nearly so.

Notwithstanding, when one compares the two vessels more closely, there are many differences. The use of the wales (GWL) at the turn of the bilge on the Pantano Longarini ship and the keel are similar to the bottom planking on the rascona, where the innermost three large planks meet at the extremities. Nevertheless, the rascona had five large planks, not just three. Additionally, the outboardmost planks in the rascona are not the ones that narrow, as opposed to the wales on the Pantano Longarini ship. The wales on the latter ship could have acted as proto-keels as they extend beyond the planking,

³²⁹ D'Agostino and Medas 2002-2003, 48, 53.

³³⁰ D'Agostino and Medas 2002-2003, 48, 53.

³³¹ D'Agostino and Medas 2002-2003, 48, 53.

however, this is not the case with the wide planking utilized in the rascona. The shape of the ships differ as well. The Pantano Longarini ship has gentle curves while the rascona has a boxy shape that is more similar to Northern European river barges. The hard chine and the futtocks spanning the turn of the bilge also bring the northern vessels to mind.

DISCUSSION

There are more similarities between the Mediterranean built ships and the Northern European ships than there are between any of these vessels and the Pantano Longarini barge. The Northern European river barges were extremely long and narrow, as opposed to the beamy Pantano Longarini ship. The former also has a hard chine while the latter has a rounded curve. The Northern European boats were also built in a different shipbuilding tradition.

The reconstruction of the Pantano Longarini ship has produced a rounded hull more similar to the Mediterranean ships than to those in the North. Yet, there are still few similarities between these ships and the reconstructed Pantano Longarini ship. The shape of the sheer is entirely different.

The rascona appears to have some similarities to the Pantano Longarini ship, but a deeper analysis suggests that it shares more features with the Northern European barges. Some of this may be due to its later date, but the overall shape of the hull suggests that the vessel was built for a different purpose than the Pantano Longarini ship, and thus it displays significantly different construction elements. The Pantano Longarini ship remains an example of a unique vessel.

CHAPTER VIII

CONCLUSION

The Pantano Longarini wreck has been publicized as the only surviving example of a Roman ship with a transom. While not a transom, this vessel did have a unique stern construction in the shape of a ramp. Originally published as a seagoing merchantman, it has been reconstructed here as a specialized coastal barge. These are two very different vessel types, built for different needs and with different considerations in mind. Comparison with other barges reveals some similarities in hull shape with Mediterranean examples. The closest parallel in shape is the rascona barge found at Boccalama, Venice, which postdates the Pantano Longarini ship by several centuries. Although speaking specifically about the Eastern Mediterranean, Kingsley and Decker note that technological changes in ship construction are due to the private entrepreneur who was more efficient with materials and labor than ever before.³³² These same considerations also apply to the western Mediterranean. The end of the state-subsidized shipbuilding industry may have had a significant impact on a patron's willingness to invest capital in a large coastal barge. This unwillingness to take risks may have affected the way in which technological change occurred, given the dire consequences for a failed plan and the large investment required in building any large vessel were too great for excessive risk taking.³³³

³³² Kingsley and Decker 2001, 13.

³³³ Adams 2001, 294.

Assuming that this was a new type of vessel, and there are no reasons to suppose that this was not a common type of barge, it is pertinent to ask what was such a heavily constructed barge doing in a shallow anchorage with only a (possible) small town nearby?

Heavy cargoes were on the move in the seventh century C.E. Some Sicilian towns were flourishing, evidenced by monumental building projects.³³⁴ In the sixth century, numerous churches were erected making construction a major aspect of the economy, especially under Justinian.³³⁵ Marble was often transported from quarries in the Eastern Mediterranean for this purpose. The Marzamemi Church wreck (sixth century C.E.³³⁶) is a well-known example of this trade.³³⁷ The deep water Skerki Bank Wreck F (first century C.E.³³⁸) on the western side of Sicily was transporting stone, probably picked up at an entrepôt such as Carthage.³³⁹ Marble was often transported to Sicily, either as the final destination or en route to another locale. It is unlikely, however, that the Pantano Longarini ship was constructed for stone transport. There were no stone quarries on Sicily, or even in Italy during this period,³⁴⁰ and as a coastal barge, it would not be able to travel to a distant quarry.

The cargo probably consisted of local industrial and/or agricultural products. During late antiquity, the meat component of the ancient diet included pigs, sheep and

³³⁴ Wilson 1985, 325.

³³⁵ Morrison and Sodini 2002, 188-9.

³³⁶ Kapitän 1969, 125.

³³⁷ Kapitän 1969, 122.

³³⁸ McCann and Oleson 2004, 91.

³³⁹ McCann and Oleson 2004, 99-100.

³⁴⁰ Sodini 2002, map "Sources of marble in the Roman world."

goats,³⁴¹ after the fourth and fifth centuries C.E. goat and sheep superseded pork in the diet.³⁴² In some areas horses and also camels were consumed.³⁴³ In addition to livestock, Agrigento, along the southwestern coast, had a sulphur industry.³⁴⁴ The ship could have transported sulphur, metals, dolia, amphora, roof tiles or timber. The strength of the construction, however, seems far too great for ceramics alone, and wood is plentiful around the island thus it would be odd to build such a large vessel simply to transport lumber.

While it is not clear what the Pantano Longarini ship was designed to carry, the most likely cargo seems to be livestock, being moved between small towns or villas to a larger market along the coast, or perhaps even acting as a ferry. The vessel was clearly purpose-built and designed to carry an extremely heavy cargo. Sicily has not been as intensively surveyed and excavated as mainland Italy,³⁴⁵ making it difficult to determine settlement patterns and wealth of individual regions. Sicilian cities were on the decline starting in the fifth century, however, market towns and road stations confirm continued occupation.³⁴⁶ Sicily maintained a villa system in rural areas and did not join the growth of villages as seen in most of the Mediterranean until the fifth century.³⁴⁷ The Letters of Gregory the Great at the end of the sixth century suggest that small land holdings and large estates continued to co-exist in late antiquity.³⁴⁸ Where luxury villas were no

³⁴¹ Morrison and Sodini 2002, 200.

³⁴² King 1999, 190.

³⁴³ Morrison and Sodini 2002, 200.

³⁴⁴ Finley, Mack Smith, and Duggan 1986, 42.

³⁴⁵ Wilson 1985, 313.

³⁴⁶ Wilson 1985, 329.

³⁴⁷ Morrison and Sodini 2002, 177.

³⁴⁸ Wilson 1985, 329.

longer in use, small peasant villages appeared around, or even in, the ruins.³⁴⁹ The countryside remained well-populated with villages and larger farms.³⁵⁰

In this sense, this unique ship provides more information than just what is gathered from its construction method; it also relates social history. Any boat this massive was a large investment. Ships of this magnitude do not seem to have been regularly built in late antiquity. Harbors and ship capacities began decreasing in size after the fourth century C.E.³⁵¹ Ship capacities declined from a probable size of 50,000 modoi in the second century to perhaps near 1000 modoi, (8 metric tons, 6 tons burden) in the fifth century.³⁵² Although still present, large capacity vessels, such as the Alexandrian vessels with capacities of 70,000 and 20,000 modoi (560-160 tons), were rare.³⁵³ Smaller ships became typical for late antiquity, especially in the West.³⁵⁴ Of the 11 well-published vessels from the fifth through the ninth centuries, the majority are between 12 and 18 meters, with only two larger wrecks: Tantura B at 18-23 meters³⁵⁵ long and the Pantano Longarini vessel at approximately 31.5 m. After the population declined from war, famine and the plague, the reduced economy required fewer ships. Because the state was no longer subsidizing the construction of large vessels, private investments generated smaller boats.

Yet, the relative peace and prosperity of Sicily at this time may have created a

³⁴⁹ Wilson 1985, 329.

³⁵⁰ Finley, Mack Smith, and Duggan 1986, 42.

³⁵¹ Morrison and Sodini 2002, 209.

³⁵² Morrison and Sodini 2002, 209.

³⁵³ Morrison and Sodini 2002, 209.

³⁵⁴ Morrison and Sodini 2002, 209.

³⁵⁵ Kahanov, Royal, and Hall 2004, 122-3.

climate in which merchants might undertake ventures like these. Even if it is unlikely that a single entrepreneur could afford such a large vessel, the mechanisms by which a number of shippers could associate and order a barge like the one from the Pantano Lognarini are well documented, albeit from a later period.³⁵⁶ A coastal barge is not be a glamorous boat; it would bring far less prestige to the owner(s) than a seagoing ship.

Indeed, it is difficult to imagine a single individual would need a vessel of this size to take his cattle to market several times a year. Between journeys the vessel would not work, thus increasing the cost of its construction in relation to the income produced through livestock sale at market. It is more plausible that this vessel may have been a communal undertaking allowing its owners to ship their products to market, or even renting it to other potential users. One can even see such a vessel helping to maintain the fundamental infrastructure of the island. If this was so, for the community that built this boat, it must have been as necessary to have a large ship as freeways are necessary for mass transit today. Typically the local authority or magistrate would maintain these services. With the Eastern wars of the seventh century C.E., and Constantinople struggling to survive, there must have been little money remaining in the treasury for the maintenance of fundamental infrastructure. Instead, the cost suggests that the construction was a community effort. The capital required to purchase not only the materials, but also pay for labor would have been substantial.

Shipworm damage is not noted in any of the publications about the Pantano Longarini shipwreck. In addition, as the wood was found in such a high state of

³⁵⁶ Lane 1992, 115 note. 12.

preservation, strong enough to support not only its own weight but that of the excavation staff as well, it does not appear that the *teredo* worm has done extensive damage to the timbers. This may suggest several things. First, that the vessel was new or nearly so when it sunk, or that it operated in coastal waters and entered riverine estuaries regularly, preventing teredo worms from developing in its timbers. Second, that it must have been quickly covered by silt. Other excavated wrecks were newly constructed, possibly even on their maiden voyages when they sunk, such as Ma'agan Mikhael.³⁵⁷ The loss of the Pantano Longarini ship would have affected the local economy as the amount of financial and social capital invested in this ship was large. The destruction of the vessel, and most likely its cargo as well, would have had a lasting impact.

There are many questions about this ship that can never be definitively answered, and we are left only with a few plausible theories about its construction, shape, function, life and death. The Pantano Longarini ship was probably built by a community, as it was far too large of an investment for a single wealthy individual. It is possible that it sunk in a storm on its maiden voyage or shortly thereafter, leading to a catastrophic loss for the community that built it. It was most likely built to ferry or ship local products to some large market, perhaps even engaging in a form of geographically restricted cabotage. Whether the cargo was livestock, like sheep or horses, or an industrial product, like sulphur from Agrigento, or some other unknown product from the region, this vessel would have worked according to the local market cycles, trading seasonally. Especially if the cargo was livestock or produce, the movements of the ship would

³⁵⁷ Kahanov 2003b, 53.

reflect the agricultural rhythm for the region. The Pantano Longarini ship was built by a community to further its interests in a time when state relations were mainly focused on the eastern Mediterranean. The labor and cost saving techniques employed in the construction reflect its status as a workboat as well as the economic condition of its origin.

Future investigations in the local area may provide evidence to substantiate Baker's suggestion that there was a harbor nearby, providing additional information about the Pantano Longarini barge. Local and regional surveys may reveal additional barges from this period, which would continue to enlighten our knowledge of the often under-represented common classes, of both ships and people, in scholarly studies.

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APPENDIX A

REFERENCES TO THE PANTANO LONGARINI SHIPWRECK

The importance of the Pantano Longarini shipwreck has led to its inclusion in numerous publications. These papers and books often contain incorrect information and/or conclusions. The numerous citations require the reader to be aware of the problems related to the excavation and reconstruction of the Pantano Longarini shipwreck. This list of references is merely a sample and should not be considered inclusive.

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APPENDIX B

NAMING DEVICES ON ROMAN VESSELS

I have, and I pray it may be, the protection of golden Minerva, my ship has its name from her painted helmet. *Ovid*³⁵⁸

To understand how mariners in late antiquity expressed themselves and their cultures through ship names, one must examine literary texts, archaeological evidence and iconography. Literature reveals that these names were often displayed with a figural representation, called a naming device. Abstract qualities or ideas did not have an exact correlation between a depiction and the name; although this was a culturally understood image. Ovid provides such an example, above, with a helmet symbolizing Minerva.³⁵⁹ Literature rarely provides specific details about these images or describes the materials and attachment method. Shipwrecks have yet to yield conclusive evidence of a name or device that is well-published by the excavator. The only remaining physical evidence of this practice is iconographical such as in the Roman mosaics in the Dougga Museum in Tunisia, frescos from San Paolo and a few other media. Ship representations contribute to our understanding of the relationship between ancient mariners and the sea as many names connect the seafarers and their belief systems. An assessment of archaeological naming devices is possible by analyzing known ship names, images and their associated patterns. This aids in placing the naming device reportedly found on the Pantano Longarini shipwreck in its proper context.

³⁵⁸ *Ov. Tr.* I.X.1-2.

³⁵⁹ *Ov. Tr.* I.X.1-2.

NAMING TRADITION

As it happens today, mariners in late antiquity named their ships. Ship names were an expression of their culture. Literary texts, iconography and also archaeological evidence have shed some light on this subject in the last decades. We assume that they were named to make them distinct and easily identified while in port, as a matter of pride for the crew and perhaps to mark ownership or the home port. How did this tradition begin and why was such care taken to portray the name? In antiquity, boats were probably the most technologically advanced objects produced by man. Merchants financially invested in their ships while the crew invested emotionally. Both groups had to believe that storms, piracy or accidents would not sink the ship and kill or injure those aboard. Ship names provided a connection to the vessel and a sense of familiarity that eased crew fears. In addition, warship names served as a rallying point. The Themistocles Decree, although earlier than the period under study, assigned crews to a specific ship by name; because the men worked and had allegiance to just one ship vessel. Rowers had to cooperate in battle or face certain death, so names like “Bravery” or “Speed” urged them on. They gained strength, fraternity and pride in their feats through their identity as crew members. Perhaps this is why many Roman navy veterans’ tombstones include the name of the vessel on which they served.³⁶⁰

³⁶⁰ Casson 1971, 355.

NAMES

Ancient literature records the names of many ships. Aristophanes' *Frogs* mentions a vessel named for a "yellow hippo-rooster,"³⁶¹ reminding the reader of the same creature in Aeschylus' *Myrmidons*.³⁶² Plutarch includes a "lion"³⁶³ and the *Aeneid* references four names: "Centaur," "Sea Dragon," "Chimaera," and "Scylla."³⁶⁴ Others include *Minerva*,³⁶⁵ a vessel named for the "two goddesses" and "The Twin Brothers."³⁶⁶ The "two goddesses" were Demeter and Kore, and the twins were Castor and Pollux.

Roman ship names fall into five main categories, loosely based on Lionel Casson's suggestions: lesser deities, animals, geography, function and ship qualities,³⁶⁷ with tombstones providing much of the evidence. Both merchant and warship names are known from this period, including the Egyptian *Isis*³⁶⁸ and the Latin *Europa*.³⁶⁹ Many merchant vessels were named for deities of protection, healing, and safe passage for mariners,³⁷⁰ although boats with names like *Halion Gripphos* "sea-fishnet" and *Pontos* "sea" were clearly named for their function.³⁷¹

³⁶¹ Ar. *Frogs*, 932.

³⁶² Dover 1997, 181.

³⁶³ Plut. *Mor.* 248a.

³⁶⁴ Verg. *Ae.* V. 116, 118, 122.

³⁶⁵ Ov. *Tr.* I. X.1-2.

³⁶⁶ Acts 28.11.

³⁶⁷ Casson 1971, 352-4.

³⁶⁸ Lucian *Nav.* 5.

³⁶⁹ Ward-Perkins and Claridge 1978, 57.

³⁷⁰ Casson 1971, 359.

³⁷¹ Casson 1971, 360.

ICONOGRAPHY

Further examination of this subject requires exploration of contemporary and relevant iconography. These images are more than a simple representation of the subject, however. Images are influenced by the intent of the artist, their familiarity with the subject, the medium in which the artist works and the contextual function of the image. In order to correctly interpret iconography, it is imperative to understand these factors.

Source Analysis

The type and size of art requires consideration.³⁷² The scale of images found on coins prevents the incorporation of fine detail. Surviving examples are also frequently worn from handling. Many mosaics survive, but varying quality limits the amount of fine detail produced. Wall paintings provide additional features in color, although they are often faded and sometimes damaged. Carved reliefs provide another important source. Many exhibit weather damage: cracks and breaks can make it difficult to interpret the naming device. Yet the relief inherent in these carvings adds additional depth which no other iconographic medium provides. No one type of evidence or single piece clarifies what ancient naming devices looked like or how they were made. Nevertheless, studying them in conjunction highlights color, size, placement and/or relief.

Accounting for the type and size of art is not enough; scene context is also

³⁷² Blackman 1982, 81.

important. Nadav Kashtan suggests that depictions fall into one of two categories: 1) commemorations of those working with ships or 2) symbols for power, religion and wealth.³⁷³ Non-specific merchantmen were likely intended to display sea knowledge or to emphasize the owner's occupation.³⁷⁴ Katherine Dunbabin suggests that some ship owners may have displayed their vessels as a way to ask for protection from the gods and also to record ownership.³⁷⁵ In the Forum of Corporations at Ostia there is only one vessel with a naming device. It is possible that stock images were used for the others or that the intent was not to depict a specific ship but the owner's trade. Depictions such as these are still found outside of stores today, such as food and a glass illustrated on a sign outside of an English pub, or a picture of bread hanging outside of a bakery. In other contexts, images signaled more than just the trade of the owner. Emperors erected victory monuments, such as Trajan's Column, to display military and political dominance. Many ship depictions that will be discussed here are found on Trajan's Column, in Rome. It was erected to commemorate the conquest of the Danube region in 117 C.E., and being well preserved depicts many of the military and cargo vessels used in this military expedition. One must be careful to understand the context of the ship representation and thus the emphasis.

The amount of iconographic evidence and the type of vessels portrayed varies by period and location. In Roman North Africa, beginning in the fourth century C.E.,

³⁷³ Kashtan 1996, 324-5.

³⁷⁴ Friedman 1996, 186.

³⁷⁵ Dunbabin 1978, 127.

iconography loses much of its originality, instead using stock themes.³⁷⁶ The palatial villa complex at Piazza Armerina provides a further complication. This site, located in central Sicily, has yielded many mosaics, yet it is believed that the mosaicists, and even many of the materials, are North African.³⁷⁷ This creates difficulties in analyzing who commissioned and/or created the art and in determining which region the images represent.

The Kyrenia II image in the church of Pedoula on Cyprus is a modern example of the complexities involved in the creation, and our interpretation, of ship images. This depiction has many mistakes, although the artist twice saw the vessel and had access to photographs.³⁷⁸ Harry Tzalas suggests that errors occurred for three reasons: not understanding the ship, simplifications to match the style and changes to suit a Christian shrine.³⁷⁹ If errors can be introduced into iconography when the artist has the use of photographs, it suggests that the ancient artist was limited not only by his ability, but also by the constraints imposed on his art. This does not mean that iconography is not informative; rather it cautions us to view the images with a wary eye and to ensure that they are analyzed not only for what they contain, but also for the context in which they exist.

An additional feature of iconography is that artists depict fewer warships, preferring to illustrate fishing and merchant vessels during the period under study. After

³⁷⁶ Dunbabin 1978, 188-9.

³⁷⁷ Wilson 1983, 44, 59.

³⁷⁸ Tzalas 1987, 323.

³⁷⁹ Tzalas 1987, 324.

the beginning of the second century C.E., only two warship images are depicted, and both are scenes from *The Odyssey*. One possible explanation for this is that peaceful times have affected the types of vessels present in actual harbors and therefore represented in marine scenes. Another influence increasing the focus on merchant and fishing boats is the use of encaustic on all vessels. Pliny records that warships had been painted for some time, but that merchant ships had just recently begun this practice.³⁸⁰ This is not paint as we think of today, but encaustic, which is wax mixed with pigment, heated and brushed on.³⁸¹ The brightly colored merchant vessels became more aesthetically pleasing and were therefore increased in building decorations.

Articulated Names

Only three known images have the name written directly on the vessel; of these, only one is Roman. The earliest, an elaborate ivory votive plaque from the Temple of Artemis Orthia, Sparta, dates to the late seventh century B.C.E. and the name *Fopθαία* or “Orthaia” appears across the bow of a warship.³⁸² On the second example, from Nymphaion on the Black Sea, in a Sanctuary of Aphrodite and Apollo, the name *Isis* is inscribed on the bow of a vessel dated to the mid third century B.C.E.³⁸³ In addition, a nameplate with a horse head and the head of one of the Dioskouroi is behind the proembolion. Multiple protective names fit well with the Isis/Dioskouroi, as both of these deities protected sailors from harm, and were associated together in later

³⁸⁰ Plin. *HN*. 35.49.

³⁸¹ Plin. *NH*, 35.149; see also Plin *NH* 35.49.

³⁸² Dawkins 1929, 214-215.

³⁸³ Basch 1985, 129; see also Murray 2001, 250.

mythology.³⁸⁴ William Murray suggests that this was an Egyptian vessel sent to spread the cult of Isis and that similarities between Aphrodite and Isis caused the priests to commission the fresco.³⁸⁵ The third example is an extremely detailed merchant vessel graffito found in house I.15.1, Pompeii, dating to the first century C.E.³⁸⁶ The name *Europa* is carved under the wales. Zeus carried Europa across the sea, but she was not considered a protective deity for mariners.

The *Europa* graffito had an unknown purpose, however, both of the early vessels had a clear sacred connection. The corpus of available evidence suggests that only important vessels, such as sacred ships, had their names articulated. Merchant vessels and warships most likely did not. Trajan's Column supports this theory as warship images on the column are extremely detailed, including draped ropes carved across the nameplate, yet no written names exist (fig. B.1). In this case it is unlikely that an artist would choose to display only figural name representations in such a precise image.

³⁸⁴ Witt 1971, 126 see also Helms 1980, 105, 116.

³⁸⁵ Murray 2002, 551.

³⁸⁶ Ward-Perkins and Claridge 1978, 57.



Fig. B.1 Trajan's Column, nameplate with half serpent, half man, Museo Civiltà Romana .

A written name suggests that rowers and observers were capable of reading the name to identify the ship. While there is no direct evidence from the Roman period on mariner literacy rates, there has been considerable discussion over the Themistocles Decree and the Athenians' ability to read. Murray strongly argues that names must have been regularly displayed on ships as the Piraeus Naval Inventories list multiple contemporary warships with the same name.³⁸⁷ He contends that if the rowers could read a name from the Themistocles Decree,³⁸⁸ surely they could read it on the ship itself.³⁸⁹

³⁸⁷ Murray 2002, 542-3.

³⁸⁸ Meiggs and Lewis 1988, 52. While the authenticity of the decree is an issue, Meiggs and Lewis contend that it is based on an authentic decree.

³⁸⁹ Murray 2002, 542-3.

Not everyone agrees that rowers were literate. Barry Strauss contends that they received their assignments from public readings.³⁹⁰ Rosalind Thomas furthers this argument, suggesting that literacy, beyond recognizing one's own name, was not widespread in Athens even into the fourth century B.C.E. Writing was used to supplement the primary, oral record.³⁹¹ Therefore, figural devices would aid ship identification far more than written names. It is no great leap to assume that the common Roman was no more literate than a Greek. Indeed, the Roman iconographic record has an overwhelming tendency towards name depictions rather than articulation.

NAMING DEVICES

Determining the method of display for ship names requires further analysis of literary texts. Known Greek devices include the *ἐπίσημον* and *παράσημον*.³⁹² Morrison defines *ἐπίσημον* as “the panel of the prow of an oared warship containing a symbol or figure to indicate the ship's name” and *παράσημον* as “the panel on each side of the bow of an oared warship facing half-front containing a symbol or figure illustrating the ship's name.”³⁹³ The Latin translations of these terms are *episemon* and *parasemon*, respectively.³⁹⁴

Many scholars have discussed ship names and even naming devices, but few have explored what the devices actually looked like and how they were attached to the

³⁹⁰ Strauss 2000, 267.

³⁹¹ Thomas 1989, 15-94.

³⁹² Casson 1971, 344.

³⁹³ Morrison 1996, 377-8.

³⁹⁴ Casson 1971, 344.

bow. When Diodorus describes a trireme fleet he mentions the “insignia on the bows.”³⁹⁵ Aeschylus describes watching a specific ship because “it is well marked.”³⁹⁶ In *Acts* the sailing vessel *Dioskouroi* is known by its sign.³⁹⁷ Finally, another *Isis* has “figures of the goddess, Isis, after whom the ship is named, on either side.”³⁹⁸ As already discussed the two goddesses, ancient authors note the presence of multiple naming devices used to differentiate ships with the same name, perhaps by employing primary and secondary images. Hippocrates mentions the Greek “Asclepiadic Ship” having Helios, the sun god, as the naming device and he also suggests that Hygieia be added as a second device.³⁹⁹ Then the vessel would carry devices of both the god of Medicine and the goddess of Health. It is important to note that in this instance the vessel’s name is not directly reflected in the images. By giving each ship several figures, they retain a unique identity although sharing a common name, such as Helios.

Naming devices took several forms, including paintings, carvings, and bronze plaques.⁴⁰⁰ Aeschylus’ *Myrmidons* yields evidence for painted devices when the “horse-cock” paint melts during a fire.⁴⁰¹ In some cases, precious metals or other luxury materials were used as references to gilt devices attests.⁴⁰² Seneca notes that a ship is not necessarily a good sailing vessel just because “it is painted with costly colors nor

³⁹⁵ Diod. Sic. 13.3.2.

³⁹⁶ Aesch. *Supp.* 714.

³⁹⁷ *Acts* 28.11

³⁹⁸ Lucian *Nav.* 5.

³⁹⁹ Hippoc. *Ep.* 17.

⁴⁰⁰ Casson 1971, 345.

⁴⁰¹ Aesch. *Myrmidons* (fr. 134).

⁴⁰² Ar. *Ach.* 54.1.

when its prow has silver or gold nor when the emblem is engraved with ivory.”⁴⁰³

Aristophanes’ hippo-rooster is a “symbol engraved on ships.”⁴⁰⁴ Carved or cast plaques would likely have been painted as well. In *Myrmidons* the horse-cock is described as fastened to the vessel and painted.⁴⁰⁵

The archaeological find of marble *ophthalmoi* from the fifth century B.C.E. Tektaş Burnu shipwreck have visible traces of pigment providing evidence of paint on the stone. Naming devices were probably attached to the ship in a similar method as *ophthalmoi* as lead nails have survived.⁴⁰⁶ Cast or carved plaques were most likely treated similarly to ship eyes: painted and attached with nails. In many of the images the naming device is located directly behind or above the ship’s eye, and seems to be a natural continuation of this decoration.

Animals

Ships were named after animals, both real and mythological, since there are devices depicting these creatures.⁴⁰⁷ When multiples of the same animal are used, or when an animal occurs in combination with others, the name most likely differs than when the animal is represented alone. The ship may have derived its name from the animal depicted or it may have symbolized a quality or abstract name such as “Bravery.”

Birds, for example, may symbolize diverse meanings. A first century C.E. monument from Aquileia has a griffin behind the proembolion. The funeral monument

⁴⁰³ Sen. *Ep.* LXXVI.13.

⁴⁰⁴ Ar. *Frogs* 933.

⁴⁰⁵ Aesch. *Myrmidons* (fr. 134).

⁴⁰⁶ Nowak 2001, 86-7.

⁴⁰⁷ Casson 1971, 357.

of Cartilius Poplicola in Ostia survives from the second half of the first century C.E. and has a warship with a plaque containing an eagle. A Roman relief believed to belong to the same century shows a naming device of a seabird landing directly behind a three-pronged ram. In the triclinium of Piazza Armerina, a heavily damaged vessel has a naming device containing two fowl facing each other with scrollwork below (fig. B.2).

Griffins, mythological creatures known for their fierceness, may have represented a name typifying this quality. The birds may symbolize actual birds like *Aquila* “Eagle”⁴⁰⁸ or they could represent a quality such as speed with a name like *Pinnata* “Winged.”⁴⁰⁹ As the eagle is the bird of Jupiter, its use would suggest a desire to call for the god’s protection. The numerous surviving bird types demonstrate that figural names were easily identified.

A model from Beth Mare, Syria dated to the second century C.E., has a snake curling around the wale and up the stem. “Snake” does not survive as a ship name from literature or inscriptions, yet this animal could have represented itself, qualities associated with snakes, or perhaps even Asclepius.

⁴⁰⁸ Casson 1971, 357.

⁴⁰⁹ Casson 1971, 357.



Fig. B.2 Mosaic of two fowl facing each other with scrollwork below, Piazza Armerina .

Dolphins appear in many naming devices from antiquity. They are used alone, in multiples, and with other sea creatures. A dolphin is outlined on a bow of an Augustan era mosaic from Ostia depicting two merchant ships (fig. 7.1). A Madrid relief celebrating a naval victory, dating from the first century B.C.E. or C.E., includes five boats, two of which have two dolphins and a hippocampus (seahorse) on the nameplates. Trajan's Column contains a vessel with a dolphin swimming from each side of the device towards a damaged central object (fig. B.3). The third century C.E. Tunisian mosaic "Dionysus and the Tyrrhenian Pirates," has two naming devices, one displaying

two dolphins, the other a hippocampus.⁴¹⁰ Piazza Armerina, dated to the fourth or fifth century C.E., includes a boat with a dolphin in a double border (fig. B.4). Also in Piazza Armerina, a partially damaged naming device contains two dolphins on the bow (fig. B.5).



Fig. B.3 Trajan's Column boat six, nameplate split in two, dolphins on top, spirals on bottom, Museo Civiltà Romana.

⁴¹⁰ Hippocampi do not always appear with dolphins. Two of the boats in the Madrid naval battle relief picture a single hippocampus each.

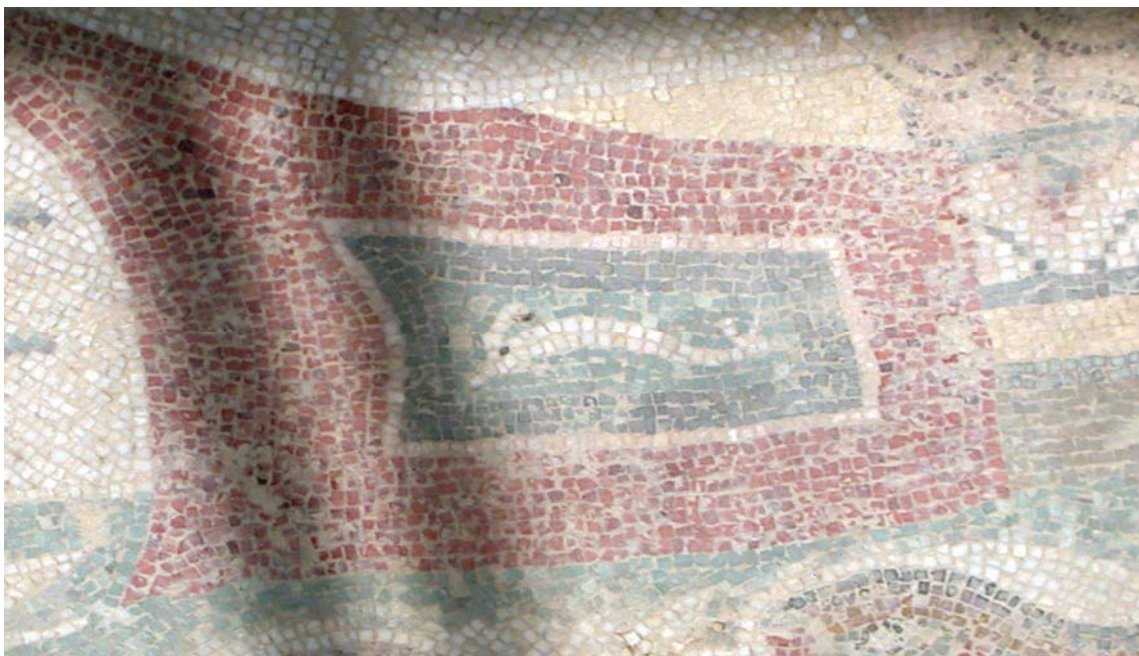


Fig. B.4 White dolphin in border, Piazza Armerina.



Fig. B.5 Corridor of the Great Hunt, two swimming dolphins on partially damaged scene, Piazza Armerina.

The dolphin theme occurs repeatedly with some modifications, possibly signifying different names or new display conventions. A single dolphin may represent

the ship's ability or the mammal itself. Because the dolphin is often associated with Venus, it may also be employed to encourage the deity to protect the vessel in a fashion similar to Jupiter and his eagles. Dolphins may also represent the fable of Dionysus and the Tyrrhenian Pirates, in which the latter were turned into dolphins.⁴¹¹ When appearing with other animals, such as a hippocampus, dolphins may relate to the sea in general, to Poseidon, to mythological creatures or a mythological event, such as Arion riding a dolphin to shore.

Trajan's Column has several extremely detailed examples of river warship bows from the Danube. One has a single hippocampus or merman with one outstretched arm holding a round object (fig. B.1). Another has several figures inside; although difficult to identify, they appear to be two (?) hippocampi and at least two winged figures (fig. B.6). Another boat from the same column has a severely damaged nameplate containing a single hippocampus (fig. B.7).

Trajan's Column provides significant evidence for the use of naming devices. In particular, that three vessels contain hippocampi suggests that they all may have had similar names. They may have all shared a primary name, perhaps to represent their military unit, with each boat then having a different secondary name to distinguish among them. The cargo boats on the column do not have naming devices. This may represent a separate local tradition or that the vessels were not deemed of sufficient status to merit a name.

⁴¹¹ Philostratus *Imagines* 1.19.10-18.



Fig. B.6 Trajan's Column, nameplate with two (?) hippocampi and two (?) winged human figures, Museo Civiltà Romana.



Fig. B.7 Trajan's column, nameplate with a single, severely damaged hippocampus, Museo Civiltà Romana.

Human Figures

Roman vessels were named after deities, people and abstract ideas. The figural representations of these names were often in the form of protomes (solitary human

heads), full bodies or scenes. The first century B.C.E. provides several naming devices of this type. The Praeneste Relief has a distinct three dimensional box in high relief angled forward and slightly to port with a damaged, unidentified head inside. A second naming device, located in front of this box, is a Medusa head laid flush with the side of the ship. A funeral marker from Rome has an indistinct face at the prow of the warship directly behind the eye. The first century B.C.E. to C.E. warship from Pozzuoli has two naming devices: Medusa's head, and an unidentified standing figure.

The first century C.E. yielded many images. A Pompeian tombstone depicts a sailing merchantman entering port with the profile of a head carved into the stem. The Arch of Orange has five ship prows carved in relief; two of them have protomes inside a square nameplate. A third vessel has a man's face carved on the outrigger.

Frescoes at San Paolo, Italy, dated to 125 C.E., depict three small pleasure craft with highly detailed naming devices. The first has a standing figure, presumably a male soldier, overlapping the border. He holds a sword in his left hand and a small object in his right (fig. B.8). The second boat has a bordered name plate with a reclining figure, nude from the waist up, offering a food (?) laden tray to a standing, fully dressed male (fig. B.9). The final image contains a seated figure in the center flanked by two standing, possibly female, figures (fig. B.10). All three have irregular borders, incorporate numerous colors and intricate details.



Fig. B.8 Fresco with a single soldier holding a sword in nameplate, Museo Palazzo Massimo Alle Terme.

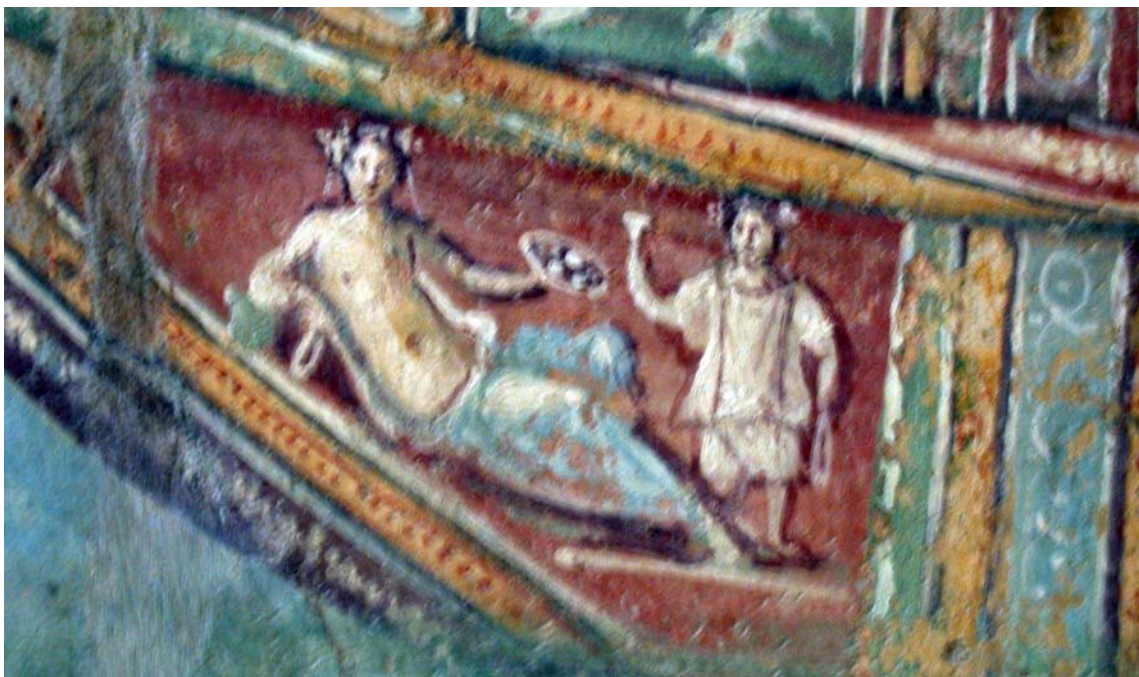


Fig. B.9 Fresco with a reclining figure offering a tray of food (?) to a standing figure, Museo Palazzo Massimo Alle Terme.



Fig. B.10 Fresco with three figures in nameplate, Museo Palazzo Massimo Alle Terme.

The third century C.E. provides two examples. The Torlonia Relief of 200 C.E. contains two merchantman bows, both with figures carved into the stem. The first has a man holding a torch; the second contains a man's head and shoulders. Tunisia provides a mosaic depicting Ulysses and the Sirens. The naming device is exceptionally detailed with a man's head and nude shoulders on a green background.

The Museo Capitolino, Italy, houses two undated warship images with human figures in relief, probably from the same building. The first has a helmeted Athena protome facing forward on the stem (fig. B.11). The second has the "hand of Mercury with winged cap"⁴¹² below breaks in the screens.

⁴¹² Jones 1912, 262.



Fig. B.11 Relief with square border behind eye and helmeted Athena head on stem, Museo Palazzo Massimo Alle Terme.

Eleven of the fifteen human figures depicted in these examples are protomes. This is indicative of a widely known and instantly recognizable image. Bodies appear to indicate action, such as carrying a torch, which may imply an abstract quality. Multiple figures in a single device may represent mythological scenes, personification of geographical locations or military victories.

Other Motifs

In addition to human figures, names were represented by various other icons such as stars, trumpets and plants. These devices represent a range of names. Stars are depicted in several images. Pompey's coin of the third century C.E. depicts a boat with a naming device comprised of a seven-pointed star inside of a border. A gravestone from the second century C.E. in the Museum of Nauplia also has a seven-pointed star at the bow of a merchantman. The star may symbolize the name "Star," represent a deity, or it could have been an appeal for navigation assistance.

Plants are present in several ship depictions. On a ship from the Arch of Orange a wheat stalk appears behind the bronze ram, although no border outlines the dimensions of the device. The wheat may represent a name like *Annona* “grain-supply.”⁴¹³ In this case the vessel would be named for its function if it was intended to escort grain-ships. A mosaic in El Djem, Tunisia from the “House of the Dionysiac Procession,” dated to the second century C.E., has a palm branch and a crown on the prow.⁴¹⁴ Again, there is no distinct border. Piazza Armerina contains a mosaic of a flower in the nameplate of a fishing boat (fig. B.12). The palm combined with the crown suggests a city symbol similar to the Rhodian rose while the flower could have many meanings.



Fig. B.12 Flower mosaic on nameplate, Piazza Armerina.

⁴¹³ Casson 1971, 357.

⁴¹⁴ Foucher 1967, 90-2.

The flagship on Trajan's Column has a device containing a garland on either side of what appears to be a statue, perhaps of Victory (fig. B.13). Another boat from the column depicts a naval battle fought with two different types of warships; this vessel may be named for an important victory (fig. B.14). Both images are designed to show domination and imperial power.



Fig. B.13 Trajan's Column, nameplate with garland on either side of a statue, Museo Civiltà Romana.



Fig. B.14 Trajan's Column, nameplate with two different types of warships, Museo Civiltà Romana.

Pozzuoli provides a warship relief dating between the first centuries B.C.E. and C.E. that shows a trumpet at the bow above the proembolion. The name *Salpinx* “Trumpet”⁴¹⁵ is a surviving Greek ship name; thus, it is possible that this is an actual representation.

Piazza Armerina has provided additional examples of figural name representations. One is a spade shape, perhaps representing an ivy leaf (fig. B.15). The other is a swastika (fig. B.16).

Many figures act as symbols for ship names. While all are not understood, some images had a one-to-one correspondence with the name. All images would not have had this close relationship; geographical locations and abstract ideas must have had a symbol easily identified by contemporary people. These images must have conveyed some distinct meaning for the sailors aboard, or the people viewing the ship.

⁴¹⁵ Casson 1971, 353.



Fig. B.15 Spade-shaped mosaic (ivy leaf?) nameplate, Piazza Armerina.

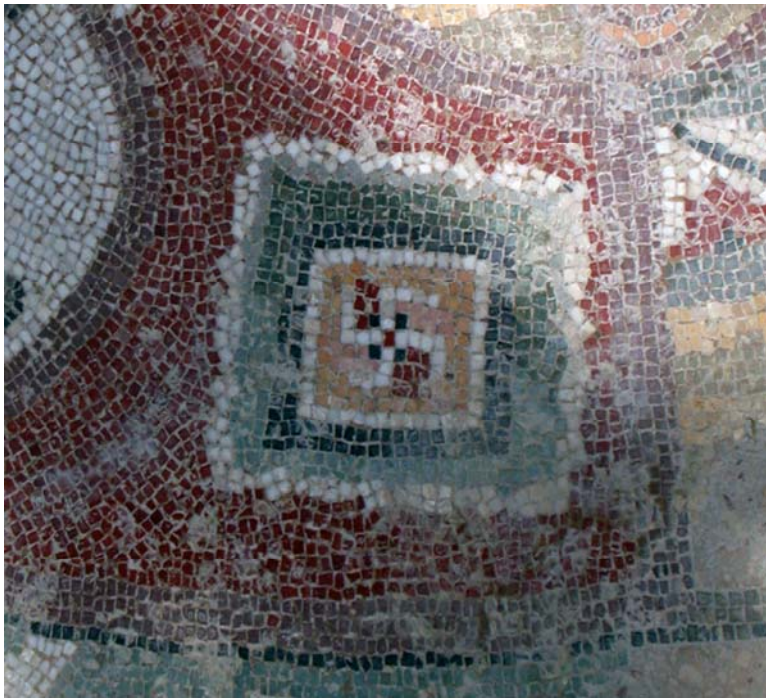


Fig. B.16 Mosaic of a swastika on nameplate, Piazza Armerina.

Absent Interior Design

Some images, ranging in date from the second to the fifth centuries C.E., have naming devices containing borders with interior color, but they lack detail. Why the artists chose not to provide detail on so many naming devices is unclear. It is possible that these images are taken from catalogs lacking detailed devices. Alternately, these vessels may have been purposely left unidentified. The artist may not have been creating a specific vessel, but simply adding a ship to a marine scene. In this case, a named vessel may have been unnecessary and could possibly detract from the scene.

ARCHAEOLOGICAL EVIDENCE

Several possible naming devices have been recovered. These include museum objects with no provenance, possible archaeological finds, one clear, yet unpublished, archaeological example and the description of the naming device found on the Pantano Longarini shipwreck.

A first century B.C.E. bronze plaque in the Fogg Art Museum has a bust of the goddess of Victory.⁴¹⁶ This plaque has at least two attachment holes, probably for nails or bolts, and shows evidence of burning as well as possible submergence in the sea due to large amounts of sand remaining in crevices. G. Hanfman suggests this may once have belonged to a ship.⁴¹⁷ A bronze bust of Mars is also believed to have been retrieved from a wreck.⁴¹⁸ While these two figures cannot be conclusively matched to a

⁴¹⁶ Hanfman 1969, 63.

⁴¹⁷ Hanfman 1969, 63.

⁴¹⁸ Hanfman 1969, 66-7.

particular shipwreck, the shape of the Victory plaque is very similar to that found on the Praeneste Relief, including the projection from the hull. The bust of Mars is quite small and oddly shaped. While this could be a naming device for a small pleasure craft it was probably just cargo aboard a vessel and should be viewed as cautionary: not all shipwreck artifacts should be regarded as potential naming devices.

The first century B.C.E. Mahdia shipwreck has two probable naming devices, one of Dionysus, the other of Ariadne. Both are cupreous and are clearly designed to fit on the outrigger of the vessel.⁴¹⁹ In addition, there are holes on the backplate of each figure,⁴²⁰ further supporting the theory that naming devices were attached in a similar method to ophthalmoi. Each side of the vessel had a different image, suggesting an alternative display, as opposed to the primary and secondary images suggested earlier. However, as this was not a proper excavation, but a salvage operation, these devices cannot be conclusively proven to represent naming devices.

Although the Lake Nemi barges were unfortunately burned, a cupreous Medusa head, mounted on a hollow cube lacking the rear face, has survived (fig. B.17). This figure does not have any obvious means of attachment to the ship other than sliding onto a timber; there are no fastening holes in the cube or through the head. It is possibly simply a beam cap, however, other beam caps were found and they are all animals with rings held in the mouth, thus it is likely that the Medusa head was a naming device. Again, however, it cannot be conclusively proven.

⁴¹⁹ Horn 1994, Fig. 9, 10.

⁴²⁰ Horn 1994, Fig. 3-6.

A naming device was found in situ at the ancient harbor at Pisa which was recently excavated. Ship C, a river craft dated to the Roman period, was found with a nameplate fixed to a thwart.⁴²¹ Five letters were carved on this board, ΑΚΛΔΩ (akldō) which has been interpreted by the excavators as a Greek transliteration for “alcedo” or seagull.⁴²² The name is probably not seagull, but a variant of the latin *alcyon* or halcyon. Another possibility is that it is a Latin variant of the Greek word αλκυών, which is usually identified with the kingfisher.⁴²³ It is interesting that Greek letters were carved on a name plate that was attached to the ship. However, it differs significantly from the iconographic evidence as the name is articulated, not represented. Yet, a bird as the name of the vessel does support the many iconographic portrayals of birds as names.



Fig. B.17 Possible naming device with a Medusa head, Museo Palazzo Massimo Alle Terme

⁴²¹ http://www.navipisa.it/scavo_naveC_nome.htm, 28 November 2006.

⁴²² http://www.navipisa.it/scavo_naveC_nome.htm, 28 November 2006.

⁴²³ Personal communication, Steven Oberhelman, 13 December 2006.

PANTANO LONGARINI

As noted in chapter four, the naming device on the Pantano Longarini vessel was described as “a plaque with Greek letters and a horse’s head above the letters, about 1.20 m long,”⁴²⁴ it was “metallic and banana coloured” which suggests it may have been gilt.⁴²⁵ Throckmorton described working with Garifolo in an attempt to determine which letters were carved on the plaque. However, being nearly illiterate, Garifolo could not precisely identify what he saw.⁴²⁶

In contrast to the device described by Garifolo, Kapitän’s unpublished manuscript suggests that the device was not so intricate. Unidentified workers described the naming device as a “plank or board” with Greek letters.⁴²⁷ There is no mention of a horse head or of any gilding. The manuscript continues with a correction by Spatola, who said the inscription was not on a board, but on the rounded end of a beam.⁴²⁸ In addition, Kapitän retains a handwritten page in his archives including only four Greek letters,⁴²⁹ most of which are dissimilar to those Throckmorton documented, although the context of the archival letters is unclear. It is possible that the workers may have been exaggerating when describing the naming device to please a foreign guest.

The letters themselves are problematic. Throckmorton admitted that because of Garifolo’s near illiteracy he was influenced by attempts to determine which letters were

⁴²⁴ Throckmorton and Throckmorton 1973, 260.

⁴²⁵ Throckmorton and Throckmorton 1973, 260.

⁴²⁶ Throckmorton and Throckmorton 1973, 260-2.

⁴²⁷ G. Kapitän, ms, The Pantano Longarini Wreck Story, INA Archives, Siracusa, Sicily, 2.

⁴²⁸ G. Kapitän, ms, The Pantano Longarini Wreck Story, INA Archives, Siracusa, Sicily, 2.

⁴²⁹ Personal Communication, Gerard Kapitän, May 27, 2006.

present.⁴³⁰ An uneducated workman probably would not have been able to specify these as Greek letters, which he would not see in daily life. His ability to correctly identify unfamiliar letters is doubtful at best.

The only parallel for having both the image and the name is the Isis/Dioskouroi of Nymphaion, dated to almost 1,000 years before the Pantano Longarini shipwreck. That was a sacred or state vessel; the Pantano Longarini ship was clearly a working boat. It is doubtful that it would have had the high status distinction of an articulated name and a figural representation. In addition, while the use of precious metals is noted in literature, it is not seen in any of the other contemporary images.

A plain inscription, however, either on a separate board as at Pisa, or directly onto a beam of the vessel is highly likely. Although there is a lacuna of images after the fifth century C.E., the decline of the economy implies a reduction in scale of naming devices, from works of art to simple inscriptions. This follows the pattern of a general reduction in craftsmanship on the ships themselves. In addition, the use of Greek letters is supported by Sicilians speaking Greek at the time, and is now highly likely with Greek letters seen on Pisa C. Additionally, literacy rates may have increased with the onset of Christianity and people's desire to read the bible.

DISCUSSION

Naming devices showed tremendous continuity during the Roman period, such as the wide presence of dolphins and hippocampi. While image complexity appears to

⁴³⁰ Throckmorton and Throckmorton 1973, 260-2.

have increased, the placement and general content remained static. However, archaeological evidence suggests that in late antiquity, the craftsmanship of naming devices was reduced to save labor and costs, and images were replaced with simple inscriptions.

Ship names and the images that symbolize those names have been divided into five categories: lesser deities, animals, geography, function and ship qualities. These were represented by direct depictions or symbolic images. As numerous contemporary ships shared the same name, it follows logically that secondary images would differentiate the vessels; thus the appearance of singular vessels with multiple devices. The Isis/Dioskouroi, with the common name of Isis, needed the secondary Dioskouroi to prevent confusion in harbor. Alternately, some ships simply were named after multiple deities with both naming devices used to identify the vessel, as was probably the case with the Mahdia wreck. While no ship images found in situ are directly associated with gods or goddesses, some vessels named for more than one deity would have well placed and similarly sized devices, while others may have used primary (larger) and secondary (smaller) devices.

As shipwreck excavations continue the probability of finding additional naming devices increases. These artifacts can be correctly interpreted within the framework of change over time and categorical groupings, with the Pantano Longarini shipwreck as an example. Correct identification of artifacts as figural name representations, and an identification of which name, will enable scholars to better understand ancient mariners and their connection to the sea.

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Articles in Journals (not refereed)

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