

**THE COPPER ARTIFACT ASSEMBLAGE FROM AN OTTOMAN
PERIOD SHIPWRECK IN THE RED SEA**

A Thesis

by

KATHRYN EWALT WILLIS

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 2002

Major Subject: Anthropology

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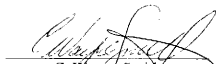
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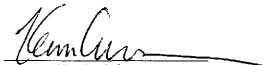
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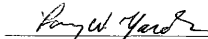
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ABSTRACT

The Copper Artifact Assemblage from an Ottoman
Period Shipwreck in the Red Sea. (August 2002)

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This thesis is a study of a group of copper alloy artifacts excavated from an 18th-century shipwreck in the Red Sea. The shipwreck is located near Sadana Island off the Egyptian coast and is hence referred to as the Sadana Island shipwreck.

The Sadana Island shipwreck provides important insight into the little known nature of maritime activity in the Red Sea region prior to the French invasion of Egypt. In addition to the historical background of Red Sea seafaring, the accounts of contemporary European travelers are examined. These accounts are unique descriptions of seafaring, trade, and travel during this time.

The excavation of the shipwreck by the Institute of Nautical Archaeology (INA-Egypt) is discussed followed by a catalogue of the recovered copper alloy objects. The copper alloy artifact assemblage consists mainly of utilitarian galleyware and presents a glimpse into the shipboard lives of the crew. The types represented are common, everyday wares but have never before been documented. Although these types have

been used for centuries and are still seen today, their utilitarian nature and basic designs have not attracted any scholarly attention prior to this thesis.

ACKNOWLEDGMENTS

I would like to thank all the people who made completing this project possible. First, I thank my committee whose insight and guidance was invaluable. Dr. Ward, Dr. Crisman, and Dr. Yarak all contributed unique perspectives that strengthened my work. A special thanks to Dr. Smith whose unwavering support through the entire process was instrumental in this project's completion.

This project would not have been possible without the assistance and hard work of the staff of INA-Egypt. Many thanks to Doug Haldane for his hospitality and for providing everything I needed for efficient research during my short time in Egypt. My appreciation also goes to Hani Bedir. Without his technical skills and good nature I never would have finished my research or learned so much about Egyptian culture. My gratitude also goes to Sean and Maria Charette whose expertise and friendship were critical to my research and well-being in Alexandria. I would like to thank Eric Nordgren and the staff of the Alexandria Conservation Laboratory for Submerged Antiquities, Mamdouh Muhammad Amin and Tahany Mustafa Muhammad, for their valuable insight and assistance.

My field research in Egypt was made possible by a generous fellowship grant from the MSC L.T. Jordan Institute. This allowed me to complete this thesis project and experience modern Egyptian culture.

Finally, I can not say how much I appreciate the love, patience, and support of my husband Rob Thomas through this entire process. He kept me focused and determined to finish even when I did not think I could.

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CHAPTER I

INTRODUCTION

During the 18th century, the large trading companies of England and the Netherlands dominated European trade with Asia. Asian wares, including Chinese porcelain, were also shipped across the western Indian Ocean to the Red Sea by Indian, Arab, and European merchants. These shipments would then head to their final destinations in Egypt and elsewhere in the Ottoman Empire. Unfortunately the exact nature of trade in the western Indian Ocean and the Red Sea is not clearly known. The Sadana Island shipwreck excavated by Cheryl Ward of the Institute of Nautical Archaeology (INA-Egypt) sheds light on the maritime trade of the Red Sea region during this time.¹

Before the Portuguese expansion into the Indian Ocean at the beginning of the 16th century, all trade between Asia and Europe passed through the Middle East. Whether goods were transported overland via the Silk Road, or by sea through the Persian Gulf or the Red Sea, the Middle East held an economically strategic position. From the Roman period through the 16th century, this region was culturally and economically the crossroads between Europe and Asia. As European tastes for Asian goods grew, especially in the post-medieval period, Europeans sought ways to bypass the Arab middlemen. Portugal became the first European nation to enter directly into the Indian Ocean trade network. After Europeans began trading directly with Asia, the

¹ This thesis follows the style and format of the *American Journal of Archaeology*.

Middle East lost its importance as the center of east-west trade. In addition, European factories in India and Asia attempted to gain strict control over all trade throughout the Indian Ocean. This never truly occurred as Indian and Arab merchants continued shipping cargoes between India and the Middle East. Although the Red Sea route was not as important as it had been prior to the Portuguese arrival in the Indian Ocean, the majority of Asian goods heading for Ottoman, Egyptian, and Arabian markets were carried along this route. Although the nature of trade between the Far East and the Red Sea changed with European presence in the Indian Ocean, it never ceased.

The Shipwreck

In the late 18th century a large merchant ship sank on a reef near Sadana Island in the Red Sea. The island is located off the Egyptian coast southwest of the Sinai Peninsula (fig. 1). The ship was laden with a large cargo of porcelain from the Far East, Islamic earthenware, and a variety of organic goods. The mix of Far Eastern and Islamic ceramics in the same shipment supports historic evidence of complex trade networks between the Middle East and Asia during this time.

Another interesting feature of the wreck is its unique hull structure, for it is unlike any other known type of construction. As a result, the hull is somewhat of a mystery. In order to reach some conclusions about who built this ship and where, historic sources must be consulted. In addition, it is necessary to look at the broader trading patterns of the area in order to identify the role the Sadana Island shipwreck played in Asian/Islamic trade.

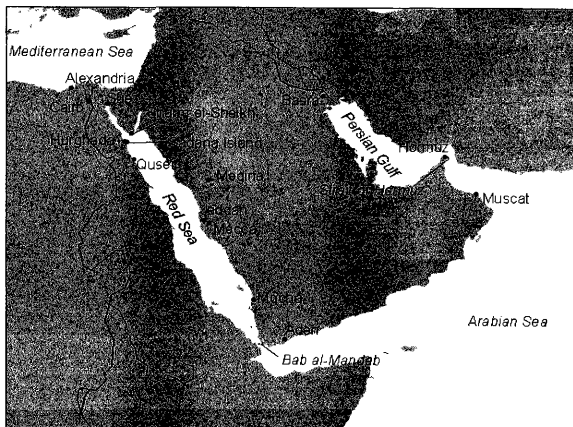


Fig. 1. Map of the Red Sea.

The Sadana Island shipwreck provides valuable insight into the nature of trade within the Red Sea, for detailed information is lacking from this time. In addition, Red Sea seafaring traditions are only vaguely known through travelers' descriptions. The Sadana Island shipwreck site is a time capsule: when the ship struck a reef and sank, the crew may have escaped, but they left behind many of their possessions. Two hundred years later these objects tell a story about the people who once used them. Among the artifacts from the site were a group of copper alloy objects, the majority of which were

utilitarian items probably used by the ship's crew. Included were personal eating vessels such as plates and bowls, larger serving pieces, and food preparation vessels.

Additionally, there were several unique copper alloy objects including two braziers, the remains of two lamps, and several personal items. The collection represents everyday wares that were common in Ottoman and Arabian homes, and examples of similar types can still be seen today in the markets, bazaars, and homes in the region. Due to the common, utilitarian nature of this assemblage, little has been written about their forms and uses. This thesis presents the first documentation, analysis, and catalogue of a collection of Middle Eastern common copper alloy objects from the 18th century. Details of everyday life among the lower and middle classes of the Red Sea region are scarce, and this catalogue of utilitarian objects from the Sadana Island shipwreck will provide a clearer understanding of how common people of the Red Sea lived.

Ancient Red Sea Sources

Many historical analyses suggest that the Red Sea played only a minor role in the economies of Egypt, Arabia, or the Ottoman Empire through the 18th century. Many sources give the Red Sea region little attention. This may be a result of the scant written evidence we have detailing this region during the post-medieval period. There are more primary sources detailing maritime activity in the Red Sea prior to the Portuguese presence in the Indian Ocean and the Ottoman presence in Egypt. One such source is the *Periplus Maris Erythrae* that was probably written in the second half of

the first century AD by a merchant or sailor.² The document focuses on the goods traded at different points along the route and even compares the quality of goods between ports. This source is commonly used for studies of Roman seafaring in the Red Sea and Indian Ocean. Although separated from the Sadana Island shipwreck by more than 1500 years, the *Periplus* is a good introduction to the fundamental problems of sailing in the Red Sea and Indian Ocean.

The archaeological excavations at Quseir al-Qadim³ and the survey of the Abu Sha'ar⁴ are two more important primary sources for the early trade and commerce of the Red Sea region. These two sites shed light on the nature of trade through the Red Sea during the first millennium AD. Quseir al-Qadim was a seaside settlement and important port along the Egyptian coast of the Red Sea. Ships that had sailed up the Red Sea from all parts of the Indian Ocean unloaded their cargoes here. The goods were then packed into caravans for the desert crossing. The caravans traversed the desert on roads leading to the Nile, linking the Red Sea ports with the main commercial centers of Cairo and Alexandria. These were important links in the larger trade network that connected the Far East with Europe. The archaeological reports also document primary material concerning the nature of trade in the region during this time. These two archaeological investigations, like the *Periplus*, are nearly a millennium earlier than the Sadana Island shipwreck; however, they do provide background on the fundamental issues of trade and navigation in the region.

Material Remains

The archaeological record does not provide much information about the Arab world during the early modern period. During the 1970s, the Underwater Exploration Society (UES) of Israel mapped and photographed the remains of a medieval merchant ship, known as the mercury carrier. This wreck appeared to be several centuries earlier than the Sadana Island shipwreck.⁵ The UES also excavated an 18th-century ship in the Red Sea.⁶ Located near Sharm-el-Sheikh, the 18th-century shipwreck carried a similar cargo to the Sadana Island shipwreck, with a mix of both Islamic earthenware and porcelain from the Far East.⁷

There have been many other 18th-century shipwrecks found throughout the world. Most are European craft that do not have much relevance to Arab seafaring. The excavation of *Machault*, an 18th-century French frigate lost in Canada, provides a nicely preserved and very comprehensive collection of utilitarian and personal effects from the same time period as the Sadana Island shipwreck.⁸ Artifacts as diverse as weapons and tools, and clothing and jewelry are represented in *Machault's* assemblage. Although this is a European collection, it can be used for contemporary comparison to the artifact assemblage from the Sadana Island shipwreck. In addition, 18th-century East Indiamen such as *Götheborg* carried porcelain cargoes that were similar to the porcelain found at Sadana Island.⁹ These are valuable sources for the porcelain study, but are not directly relevant to the analysis of the copper artifacts.

Museum collections of Islamic copper have little relevance to the Sadana Island shipwreck assemblage. The collection of the Cairo Museum of Islamic Art and the

catalogues of Islamic metalwork collections in the Freer,¹⁰ Keir,¹¹ and Victoria and Albert¹² Museums are of limited value to this study because the museum collections consist of highly decorative pieces that were originally intended for elite households and mosques. Decorative pieces only demonstrate one extreme of the craft, as the wealthy demanded exceptional work. As a result, the most ornate or elaborate pieces most often survive in museums and private collections. The artifacts from the Sadana Island shipwreck are of the most basic forms that ordinary people could afford. These were the most common vessels of the day, but are less likely to survive in museum collections because of their utilitarian nature. In addition, the vessels in all the museum collections date from the centuries just prior to the Sadana Island shipwreck. As a result, sharp distinctions can be made between the ornate pieces and the basic, utilitarian wares that were used in common homes and aboard ships.

Historical art analyses of Islamic metalwork have been examined in an attempt to find sources relevant to the copper alloy objects. Two art historians, Baer¹³ and Ward,¹⁴ have written excellent compendiums that are helpful in providing a framework for the Sadana Island shipwreck artifacts. These works give the history of Islamic metalwork and its uses in Islamic society. Both works use museum collections as the basis of their analyses, and as a result, both focus on earlier periods and decorative pieces rather than the common vessel types found in the Sadana Island collection.

Travelers' Accounts

Contemporary with the Sadana Island shipwreck are a group of European travelers' accounts written from the middle of the 17th century through the first two decades of the 19th century. These descriptions provide insight into many aspects of the region. As primary sources they provide excellent overall views of the nature of trade in the area as well as lively and detailed descriptions of the social environments, landscapes, people, and politics. These accounts can be excellent reading for these reasons alone. Their descriptions of places provide the reader with an opportunity to step back into worlds that had been little altered by western influences.

Europeans traveling through the Ottoman Empire and Arabia describe the region from a unique perspective. As outsiders they were often struck by small details of everyday life. Clothing, religious, and culinary traditions were new and often strange to them, and were often carefully recorded in their writings. These observations are valuable in order to gain a full understanding of trade and maritime activity. In addition, many of the travelers sailed on the Red Sea on vessels similar to the Sadana Island shipwreck. Their experiences provide insight as to how the copper artifacts from the Sadana Island shipwreck may have been used on board the ship.

These accounts do have to be used with some caution as European travelers often had distorted perspectives. As a result, some of the accounts are biased against certain ethnic groups or diminish the technology or culture of the Ottomans and Arabs. In addition, each traveler had very different objectives and included different sorts of details. Carsten Niebuhr wrote a detailed account of his travels through Arabia from

1761 to 1767.¹⁵ He was a member of an expedition commissioned by the King of Denmark to collect scientific information and manuscripts throughout Arabia. Niebuhr joined the group as a surveyor, mathematician, astronomer, and treasurer. He was also the only one of the five expedition members to survive and return safely to Copenhagen in 1767. Niebuhr included many detailed writings of widely different aspects of Arabia, from descriptions of the landscape and the cuisine to political analysis. This gives a broad and detailed picture of the region. In addition to Niebuhr's extensive writings, Thorkild Hansen wrote an analysis of the expedition largely based on Niebuhr's notes and other archival sources.¹⁶ These two publications are essential sources for detailed information about the Arabia during the second half of the 18th century.

Similar to the Danish scientific expedition, the Frenchman Jean de La Roque sailed throughout the Red Sea from 1711 to 1713 in an attempt to update and improve French knowledge of trade and seafaring in the region.¹⁷ In addition to his accounts, he made a map of the mouth of the Red Sea.

In contrast to these intelligence and scientific expeditions, Joseph Pitts' writings are from a very different and unique perspective. Around 1685, Pitts became possibly the first Englishman to go on a pilgrimage to Mecca.¹⁸ He had been taken as a slave in Algiers where his master converted him to Islam. He later accompanied his master on the *hajj*, or pilgrimage to Mecca. By the mid and late 18th century his accounts were published in several different forms and provided great insight into Islam, which up to that time had been entirely closed to Europeans.

In addition to these exceptional accounts, there were number of Europeans in the Red Sea as sailors, merchants, or in the service of the East India Company. During the early 18th century Alexander Hamilton,¹⁹ Charles Jacques Poncet,²⁰ and William Daniel²¹ recorded their observations and impressions of the Red Sea region. Later in the century Eyles Irwin's²² and Henry Rooke's²³ letters from Arabia provide interesting accounts. Finally, in the first two decades of the 19th century George Viscount Valentia²⁴ wrote an informative account of his travels through the Red Sea and India.

Based on these and similar accounts, Michael Naylor Pearson has written an interesting analysis of the hajj from India during the 16th to the 18th centuries that has been published as *Pious Passengers*²⁵ and *Pilgrimage to Mecca*.²⁶ This work provides a modern view of Indian Muslim pilgrimages during this time. It complements the Europeans' accounts but approaches the topic from a different perspective. Pearson focuses on Muslim travelers' accounts and experiences as they made their pilgrimage to Mecca. He focuses especially on Indian Muslims and their journeys. The most relevant chapters of this work focus on the development and nature of trade associated with the Muslim pilgrimage. He clarifies numerous European and Muslim accounts of the pilgrimage and of trade especially in Jeddah. Finally, he concludes that the Red Sea trade was only minimally affected by the Muslim pilgrimage.

The most recent traveler's account in this thesis is my own experience in Egypt and Turkey. During my travels in both countries from 1998 to 2000 I encountered several copper objects in the markets and bazaars of Istanbul and Cairo that were strikingly similar to the Sadana Island shipwreck assemblage. As I read the 18th century

descriptions of copper cooking vessels and compared the objects from the Sadana Island shipwreck to those seen in the copper shops, I realized that the forms had changed little over the last 300 years.

Historical Background

The Red Sea region remained part of the larger Indian Ocean trade network through the 18th century even though its importance had diminished. Europeans were never able to infiltrate the area in great numbers, and as a result, there are few available documentary sources pertaining to the area. The historical analyses discussed below provide detailed information about European presence in the Indian Ocean and Indian trade activity, but provide little specific information regarding the Red Sea. Even published Ottoman, Egyptian, and Arabian histories have limited insight into this relatively small, yet crucial piece of the Indian Ocean trade network.

George Hourani summarizes seafaring and international trade networks in the Indian Ocean in his important work on Arab seafaring.²⁷ He discusses iconographic and written sources dating from Ancient Egypt through the early Middle Ages. His focus is primarily on the trade between the Persian and Chinese Empires and he gives scant attention to the Red Sea region. The Red Sea grew in importance from the 10th century, although Hourani gives few details about the seafaring traditions in the region during this time.

Most historical research on the Indian Ocean trade networks has focused on the role of Indian seafarers and merchants. Works by scholars such as Das Gupta,²⁸

Pearson,²⁹ Arasaratnam,³⁰ and Qaisar³¹ provide excellent descriptions and analyses of Indian seafaring and trading. These provide a context for Red Sea trade within the larger Indian Ocean network. They do not, however, look at the role of Red Sea in any detail, but instead deal with internal Indian issues and the Indian role in Asian, African, and European trade.

Numerous works focus on Egypt and the Ottoman Empire. These are especially useful in describing the economic conditions of Egypt during the 16th through the late 18th centuries. Inalcik and Quataert's *An Economic and Social History of the Ottoman Empire vol. II*³² and Veinstein's essay "Commercial Relations between India and the Ottoman Empire"³³ are invaluable for outlining the major economic, political, and social forces at work within the Ottoman Empire. These sources also investigate the international economic atmosphere. Winter's³⁴ and Petry's³⁵ works look specifically at Egyptian society under the Ottoman Empire, which deserves special attention as Istanbul permitted Egypt relative autonomy within the Empire.

Rene Barendse provides a broad description and analysis of the Arabian Sea region.³⁶ He outlines the major political and economic issues of the region from the 15th through the 18th century, and discusses overland and maritime trade routes in the global market. This gives a very clear picture of the wider context of the Sadana Island shipwreck. This broad spectrum of sources provides a clear understanding of the world in which the 18th-century ship in the Red Sea was built, sailed and sunk. However, none of these sources give detailed insight into the nature of shipboard life for Red Sea sailors.

The Sadana Island shipwreck lies in Egyptian waters in the Red Sea. Accordingly the Egyptian government owns all the artifacts recovered from the site. These objects are currently undergoing conservation treatment at the Alexandria Conservation Laboratory for Submerged Antiquities (ACL), run by the Supreme Council of Antiquities (SCA) in conjunction with INA-Egypt. By photographing and documenting the collection of copper alloy artifacts, I have gained a thorough understanding of these objects. This thesis examines the copper alloy artifact assemblage found on the 18th-century shipwreck near Sadana Island in the Red Sea. The documentation, analysis, and catalogue of these artifacts is the first of its kind. Although copper alloy vessels were common throughout the Arab world up until the 20th century, very little information concerning them has ever been published. This thesis provides much needed research in this area, and attempts to fill in details of the common seafarer's way of life that have been lost over time.

Notes

- ¹ Haldane 1994, 1995, 1996a, 1996b, 1996c; see also Ward 1998, 2000a, 2000b, 2001; Haldane 1998.
- ² Casson 1989.
- ³ Whitcomb and Johnson 1982.
- ⁴ Sidebotham et al. 1991.
- ⁵ Raban 1990.
- ⁶ Raban 1971, 1973.
- ⁷ Haldane 1996a.
- ⁸ Sullivan 1986.
- ⁹ Wastfelt 1990.
- ¹⁰ Freer Gallery of Art 1985.
- ¹¹ Fehervari 1976.
- ¹² Victoria and Albert Museum 1982.
- ¹³ Baer 1983.
- ¹⁴ Ward 1993.
- ¹⁵ Niebuhr 1792.
- ¹⁶ Hansen 1965.
- ¹⁷ La Roque 1726.
- ¹⁸ Pitts 1738.
- ¹⁹ Hamilton 1811.
- ²⁰ Poncet 1949.

- ²¹Daniel 1949.
- ²²Irwin 1787.
- ²³Rooke 1784.
- ²⁴Valentia 1811.
- ²⁵Pearson 1994.
- ²⁶Pearson 1996.
- ²⁷Hourani 1951.
- ²⁸Das Gupta 1994.
- ²⁹Pearson 1976; see also Das Gupta and Pearson 1987.
- ³⁰Arasaratnam 1994.
- ³¹Qaisar 1968, 1972.
- ³²Inalcik and Quataert 1994.
- ³³Veinstein 1999.
- ³⁴Winter 1992.
- ³⁵Petry 1981.
- ³⁶Barendse 2000, 2001.

CHAPTER II

HISTORICAL BACKGROUND

By the first century AD the Romans had established a trading network from the Nile across the desert to the Red Sea coast and then by sea to Arabia, India, and the west coast of Africa. Geographers such as Pliny and Strabo described the roads and ports that were in use. However, someone who had intimate knowledge of the sea routes wrote another source that still survives. The *Periplus Maris Erythraei* was probably written in the second half of the first century AD by a merchant or sailor.¹ The author focused on the goods traded at different points between the Red Sea, Persian Gulf, and India. He even compared the quality of goods between ports. According to the *Periplus* many high value items were traded. Goods such as frankincense, myrrh, and aloe were exported from Arabia in return for clothing, textiles, grain, oil, wine, copper, tin, saffron, fragrant ointments, storax, horses, pack mules, and high quality goods such as silverware, goldware, bronzeware, deluxe clothing, and statuary. Along the west coast of Africa merchants traded ivory, tortoise shell, frankincense, and myrrh for tools, iron, cheap clothing, brass, bronze vessels, ornamental glass, olive oil, and wine. Roman merchants brought lead, tin, copper, drugs and cosmetics, silverware, glassware, coral, multicolored textiles, ointments, wine, deluxe clothing, and slaves to India. They returned with spices, drugs, aromatics, gems, textiles, ivory, pearls, and tortoise shell.² Some of the goods purchased in India originated from the east coast of India or from China. The Chinese ceramics excavated at the Egyptian coastal site of

Quseir al-Qadim support this. Although the *Periplus* outlines a trade in high value luxury items, Whitcomb and Johnson believe that “the seaborne aspect of this trade, via the Red Sea, involved mostly staples, rather than luxury items, which were more frequently carried overland.”³ It is likely that the largest volume of sea trade was bulky, low value goods; however, it is impossible to ignore the luxury items listed as common cargo in the *Periplus*.

The key to maritime trade between India and the Red Sea through history was the mastery of the monsoon winds. It is impossible to sail against the prevailing winds, so the Romans must have taken advantage of the biannual wind change in order to sail the western Indian Ocean. The *Periplus* stated that ships heading for India from the Red Sea should leave by July to sail with the southwestern summer monsoons. They should depart for their return sometime in November after the winds have changed to the northeast.⁴ If a ship did not sail with the monsoons it could be stuck at port for six months waiting for more favorable conditions. In addition, the monsoons that enabled rapid sailing to the east were also extremely strong and treacherous. This has led Casson to the debatable conclusion that only large, strongly built Roman ships would have been able to withstand the voyage.⁵ Although the winds posed serious hazards to seafarers, their mastery was the basis for maritime trade up until this century.

The location of Roman ports indicates the importance of trade in the Red Sea. The ports along the west coast of the Red Sea required significant amounts of constant resource investment in order to survive. Therefore trade must have provided important goods, either food or high value luxury items. During Roman times the primary port

along the Egyptian coast of the Red Sea was Bernice.⁶ Quseir al-Qadim was also an important port; because of its remote location, great effort and resources went into its maintenance.⁷ Food and water had to be imported either by boat or by caravan across the desert from the Nile. The only native food source was fish, and archaeological evidence of fishing was found during the excavation of the Roman levels. Water also had to be transported from as far as 20km away, since there were no natural wells in the immediate area.⁸ This was a precarious settlement that diminished in size throughout the Roman occupation. Finally sometime in the third century AD the settlement collapsed and remained abandoned for nearly 1000 years.

From Quseir al-Qadim's disappearance sometime in the third century until the eighth century, there is very little information about the nature of trade in the Red Sea or even in the western Indian Ocean. The only evidence from the sixth century is the writing of an Egyptian Greek named Cosmas Indicopleustes. In *Christian Topography* he described the island of Sri Lanka and its important, central role in international trade. He explained that merchants came to Sri Lanka from India, China, Persia, and Ethiopia to trade with each other as well as with local merchants.⁹ Unfortunately little exists in the archaeological record to substantiate this trade network because the goods were mostly perishable. Additionally, many cargoes were not carried in sturdy containers such as amphorae, which would have survived, providing archaeological clues about trade patterns. Some of these trade goods included aloe, spices, aromatics, slaves, textiles, gemstones, and wood. It was not until the Chinese began producing porcelain for trade in the eighth century AD that trade in this region can be clearly traced in the

archaeological record. From this time until the beginning of the 11th century, Arabs dominated the Indian Ocean trade. As a result, the ports along the Persian Gulf became major trading centers. One such port is Siraf. At this site many Chinese ceramic sherds dating from the eighth to 10th centuries AD have been found.¹⁰ During that period the city grew in population and wealth as is shown by intensive construction projects including a huge mosque. Undoubtedly Red Sea-based merchants continued trading in the Indian Ocean, but on the whole, Gulf traders dominated the region.

The focus of trade in the western Indian Ocean shifted from the Persian Gulf to the Red Sea at the beginning of the 11th century. In Egypt, the Fatimid dynasty established its capital at Fustat, modern Cairo, making it one of the primary centers in the Middle East.¹¹ At this time the dynasties along the Persian Gulf were politically unstable.¹² Although trade activity continued mostly near the Straits of Hormuz, former centers such as Siraf fell into decline.¹³ As a result, the Red Sea began to dominate trade in the western Indian Ocean. Fustat became the capital of an international market where the Mediterranean world met the world of India and the Far East.

Large amounts of Chinese ceramics that date from the 11th and 12th centuries have been found in Fustat;¹⁴ however, the most insightful material remains of this time are the Cairo Genizah documents. The collection of documents, discovered in the 19th century, belonged to Jewish merchants. As these records contained the name of God and could not be destroyed under Jewish beliefs, they were buried in the genizah, or depository.¹⁵ The documents demonstrate that the trade network of Jewish merchants extended from Tunisia, across northern Africa, through the Middle East, and down the

Red Sea to Aden. Aden was an important site because it was located at the mouth of the Red Sea. Unfortunately, no extensive archaeological work has been done in the area, but as seen in the Cairo Genizah, many Egyptian merchants settled there. Although there is no archaeological or historical evidence, it is possible that Aden was a very important port because the large ships that were capable of sailing the monsoons across the Indian Ocean may have unloaded here.¹⁶ Trade goods would have then been transferred to smaller ships that could better sail against the prevailing northerly winds of the Red Sea.

In the middle of the 13th century the Mamluks came to power in Egypt and retained control of the Red Sea until the Portuguese arrived in the 16th century.¹⁷ Although Quseir al-Qadim was reestablished as a port in the 13th century and remained in use until the 15th century, its existence was precarious.¹⁸ It never rivaled Cairo as a market place; it was merely a transit stop for luxury goods on their way to the international markets in Cairo. As with the Roman settlement at Quseir, maintaining the town came at a considerable expense. Food and water were still brought from afar and any shortages of grain in the Nile Valley would have had serious ramifications. In addition, the town relied on unstable markets in distant lands; any shift in overseas prices or disruption in trade must have had dramatic effects on Quseir's inhabitants. As a result, the settlement never became a major commercial center.

From the mid-13th to the 15th century, a middle class of merchants developed in Egypt. One reason for their increase in wealth and rise in social status was the amount of relative freedom allowed by the Mamluk government.¹⁹ These wealthy merchants

contributed greatly to the development of the cultural and intellectual resources of Cairo by funding various religious, intellectual, and charitable institutions. By the mid-15th century, government policies in the Middle East began interfering in Indian Ocean trade.²⁰ Newly created high taxes on eastern commodities by Muslims forced European powers to find a direct sea route to the Far East in order to bypass the Muslim middlemen. The Portuguese were the first to do so in 1497. With a direct sea route between the Indian Ocean and Europe established, the role of the Red Sea in international trade changed dramatically. In addition to the European presence in the Indian Ocean, the Ottoman Empire expanded in the early 16th century and gained control of Mamluk Egypt. This also affected the Egyptian economy for nearly three hundred years.

Economic Conditions in the 17th and 18th Centuries

The economy of the Ottoman Empire underwent drastic changes during the 16th and 17th centuries.²¹ Although the Empire suffered from an economic crisis during this time, Egypt remained stable.²² Cairo, second only to Istanbul in importance, grew in population and size while remaining prosperous. As Cairo grew, the population in many other regions dwindled. Local decline was exacerbated by smaller tax bases and the inability to be self-sufficient. The decreased tax bases strained an already-burdened Ottoman economy. As Europeans moved into the Indian Ocean, the Ottoman Empire's traditional role as intermediary between east and west ceased. This void was filled with

new forms of trade, such as the growth of the *hajj*, the Muslim pilgrimage to Mecca, and the introduction of Indian seafarers in the Red Sea.²³

During the 17th century, the Ottoman Empire faced an economic crisis. As Faroqi explains, the crisis began at the end of the 16th century with the devaluation of silver.²⁴ With the devaluation, military revolts ensued as a result of regiments' pay cuts. These military rebellions were frequent occurrences throughout the 17th century, becoming so common that rulers had to account for them in their annual expenditures. The Iranian Wars (1603-1639) and the conflict with the Hapsburgs throughout the century also increased military expenditures. During these wars the central administration ordered private producers to supply the armies, often without compensation. This took a toll on the economy, as often the best producers could no longer support their businesses. The production of guns and gunpowder also drove up the cost of warfare. The military budget became a drain on the economy, and by 1669-70 it accounted for 63 percent of the entire Empire's expenditures. The military, however, was not the only huge expense. The sultan's household accounted for 30 percent of total expenditures. This included the costs of the household, kitchens, artisans, the sultan's personal spending money, and elaborate ceremonial robes.²⁵

Through the economic crisis of the early 17th century, local crafts declined. Later in the century local production of goods, such as textiles, developed and prospered. This indicated that the Ottoman economy was not strictly dependent on European trade, but possessed its own potential.²⁶

Although traditionally it was the center of east-west trade, the Ottoman Empire's role changed as European nations established direct connections with Asia. Through the 17th century the Ottoman economy was not dependent on Europe. To promote European trade in the Empire capitulations, or special conditions of trade, were granted to some European countries. These capitulations generally directed trade through lower Ottoman officials.²⁷ This was beneficial for foreign merchants since they had less bureaucracy to deal with. Agreements could be made that were mutually favorable to the merchant and the local official. As a result, in the late 16th century large numbers English merchants began bringing wool cloth into the Empire.²⁸

The capital of the Ottoman world was Istanbul, whose population required large quantities of provisions. The export of grain from the Empire was forbidden to prevent possible shortages in the capital city.²⁹ In Egypt the sale of coffee to European merchants was also forbidden in order to ensure a supply to Istanbul.³⁰ This rule was largely ignored. Egyptian wheat was a key part of the Ottoman economy. There was a high demand for Egyptian wheat and Indian rice, especially among the wealthy in Istanbul.³¹ River trade was regular and well established on the Nile by the 17th century.³² Egyptian grains and other agricultural products were sent down the Nile to Cairo. Riverboats from the Upper Nile unloaded at Cairo because they were built more lightly than the vessels used on the lower section of the river. Ships on the Lower Nile were larger and built strongly enough to make limited voyages into the open sea. Since all the agricultural goods from Upper Egypt were transshipped through Cairo, the city was a crucial link in the Ottoman grain supply. In addition to supplying Istanbul with

wheat, Egypt was also a major source of rice. Because it was a major center for trade, Cairo maintained its status as second only to Istanbul in economic importance.³³

Beyond the internal Ottoman economy, significant changes that began centuries earlier in the Indian Ocean altered the nature of trade within the trans-oceanic network. The 16th century saw major changes in seafaring and trade in the Eastern Hemisphere. Prior to the European presence in the Indian Ocean, Arab and Indian merchants brought spices, drugs, dyes, and textiles from India to sell in markets in Persia, Egypt, and Istanbul.³⁴ These markets linked Asia, Africa and Europe. The local merchants had extensive control over the supply and pricing of Asian goods. As Europeans became dissatisfied with Middle Eastern politics and merchants, they explored ways of bypassing the Middle Eastern middlemen. In 1497 the Portuguese had found a sea route to India. Using this route, they quickly established themselves as merchants in India and Southeast Asia.³⁵ Not only did the Portuguese control the Indian Ocean, but with the capture of Hormuz, they also controlled the Persian Gulf. Their next step was to take control of the Red Sea, but the Ottoman Empire held them at bay.³⁶ Although the Portuguese interrupted the flow of spices into the Red Sea, by 1560 the Red Sea spice trade had resumed at the volume prior to the Portuguese presence.³⁷ In the early 17th century, other European countries such as England and the Netherlands also established trading companies in Asia. As a result, non-European merchants no longer controlled the spice trade, or even the sea-lanes through the Indian Ocean.³⁸ Spices no longer flowed freely into the markets of Istanbul and Cairo since they were no longer coming in great volumes through the Red Sea.³⁹

Muslim Trade

To compensate for the greatly reduced spice trade in the Red Sea, several mechanisms developed. First, coffee replaced spices as the primary high value commodity.⁴⁰ Coffee grown in Yemen was transported to ports such as Mocha where it was either purchased directly by Egyptian merchants or was shipped to the large markets at Jeddah.⁴¹ There, Egyptian merchants bought the commodity and shipped it to the markets in Cairo. Second, the rise of Muslim pilgrimages to Mecca created new demand for seafaring in the Red Sea.⁴² About the same time as the Portuguese were entering into the Indian Ocean, powerful monarchies rose in India, Persia, Iraq, Syria, and Egypt. This helped spread and strengthen Islam and increased the importance of the hajj.⁴³ Every able Muslim is required to complete a pilgrimage to the city of Mecca at least once in their lifetime. The hajj is performed once a year and is determined by the lunar calendar. At the beginning of the 18th century, William Daniel described Mecca during the hajj as the place “where meet 4 caravans—one from Egypt on the coast of Barbary, another from Constantinople, one from Persia, and the fourth from the country of Yemen; which meeting together are computed to be near 400,000 souls.”⁴⁴ At about the same time, Joseph Pitts, who was possibly the first Englishman to go on pilgrimage to Mecca, gave a more detailed description of four caravans.⁴⁵ The first from Morocco was called the Moggarib Caravan, which journeyed through Egypt picking up pilgrims along the way. The second originated in Grand Cairo and was the largest and safest. The Sham Caravan brought people from Anatolia. The last was called the Hind Caravan and consisted of pilgrims from the East Indies. This caravan

brought “many rich and choice goods, which are sold to all sorts of persons who report to Mecca.”⁴⁶ At the turn of the 18th century, Charles Jacques Poncet described the extent of the gathering as “when those caravans arrive at Mecca, there is held a great fair, where an infinite multitude of Mahometan merchants meet, with all the most precious commodities of the three quarters of the world; which they barter together.”⁴⁷ This illustrates the importance of the hajj in establishing Arabia as a center of international trade.

During the 18th century, some European writers questioned the true intentions of many pilgrims. These accounts often belittle non-European cultures and criticize any commercial activity related to the pious act of pilgrimage. This is contrary to the Muslim view that approves of trade and accepts it as part of the hajj.⁴⁸ The European perspective is apparent in some descriptions of the crowds at Mecca and Jeddah. At the beginning of the century William Daniel stated that there were a great number of people who went “there as pilgrims and under the pretense of religion, but merchandising was their chiefest business.”⁴⁹ Louis de Grandpre echoed this sentiment at the end of the century by saying that “whole ship loads of these religionists often arrive, influenced, many of them, by motives of trade, interest, and a desire of pillage, more than by devotion.”⁵⁰ Regardless of the pilgrims’ intentions, a huge market emerged from this great gathering of people who came from throughout Africa and Asia.

In addition to the pilgrims that gathered every year at Jeddah, the port city of Mecca on the Red Sea, numerous merchants were also attracted by the prospects of the great fair. Pitts stated that upon their return to Jeddah a 10- to 12-day fair took place

because it was unlawful for pilgrims to engage in trade before they finished their devotions in Mecca.⁵¹ His description of the market goods from the East Indies included silks, muslins, calicoes, spices, and coffee.⁵² Goods from other regions included jewelry from Yemen, and porcelain, musk, and other curiosities from China.⁵³

The pilgrimage caravans, both overland and through the Red Sea, became busy and prosperous routes. Many devout Muslims engaged in trade both enroute to Mecca and along the return trip. To help subsidize the hajj, pilgrims often purchased items while in the Holy Land to sell along the return trip and at home. Records indicate that pilgrims returned home with incense, coffee, Indian textiles, perfumes, drugs, and spices.⁵⁴ For some, trade was necessary to pay for the pilgrimage. Merchants also joined the caravans to provide pilgrims with supplies along the way.⁵⁵

With the influx of travelers through the desert and Red Sea, Arab Bedouins found a niche in supplying the caravans with basic necessities.⁵⁶ Throughout the 17th century, these same Bedouins immigrated to Egypt and took over many critical functions including supplying Mecca with grain, securing water sources along the hajj, and providing pilgrims with transportation.

Pilgrims and merchants brought commodities from their homelands to capitalize on the markets associated with the hajj. Non-muslim merchants from Europe and India also engaged in the Jeddah market. However, Poncet said that “Indian idolaters” and Europeans were not allowed to settle in the Jeddah.⁵⁷ This regulation did not sway non-Muslim merchants from traveling to Jeddah. The markets must have been very lucrative to attract transient, long-distant traders. It was, therefore, common to see

foreign and non-Muslim vessels anchored in the harbor in order to participate in the market. European ships that were trading along the Indian coast would often detour to the hajj on their return to Europe. During the hajj, Jeddah became one of the world's largest markets. There is evidence that at other times of the year trading dramatically decreased. In order to compensate during slower economic times, Alexander Hamilton records that Jeddah was active in attracting vessels. Four or five "gallies" are reported to have patrolled the Red Sea, forcefully encouraging ships to call at Jeddah.⁵⁸ The nature of the encouragement was unspecified, but it was implied that merchant vessels had little choice if stopped by one of these ships. This may have been an attempt to raise revenues during other times of the year when business was considerably slower. However, there is contrary evidence that points to a thriving market at Jeddah during other times of the year.

Pearson argues that Jeddah was an important international market regardless of the hajj.⁵⁹ He notes that the timing of the hajj was independent of the monsoon seasons.⁶⁰ As shipping was entirely dependent on the monsoon seasons, sea trade could not always coincide with the gathering of pilgrims.⁶¹ One of the most important functions of Jeddah was as a center for transshipment. Large ships would unload their cargoes from around the Indian Ocean. The goods were transferred into local ships that could more easily navigate the treacherous Red Sea, or packed into caravans for an overland journey.⁶² As a result, Jeddah was a major commercial center regardless of the hajj. The trade with Mecca was only one portion of the total economic activity.

Trade throughout the Indian Ocean

With the growing importance of the hajj, there were widespread shifts in trade throughout the Indian Ocean. While Chinese merchants dominated shipping in the South China Sea, a series of seven Ming dynasty expeditions led by Zheng He were sent to the western Indian Ocean at the beginning of the 15th century.⁶³ A fleet of 300 ships was deployed to promote Chinese trade and control private Chinese merchants.⁶⁴ These expeditions ended by 1433, when a series of Imperial orders outlawed maritime trade.⁶⁵ As a result, Chinese seafaring dwindled through the middle 15th century. Although forbidden from overseas trade, Chinese merchants still sailed to Malacca, which by 1500 had become the primary trading center for the entire Indian Ocean.⁶⁶ Malacca hosted merchants from China, India, Java, and Arabia. Muslim travelers from Persia and the Red Sea traded at Cambay before continuing on to Malacca (fig.2). By 1500, 50 ships voyaged directly from Malacca to Mecca.⁶⁷ As European demand for exotic trade items skyrocketed, the Portuguese entered directly into the spice trade by occupying Malacca in 1511. This caused a decline in non-European sea trade. With new restrictions on traditional trade patterns in the region, non-European merchants were forced to look for new economic centers. The increased importance of the hajj made the Red Sea the natural emporium for Muslims and non-Muslims alike.

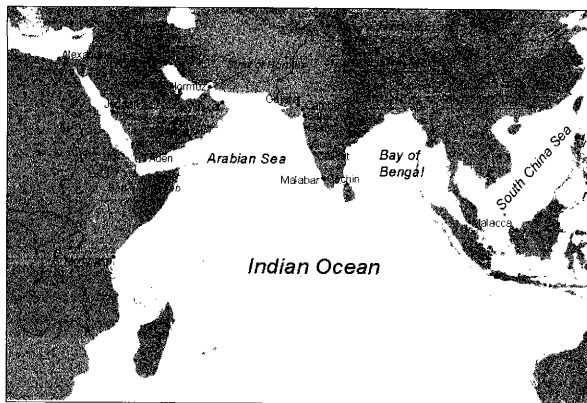


Fig. 2. Map of the Indian Ocean.

Although Hindu merchants were not allowed to reside in the port city of Jeddah, they played an important role in Red Sea trade. Non-Muslim Indians settled in Mocha and became essential to European trade in the Red Sea. According to de Grandpre, “the whole commerce of the Europeans is entrusted to them, they alone being able to deal with the Arabs.”⁶⁸ The Europeans considered them the kindest, gentlest and most trustworthy people.⁶⁹ Accounts reveal that Europeans left goods and money in the Hindus’ care for extended periods of time, often years.⁷⁰ This trusting relationship was the foundation of long-term European trade connections in the Red Sea.

Other Indians were also key figures in Red Sea trade. During the 16th century, the Red Sea became the most important market for the lucrative trade from Gujarat.⁷¹ Prior to Portuguese occupation of Malacca, Gujarati trade had two geographical focuses; one in the east and one in the west. With the rise of Portuguese influence in the region, Gujaratis were forced to look for alternative markets. The Portuguese controlled the Indian Ocean, and with the capture of Hormuz, they also controlled the Persian Gulf.⁷² Therefore, the only unencumbered market open to the Indian merchants was the Red Sea. During this time of rapid change, Arabs who had dominated the Red Sea in the 15th century were preoccupied with defending themselves from European encroachment. This allowed Indian merchants to infiltrate the Red Sea trade. As the Portuguese were fighting the Arabs in the western Indian Ocean, fewer Arabs were arriving at the markets in India. This provided an opportunity for Indians to take up the trans-Arabian Ocean routes.⁷³

In an attempt to control Red Sea maritime traffic, the Portuguese blocked the mouth of the Red Sea at Bab al-Mandab.⁷⁴ This was ineffective in stopping merchant ships from passing through, and was discontinued by the 1570s. Aden, located at the mouth of the Red Sea, had once been a busy and prosperous port and the most important market for coffee. It was also a haven for ships avoiding the Portuguese patrols at Bab al-Mandab.⁷⁵ Once the Portuguese patrol was suspended, Aden had to rely on the coffee trade. Unfortunately, the local ruler, the Iman of Sana, who governed the prime coffee-producing regions of the world, Bayt al Faqih in southwestern Yemen, did not control Aden.⁷⁶ Therefore, he placed extremely high taxes on all coffee that was

destined for market there. As a result, by the second half of the 17th century, most coffee was traded within his jurisdiction at the town of Mocha, just north of Bab al-Mandab inside the Red Sea. Although Aden was more accessible to ships, without the coffee trade, it soon fell into decline.⁷⁷

The Portuguese continued their efforts to control the spice trade through the Indian Ocean and the Red Sea, although there are many indications that this never occurred. As Pearson describes, throughout the 16th century, the Portuguese made several decrees that were aimed at curbing Indian trade in that region.⁷⁸ Trade was officially banned between the Red Sea and Mombasa. Non-Christians of western India were forbidden to trade anywhere but the West Indian coast. In 1520, only small coastal boats could sail from Calicut and they traded freely only in Goa. These efforts were ineffective in slowing the flow of spices to Red Sea markets for many reasons, including corrupt Portuguese officials and limited naval power in the region. Although the Portuguese tried to impede the movement of pepper into the Red Sea, the volume recorded increased by 1560-64.⁷⁹ Frederic Lane estimates that prior to the Portuguese influence in the pepper trade, the average yearly volume of pepper through the Red Sea was 1,150,000. Between 1560-64, he calculates the average to be 1,310,454 pounds per annum.⁸⁰ This clearly shows the lack of any effective Portuguese control of the spice trade during the later 16th century.

In addition to pepper, Surat maintained profitable trade in coarse textiles in the Red Sea.⁸¹ During the 17th century, Indian textile production grew in relation to Ottoman demand. Ottoman demand was so high that textile industries had developed

throughout the Ottoman Empire producing imitations of every kind of Indian textile.⁸² Authentic Indian textiles became highly prized. Even coarser Indian fabrics were traded in large volume and as the demand and prices increased, larger quantities of gold and silver left the Ottoman Empire for India. This was already an important issue in the 16th century when records indicate concern over the outflow of precious metals from Egypt. This outflow corresponded to the purchase of foreign textiles in Cairo.⁸³

Interestingly, not all non-European trade between India and the Red Sea was deemed illegal by Europeans. Gujarati ships carried *cartazes*, or shipping permits granted by the Portuguese.⁸⁴ These permits required that Indian vessels pay fees, and, in return, they could trade without Portuguese hindrance. A ship that did not have a cartaz or had an inaccurate one could be confiscated along with its cargo. Some Gujarati ships circumvented the Portuguese by obtaining cartazes for trade in Southeast Asia. They could purchase pepper there and then make a clandestine run to the Red Sea.⁸⁵ Since the Portuguese had almost no control over ships entering the Red Sea, these types of voyages were very often successful. However, records indicate that the majority of Gujarati ships sailing to the Red Sea carried cartazes.⁸⁶ Despite Portuguese efforts to control trade, Gujarati merchants dominated the Red Sea markets. The English were also trading in the Red Sea by the 17th century. In order to combat any English encroachment, Surat merchants forbade anyone from selling any merchandise that could be used in the Red Sea trade to the English in Surat.⁸⁷

Another indication that Portuguese control of Asian trade was never effective is shown in Perotin-Dumon's theory of piracy. He asserts that accusations of piracy are

typical of a nation's "compensation of their lack of effective control."⁸⁸ This holds true with the Portuguese in the Indian Ocean. They wanted complete control of the Indian Ocean spice trade, including the Red Sea, and demanded that Indian and Arab merchants purchase letters of safe-conduct from them.⁸⁹ Although the Portuguese failed to completely control the Red Sea, Indian merchants crossing the Indian Ocean were still pressured to pay the Portuguese. Those who did not were labeled pirates. Perotin-Dumon's argument is supported, as there was an increase in Indian merchants traveling by sea to the Middle East, indicating that the Portuguese did not have strict control over the Indian Ocean. In addition, the Portuguese were not interested in other Indian commodities such as textiles. As a result, non-European merchants were able to conduct large-scale trade with other areas of the Indian Ocean, which peaked in the late 17th century.⁹⁰

At the beginning of the 18th century, Gujarat still had a stronghold on the Red Sea trade. By mid-century, their lucrative commercial network had drastically changed. In 1701, merchants of Surat operated over 100 ships, while in 1750 the fleet had dwindled to 20, with only five sailing to the Red Sea.⁹¹ This decline was caused by a number of factors.⁹² First, Indian merchants in Mocha were charged higher customs and fees in response to a civil war in Yemen. Additionally, during the peak of their trade between 1698 and 1710, Surati merchants had created a glut of Asian and Indian goods in the Red Sea market. This drove down profit margins for Gujarati merchants in the region. Surat was also struggling with domestic political problems.⁹³ Political unrest had isolated Surat from its hinterland. Surati merchants were no longer able to

obtain commodities destined for Red Sea market and therefore, had difficulty selling items from abroad. Finally, Indian merchants' role in trade diminished as the English and Dutch factories controlled more and more Indian commerce.⁹⁴ In 1740, half the meager trade revenues of Surat were attributed to English trade while the Dutch held approximately one-tenth.⁹⁵

Internal Issues: Red Sea in the 18th Century

Throughout the 18th century European demand for Ottoman commodities increased. Instead of luxury items, Europe sought raw materials, such as cotton.⁹⁶ In return, large quantities of European precious metal came into the Empire. European bullion ultimately ended up in Asia in return for spices, silks, and other goods.⁹⁷ This general trend was reflected in Egypt throughout the century, although Egypt's primary markets were other regions of the Ottoman Empire.⁹⁸ The Red Sea trade was secondary, and the lowest volume was conducted internationally. Muslim merchants primarily conducted the domestic trade, while an ethnic minority of Syrian Catholics known as the Melkite took over Mediterranean and Red Sea commerce.⁹⁹ These minorities became wealthy merchants in Egypt as domestic trade was rarely as lucrative as the international market. The most prosperous merchants were those dealing in coffee, a commodity that comprised two-thirds of the value of Red Sea trade at this time.¹⁰⁰ Much of this coffee was re-exported by the French, who up until the 1740s, were the principle European merchants in Egypt. Unfortunately for Egypt, European demand for Yemeni coffee via Alexandria declined through the 18th century as coffee

from the West Indies became cheaper.¹⁰¹ In addition, the French invasion of Egypt at the end of the century changed the entire face of the Egyptian economy.

The Sadana Island shipwreck was engaged in Red Sea trade during the late 18th century. The cargo of porcelain, earthenware, and organic material that sank within it was primarily intended for the Ottoman market. The ship was probably heading to the northern Red Sea port of Suez from one of the two major ports in the southern Red Sea, Jeddah or Mocha.¹⁰² Although the mixed cargo includes goods from outside the Red Sea, there were no arms found on board. This probably indicates that the ship stayed within the Ottoman controlled Red Sea and did not venture out into the unstable waters of the Indian Ocean.¹⁰³ Although the ship stayed within the confines of the Red Sea, this ship is a small piece of a global trade that was undergoing rapid and dramatic changes.

Notes

¹ Casson 1989, 6-8.

² Casson 1989, 16-30.

³ Whitcomb and Johnson 1982, 2.

⁴ Casson 1991, 8.

⁵ Casson (1991, 10) argues in favor of a predominantly low bulk, high value trade carried in large, heavily built vessels. If this is true, he believes the value of the cargo of each ship would have been astronomical. Although the monsoons pose an interesting problem to seafaring, loading a large cargo ship with goods valued at 7,860 talents or enough to buy 144,000 acres of the best farmland in Egypt does not seem likely either.

⁶ Sidebotham 1991, 20-1.

⁷ Whitcomb and Johnson 1982, 2.

⁸ Whitcomb and Johnson 1982, 4.

⁹ Bopearachchi 1996, 70.

¹⁰ Rougeulle 1996, 162.

¹¹ Chaudhuri 1985, 58.

¹² McPherson 1993, 105-6.

¹³ McPherson 1993, 145.

¹⁴ Rougeulle 1996, 170.

¹⁵ Goitein 1967.

¹⁶ Pearson 1996, 150; 1976, 11; see also McPherson 1993, 154.

¹⁷ Chaudhuri 1985, 60.

- ¹⁸ Whitcomb and Johnson 1982, 11-13.
- ¹⁹ Petry 1981, 29.
- ²⁰ Petry 1981, 31.
- ²¹ Faroqhi 1994, 540-1.
- ²² Winter 1992, 226.
- ²³ Das Gupta 1982, 426.
- ²⁴ Faroqhi 1994, 540-1.
- ²⁵ Faroqhi 1994, 540-1.
- ²⁶ Faroqhi 1994, 525-6.
- ²⁷ Faroqhi 1994, 481.
- ²⁸ Faroqhi 1994, 482.
- ²⁹ Winter 1992, 207; see also McGowan 1994, 717.
- ³⁰ Winter 1992, 62.
- ³¹ Faroqhi 1994, 494.
- ³² Faroqhi 1994, 484.
- ³³ Winter 1992, 226.
- ³⁴ Pearson 1976, 10.
- ³⁵ Chaudhuri 1985, 66.
- ³⁶ Faroqhi 1994, 488.
- ³⁷ Lane 1940, 581.
- ³⁸ Chaudhuri 1985, 82-3.

- ³⁹ Faroqhi 1986, 87-8.
- ⁴⁰ Faroqhi 1986, 88.
- ⁴¹ Pearson 1996, 155.
- ⁴² Das Gupta 1982, 425-6.
- ⁴³ Das Gupta 1987, 28.
- ⁴⁴ Daniel 1949, 78-9.
- ⁴⁵ Pitts 1738, 84-6.
- ⁴⁶ Pitts 1738, 84-6.
- ⁴⁷ Poncet 1949, 158.
- ⁴⁸ Pearson 1996, 127.
- ⁴⁹ Daniel 1949, 78-9.
- ⁵⁰ de Grandpre 1814, 217.
- ⁵¹ Pitts 1949, 38.
- ⁵² Pitts 1949, 11.
- ⁵³ Pitts 1949, 38.
- ⁵⁴ Veinstein 1999, 99.
- ⁵⁵ Pearson 1996, 129.
- ⁵⁶ Winter 1992, 102-4.
- ⁵⁷ Poncet 1949, 157-9.
- ⁵⁸ Hamilton 1811, 276.
- ⁵⁹ Pearson 1996, 147.

⁶⁰ Pearson 1996, 143.

⁶¹ Pearson 1996, 144.

⁶² Pearson 1996, 150.

⁶³ Needham 1978, 55.

⁶⁴ Das Gupta 1982, 410.

⁶⁵ Das Gupta 1982, 410.

⁶⁶ Das Gupta 1982, 408-9.

⁶⁷ Das Gupta and Pearson 1987, 25.

⁶⁸ de Grandpre 1814, 247.

⁶⁹ de Grandpre 1814, 247.

⁷⁰ Niebuhr 1792, 405.

⁷¹ Das Gupta 1982, 426.

⁷² Pearson 1976, 31.

⁷³ Das Gupta 1982, 426.

⁷⁴ Pearson 1976, 48.

⁷⁵ Pearson 1976, 48.

⁷⁶ de Grandpre 1814, 223.

⁷⁷ de Grandpre 1814, 222-3; see also Hamilton 1811, 277; Valentia 1811, 77.

⁷⁸ Pearson 1976, 52-3.

⁷⁹ Lane 1940, 581.

⁸⁰ Lane 1940, 581-5.

- ⁸¹ Veinstein 1999, 104.
- ⁸² Veinstein 1999, 105.
- ⁸³ Veinstein 1999, 111-2.
- ⁸⁴ Pearson 1976, 48.
- ⁸⁵ Pearson 1976, 98-9.
- ⁸⁶ Pearson 1976, 94.
- ⁸⁷ Pearson 1976, 125.
- ⁸⁸ Perotin-Duman 1991, 213.
- ⁸⁹ Faroqi 1994, 488.
- ⁹⁰ Das Gupta 1982, 431.
- ⁹¹ Das Gupta 1970, 195.
- ⁹² Das Gupta 1982, 433.
- ⁹³ Das Gupta 1970, 189.
- ⁹⁴ Das Gupta 1982, 431.
- ⁹⁵ Das Gupta 1970, 195.
- ⁹⁶ McGowan 1994, 695.
- ⁹⁷ McGowan 1994, 727.
- ⁹⁸ McGowan 1994, 724.
- ⁹⁹ McGowan 1994, 706.
- ¹⁰⁰ McGowan 1994, 731.
- ¹⁰¹ Faroqi 1994, 507.

CHAPTER III

ARCHAEOLOGICAL EVIDENCE

Sadana Island Shipwreck Excavation

The Sadana Island shipwreck was first located by the Institute of Nautical Archaeology-Egypt (INA-Egypt) during the 1994 Red Sea shipwreck survey.¹ The site is located about 40 km south of Hurgada in 27-42m of water. The ship lies at the base of a coral reef. During that first visit, archaeologists noted Chinese porcelain, Islamic ceramics, three grapnel anchors, and glass “case” bottles. In addition, portions of the hull were exposed and showed this ship’s construction to be unlike any other previously documented type.² In addition to its unique structure and its role in Red Sea trade, the shipwreck site showed signs of looting. These factors were compelling reasons to further study the site.

During the summers of 1995, 1996, and 1998 an international team of archaeologists led by Cheryl Ward mapped and excavated the shipwreck. Much of the first two season’s work involved making the site less attractive to sport divers. Eye-catching porcelain artifacts that were exposed on the sea floor were removed. Large ceramic storage jars, called *zila’* in Arabic, were mapped and removed to expose the center of the site. Some of these jars contained smaller artifacts that reportedly had been placed there by sport divers in an attempt to conceal them from looters. In addition, objects that had been broken and scattered throughout the area by previous visitors were documented and recovered.³ These basic steps were taken in order to

salvage any information from the disturbance caused by careless sport divers or malicious looters and to discourage further damage by future visitors.

Another primary goal of the later seasons was to open up excavation trenches in order to examine and record the unusual ship construction. The ship was huge with an estimated displacement of about 900 tons burden.⁴ Surprisingly, the ship was built with relatively light frames but large and heavy stringers. This type of construction is a previously undocumented and unidentified type. Comparing the hull found at Sadana Island to other known ship types illustrates the unique features of the Sadana Island wreck. This shipwreck did not have any characteristics of the two major ship building traditions of the Indian Ocean: sewn and junk construction.

In sewn boat construction, a practice that lasted for centuries, the keel was laid and the strakes were fastened to it edge to edge creating a smooth shell. The strakes' edges were stitched together using a cord made from coconut husks, palms, reeds, or grasses. Hourani mentions the practice of sewing battens over the seams to help keep the seams watertight. This is the only mention of additional longitudinal components.⁵ After the shell was erected, the frames were added for additional support. Many small craft may not have had any framing; however, an oceangoing vessel of any size would certainly require the additional strength. The vessels were then made water tight by spreading a layer of pitch, lime, fish oil, and beaten vegetable matter on the outside of the hull.⁶ The coating also protected the cordage from breaking. If this occurred, it could be disastrous as the planks could then separate. As a result, the stitching was replaced every year. Despite this practice, sewn boats still leaked. Prior to the

European presence in the Indian Ocean, iron fastenings were also familiar to shipbuilders on the Indian subcontinent.

Chinese junks employed heavy construction with iron nails. Marco Polo described a junk when he said that the ship had divided holds and multiple layers of planking. During the first half of the 15th century, Nicolo Conti described similar ships with five masts and sails, triple planking, and watertight compartments.⁷ As these two Europeans observed, some of the junks' unique characteristics were their large capacity, multiple masts, layers of planking, iron fastenings, a stern rudder, and solid bulkheads that divided the hold. The ship was double-planked to protect the hull from the virulent wood-eating toredo worms that are common in the warm Asian waters. As the top layer of planking wore thin, rather than remove it, a new layer was simply fastening on top. As a result, old ships had many layers of planking as Marco Polo noted.

The sewn ship construction of the Arabian sea and the junk type of the eastern Indian Ocean were two common general forms of ship construction that influenced regional construction. However, these forms only show how different the Sadana Island shipwreck's hull remains are. Although the Sadana Island ship was large, it did not have any of the diagnostic features of Chinese junks. It also lacked any evidence of sewn construction. It likely was a ship from Suez that operated strictly within the Red Sea. According to shipping records kept by the Dutch, the only two ships recorded in Suez in 1622 were described as big ships.⁸ Later in the century Evliya Çelebi noted that hundreds of passengers and large amounts of grain could be transported on ships operating within the Red Sea.⁹ Other accounts confirm this size of the ships, but

describe a larger fleet. Charles Poncet said that 20 to 25 large ships sailed from Egypt to Jeddah annually.¹⁰ The fleet carried “provisions and money...for its (Jeddah’s) subsistence and the support of trade.” William Daniel corroborated Poncet’s account but estimated a fleet of 40 ships.¹¹ In 1782 Henry Rooke described ships of 1200 tons burden that were built in Suez.¹² According to him, these ships would sail to Jeddah before the hajj and return loaded with coffee. The ship that sank near Sadana Island fits these descriptions. Therefore, the Sadana Island ship was probably typical of cargo ships on this trade route.

Sadana Island Shipwreck Cargo

The Sadana Island shipwreck was carrying a mixed cargo when it sank. The wares found are similar to three other known shipwrecks in the northern Red Sea. The wreck near Sharm-el-Sheikh investigated by Avner Raban carried about 1000 similar clay water jars called *qulal* that were also numerous on the Sadana Island site. Although there were very few and fragmentary porcelain pieces found, the precious porcelain cargo may have been salvaged long before the site was documented.¹³

Two more porcelain wrecks were located by INA-Egypt in this area. A wreck near Hurgada lies deeper than 50m.¹⁴ Unfortunately, this depth makes excavation much more difficult. In addition, a porcelain wreck north of Jeddah was salvaged in the early 1980s.¹⁵ The number of known porcelain wrecks in the northern Red Sea indicate that this was a common trade item through the 17th and 18th centuries.

Porcelain

The porcelain on the Sadana Island shipwreck was found primarily in the forward area of the vessel.¹⁶ The collection consists mostly of types that were made specifically for Middle Eastern markets.¹⁷ According to Islamic custom, animal and human images were discouraged. A single piece of porcelain from the Sadana Island wreck contained a decoration with two cranes.¹⁸ All the other porcelain was decorated with floral or abstract designs.¹⁹ This indicates that the porcelain was heading for the Middle East and was not meant for transshipment to European markets. This is in contrast to the porcelain cargoes found on two 18th-century European shipwrecks. The Swedish East India Company's ship, *Göteborg*, sank on her return from China in 1745.²⁰ She was fully loaded with a cargo of valuable Asian goods including tea, porcelain, silk, and spices. The porcelain on board was decorated in a wide variety of methods with many different motifs. Some designs were strictly floral and are similar to the porcelain from the Red Sea. Other designs include cock-fighting scenes, landscapes with birds, and landscapes with human figures.²¹ These decorations were popular in the Europe and America, but were not commonly shipped to Islamic markets. The 18th-century French supply ship, *Machault*, also sank with a cargo of porcelain.²² The ship was enroute to the Canadian colonies when she was lost. Her cargo of porcelain is similar to the *Göteborg* cargo and includes pieces with animal and human images.

Merchants in Asia were very aware of the different markets. The collection of porcelain found on the Sadana Island shipwreck reflects instructions written in 1723 for

the purchasing of a porcelain cargo in China for a British ship bound for Mocha, which states:

“CHINAWARE 300 to 350 chests. ... never to pack a peice [sic] of Ware that hath the figure of the Humane Species, or any Animal whatsoever, and as formerly the Color'd ware prevailed...the red and gold used to be most in esteems, & three quarters of the colour'd Sortments with one quarter of blew & white was the customary package of the whole parcel.”²³

As described, the Sadana Island shipwreck contained blue-and-white wares, overglaze enamel wares, monochrome glazed wares, and undecorated white wares. These were present in a variety of forms including large and small bowls, large dishes, cups, plates, shallow plates and dishes, and platters. The most common type of decoration in the collection was found on over 170 large blue-and-white dishes. The design included a peony scroll motif on the interior with two bare branches on the reverse.²⁴ This type is similar to an example found in the Topkapi Sarayi collection that is dated to the late 17th through the early 18th century.²⁵ Another blue-and-white type found has a chrysanthemum pattern on the interior and also has parallels in the Topkapi Sarayi collection that are dated to the early 18th century.²⁶

Yet another type of porcelain found on the shipwreck is called “Chinese Imari.” Imari wares refer to porcelain that has an overglaze enamel applied after firing. There are a variety of colors of overglaze enamel, including shades of green, red, blacks, and yellow.²⁷ The most common overglaze enamels were red and gold.²⁸ Unfortunately, after years underwater, the overglaze enamels have disappeared, but a “ghost” of the

original decoration can usually be seen under special lighting conditions.²⁹ Among this type of porcelain is a large bowl decorated with chrysanthemums and day lilies that is slightly smaller but otherwise identical to one found in the Topkapi Sarayi collection.³⁰ The Topkapi Sarayi bowl is dated to the early 18th century. Other examples in Istanbul also have parallels on board the Sadana Island ship. Bowls decorated with medallions in a vine leaf shape and others with spiraling blue panels are dated to the second half of the 18th century.³¹

The dates of these pieces span over a century according to existing chronologies. These chronologies are difficult to determine because porcelain of this type usually does not bear reign marks. The Sadana Island shipwreck collection may help correct these dates and answer questions about Qing Dynasty porcelain.³² Two inscribed copper artifacts (Cu 2 and Cu 25) are the only dated objects recovered from the wreck. These two items may help rewrite porcelain chronologies.

Earthenware

Another main component of the shipwreck's cargo was over a thousand earthenware vessels. The jars are Islamic water jars and jugs called *qulal*. There are few known examples of this type of ceramic from land archaeological sites, however, the Sharm-el-Sheikh shipwreck carried about a thousand of them. Beyond those examples, little is known about exactly when or where these ceramics were produced. The Sadana Island ship's cargo of *qulal* consisted of about 30 different forms, and most were located in the stern area of the ship. Many of the forms were elaborately

decorated with incised lines and applied clay ridges and lobes.³³ Among the types found were pitchers with and without handles, goblets, and long-necked plain jars.³⁴ Although their decoration varied widely, they were generally a standard size. Their size and shape allowed them to be stacked horizontally in the hold with the bulbous bodies nestled between the thinner necks in the upper and lower rows.

Approximately 30 large ceramic storage jars called *zila* ' also were recorded. These may have contained a liquid cargo or were carried empty. Previous visitors to the site had placed numerous artifacts including copper wares, earthenware pipes, qulal, porcelain bowls, and a glass case bottle inside them.³⁵

Organic Material

In addition to the ceramic cargo, organic remains were found on the shipwreck. The southern Red Sea and the Arabian peninsula were known for aromatic resins, incense, and coffee. From Roman times the western Indian Ocean was famous for its organic goods. In addition, many commodities grown in India and the Far East were shipped to Arabia before being transported up the Red Sea.

Once Europeans had infiltrated the Indian Ocean, the spice trade in the Red Sea diminished. European ships were sailing directly to India and the Far East and transporting valuable spices directly to Europe. The Middle East, and the Red Sea particularly, lost its importance in this trade. As the spice trade declined in the Red Sea, coffee was gaining popularity throughout the Ottoman Empire and the rest of Europe. The center of coffee production was Yemen. Captain Hamilton, who traveled through

Arabia from 1688 through 1723, described the market of Jeddah as supplying “India, Persia, Turkey in Asia, Africa, and Europe, besides England, France, and Holland with coffee beans.”³⁶ Therefore, coffee was a valuable cargo on many ships sailing up the Red Sea from the 16th century through the time the Sadana Island shipwreck sank. As a result, it not surprising that coffee beans were found in the ship.³⁷ This was probably part of the cargo in addition to part of the mariners’ diet.

In addition to the coffee, other organic goods were important commodities in the Arabian markets. Its position as the hub for trade between the Ottoman Empire and the rich spice and drug producing lands of the eastern Indian Ocean also contributes to the importance of organic goods in Arabia’s economy. As early as the first century AD the *Periplus Maris Erythraei* describes the goods exchanged throughout the Indian Ocean.³⁸ Ships from all reaches of the Indian Ocean sailed to Arabian ports in order to trade for frankincense, myrrh, and aloe. Therefore, it is not surprising that organic samples survived over 200 years on the Sadana Island shipwreck. Several kilograms of purplish resin were found. The resin contains many twigs and branches and was found in lumps and carefully formed cakes.³⁹ A yellow resin was also found throughout the ship.

Another interesting cargo item was coconut. Over 100 coconuts were found, mostly in the stern of the ship. Coconuts were enjoyed as a food and also as a curiosity. Included in the cargo was a rare, huge bi-lobed coconut native to the Seychelles Archipelago.⁴⁰ This particular specimen was likely headed to a wealthy European or Ottoman display cabinet, but will soon end up in a modern museum cabinet in Egypt.

Another interesting find was more than 50 black-lipped, pearl oyster shells. The shells were found just aft of midships. The shells are known to have been used as mother-of-pearl for inlay in decorative pieces and furniture in the Islamic world. In addition, a large amount of branches covered nearly a quarter of the wreck. These branches were undoubtedly carried as either the ship's firewood, or as a trade cargo.⁴¹

Ward identified other botanical remains from the western Indian Ocean including pepper, cardamom, and nutmeg.⁴² Hazelnut, grape, fig, and olive remains originating from the Mediterranean were identified, along with remains of grasses, squash, onion, and bean. Animal remains were also found and include a leather bag, and butchered sheep and goat bones.⁴³ These remains may provide insight into the diet of Red Sea sailors.

Copperware

Scattered throughout the site were copper artifacts. This group consisted of a variety of different forms. Artifact analysis suggests that most of these were very common, utilitarian wares that were probably used by the ship's crew. Included in this group were personal eating vessels such as plates and bowls, larger serving pieces, and food preparation vessels, possibly from the ship's kitchen, or galley. In addition there were several unique objects including two braziers, pieces of lamps, and several personal items. This collection represents everyday wares common in Ottoman and Arabian homes. These types are still seen today in the markets, bazaars, and homes of

the region. Due to their common, utilitarian nature, very little has been written about these types.

The analysis of this assemblage gives some insight into the nature of shipboard life. Very little direct evidence exists describing the average Red Sea sailor's life during the 18th century. It is therefore important to examine the objects common sailors used to glean details about their daily habits and behavior. This can help broaden and deepen our understanding of the Ottoman and Arab world during this time just prior to the great changes of the Industrial Revolution and the French invasion of Egypt.

Notes

- ¹ Haldane 1994, 6.
- ² Haldane 1994, 6.
- ³ Haldane 1996b, 3.
- ⁴ Ward 1998, 3.
- ⁵ Hourani 1951, 92.
- ⁶ Arasaratnam 1994, 250.
- ⁷ Mookerji 1912, 46.
- ⁸ Brouwer 1991, 162.
- ⁹ Faroghi 1995, 239.
- ¹⁰ Poncet 1949, 178.
- ¹¹ Daniel 1949, 64.
- ¹² Rooke 1784, 128.
- ¹³ Ward 2000a, 187.
- ¹⁴ Ward 2000a, 188.
- ¹⁵ Ward 2000a, 188.
- ¹⁶ Haldane 1996a, 86.
- ¹⁷ Ward 2000a, 189.
- ¹⁸ Ward 2000a, 189.
- ¹⁹ Ward 2001, 370.
- ²⁰ Wastfelt 1990, 11.
- ²¹ Wastfelt 1990, 61-271.

- ²² Sullivan 1986, 7.
- ²³ Ward 2000a, 189.
- ²⁴ Ward 2000a, 189.
- ²⁵ Ward 2000a, 189.
- ²⁶ Ward 2000a, 189.
- ²⁷ Dewolf 1998, 88.
- ²⁸ Haldane 1996a, 89.
- ²⁹ Haldane 1996a, 89.
- ³⁰ Ward 2000a, 191.
- ³¹ Ward 2000a, 191.
- ³² Ward 2000a, 192-3.
- ³³ Ward 2000a, 193.
- ³⁴ Ward 2000a, 194.
- ³⁵ Haldane 1995, 3.
- ³⁶ Hamilton 1811, 276.
- ³⁷ Ward 2001, 376.
- ³⁸ Casson 1989, 16-30.
- ³⁹ Ward 1998, 4.
- ⁴⁰ Ward 1998, 4-5.
- ⁴¹ Ward 1998, 4.
- ⁴² Ward 2001, 376.

CHAPTER IV

THE COPPER ARTIFACT ASSEMBLAGE

The Sadana Island shipwreck carried a mixed cargo of East Asian porcelain, Islamic earthenware, and organic material from the western Indian Ocean. It was a large ship, which required a large crew to handle it. The crew left behind pieces of their shipboard life that survived on the seafloor for more than 200 years until looters and archaeologists uncovered them. Sixty-two copper alloy items were found throughout the shipwreck site. To date no analysis of the metal has been done to determine the alloy. Therefore, all copper alloy objects will simply be referred to as copper artifacts. The primary component of this assemblage is galleyware. Fifty-five of the copper artifacts belong to this category. Five objects represent pieces of hardware from either ship's gear or other furniture, and the final two artifacts are decorative personal belongings. The copper alloy assemblage provides one of the few glimpses into the lives of the sailors from this shipwreck.

The substantial collection of galleyware indicates that this ship carried large numbers of sailors, passengers, or both at the time of sinking. Unfortunately, few items have any personal identifying marks. Three copper artifacts (Cu 2, Cu 5, and Cu 25) are the only inscribed artifacts from the wreck. The inscription on artifact Cu 2 is legible with a date, while the text on artifact Cu 25 is unreadable but the date is clear. These two inscriptions provide the only dated objects recovered from the shipwreck. The inscription on artifact Cu 5 is legible but it does not contain a date.

The galleyware can be divided into three groups: large serving pieces, small, personal eating implements, and food preparation vessels. Of these groups, vessels can be further categorized by their form. These forms include kettles, basins, pitchers, trays, dishes, pans, braziers, and strainers. In addition to these groups there are a number of miscellaneous vessel parts including rims, handles, tripod bases, base rings, lids, and body fragments.

Kettles

A kettle is a vessel that grows wider towards to mouth. Six kettles or kettle fragments were found on the Sadana Island shipwreck. All are wide-mouthed with an average rim diameter of 0.320m and all were made from a single sheet of copper that was bent into the desired shape. As a result, there are not any crenellated¹, or toothed seams that are seen in cupreous vessels from early Byzantine levels of Sardis² or from the 7th-century shipwreck at Yassı Ada.³ The Sadana Island shipwreck kettles are also unlike the kettles commonly found on post-medieval European wrecks. The European kettle is made by fastening multiple, bent sheets of copper together with heavy rivets.⁴ There are not any hammer marks on the kettles, but incised lines ringing the vessels indicate that they were turned on a lathe.

Copper working involves many processes. Today, the best music cymbals in the world are still handmade from copper alloy following a centuries old tradition originating in Turkey. Many of the copper working techniques used in cymbal manufacturing are very similar to the methods used by coppersmiths over 200 years

ago. By examining the current processes used by the Zildjian family in cymbal making, great insight is gained into copper working techniques. The ancient tradition of copper working handed down through generations of the Zildjian family begins by rolling the copper into sheets. The sheet was heated and formed into the general shape of the cymbal or vessel. It was then set on a lathe and spun to add any detail or to further refine the shape.⁵ The coppersmiths that made the vessels found on the Sadana Island shipwreck probably followed a similar process.

All six kettles have wide mouths. Four are larger with a rim diameter in excess of 0.330m, while Cu 1 and Cu 6 are smaller with a rim diameter of 0.235m and 0.248m respectively. Of these, all except Cu 4 have a nearly complete body. Cu 2, Cu 3, and Cu 4 have significant portions of their base intact as well. The surviving three bases are rounded. The interior of all five rims is stepped as if to accept a lid. The four larger vessels have steps between 0.022 and 0.030m wide, and the small example has a rim step of 0.014m wide. Cu 6 consists of two objects, a kettle with a lid. The lid was found inverted and stacked inside the kettle. The kettle rims are sharply folded up to form a small horizontal ridge on the outermost edge of the rim. It is then folded out and bent down to form an outer vertical band around the rim. The exterior surface of all six rims is between 0.017m and 0.022m high. This surface is an ideal location for an inscription. Artifact Cu 2 has inscriptions in this place that reads *A gift for Mustafa 1169*.⁶ As this is undoubtedly an Islamic date it translates to 1755-56 AD. The dated inscription of Cu 2 is one of only two dated artifacts recovered from the shipwreck. Kettle Cu 5 also bears an inscription on the flat lid ledge on the interior rim surface.

This inscription reads *Sahibi Ra'is Musa Mahmoud*, which translates to *the owner, captain Musa Mahmoud*.⁷ The inscription on Cu 5 tells us more about the people who used these artifacts. This belonged to a highly respected person, the captain.

Interestingly, the kettle's large size makes it useful for cooking for a group of people, but the inscription indicates that this was a personal possession. All the kettles are relatively large and deep with sides that slightly taper toward the base, unlike the other vessel forms found on this shipwreck.

Kettle Cu 7 is a unique artifact. This is the only kettle that was hammered, as is indicated by the hammer marks covering the entire surface. As a result, this large piece is very heavy compared with the other kettles and its walls are comparatively thick. The mouth is 0.441m in diameter and is the widest point. There is not a separate rim element; the sides simply end at the top edge. The sides are uneven and concave, tapering to an exterior diameter of 0.204m at the base. There are two pairs of rivets near the rim opposite each other. These rivets are the remains of two handles. The exterior diameters of the rivets are between 0.010m and 0.020m and protrude approximately 0.010m from the side. The interior diameters of the rivets are between 0.030m and 0.048m. This is a heavy kettle that was probably used for cooking. The thick, heavy base and sides held heat more effectively than the thinner vessels. The handle attachments may be the remains of a pair of loop handles that allowed the kettle to hang over a fire.

Pots

Remains of five pots were found on the Sadana Island shipwreck. A pot is a vessel with sides that taper to a mouth that is narrower than the widest diameter, yet the mouth is still at least 0.200m wide. Vessels Cu 8, Cu 9, Cu 10, and Cu 11 are very similar to each other. In addition, one of the two rims that make up Cu 12 is similar to Cu 8, Cu 9, Cu 10, and Cu 11. Artifacts Cu 9 and Cu 10 are nearly complete with portions of their bases intact while artifacts Cu 8, Cu 11, and one of the vessels in Cu 12, only consist of the rim and upper sides of a similar form. All examples show the sides of the bodies flaring out towards the base. Pots Cu 9 and Cu 10 have sharp transitions between the sides and the base. The bases are not well preserved, but appear to have been slightly concave. The interior surface of the rims is slightly bent out to an upper ridge and then sharply folded down forming a vertical exterior surface. Artifact Cu 10 also has two incised lines cut into the exterior of the body. Turning marks are visible on the sides of artifact Cu 9, but none of the marks appear to be decorative incisions. Not enough of the body of artifacts Cu 8, Cu 10 or Cu 12 survives to make this comparison, but their rims clearly show they are similar vessels. This shape would have been very useful on board a ship since the contents are less prone to spilling and the pot is less prone to tipping than a vessel whose widest diameter is the mouth. In addition, artifact Cu 12 consists of two copper rims that were found stacked one in the other.

Lids

Kettle Cu 6 and pot Cu 12 were each found with a second rim nested inside the vessel. The additional rims are both simple horizontally bent rims with vertical sides. These are the remains of lids. In addition to Cu 6 and Cu 12, Cu 13 and Cu 14 have similar rims and sides. The most complete specimen is the lid of Cu 6. This piece has a simple, flat rim, vertical sides, a concave base that is attached to a heavy ring approximately 0.020m high with flaring sides. Although this piece does balance firmly on the ring, it is more likely that this is the handle of a lid. This nearly complete lid displays a high domed shape. This same shape with a flaring top ring is seen in a miniature painting that dates to 1582-3. This miniature is from the *Surname* manuscript, attributed to Nakkaş Osman, and depicts a procession of the guild of restaurant owners.⁸ In the central scene, a meal is being prepared in a large kettle set into a large table. To the right of the kettle on the table is a lidded vessel. The lid is bell shaped and topped with a flared ring (fig. 3). Although the shape in the illustration is slightly more rounded than Cu 6, it demonstrates that lids for cooking vessels were tall and topped with a ring handle similar to Cu 6. The flat-rimmed object in Cu 12 was also probably a lid to the vessel it was found in.

Although artifacts Cu 13 and Cu 14 were not found nestled inside another vessel, they are similar to Cu 6 and Cu 12. Both artifacts Cu 13 and Cu 14 have wide mouths of 0.214m and 0.220m respectively. The sides of both are nearly vertical. Artifact Cu 14's sides are well preserved and some of the base is intact, but the

diagnostic lid ring handle is missing. A separate lid ring handle was found and is labeled Cu 15. It is possible that this ring belongs to lid Cu 14.



Fig. 3. Detail from "Procession of the guild of restaurant owners."⁹

Basins

The basins are characterized by a large body with a wide mouth and sloping or curving sides. They were used either for food preparation or other activities like bathing. A nearly complete vessel and three rim fragments illustrate this form. The basins have wide mouths approximately 0.300m in diameter, and shallow bodies of only about 0.075m as seen in artifact Cu 16. The sides of the body have a slight flare towards the rim. The rims are relatively simple. The interior surface of the rim is everted and subsequently folded down to form the outer rim band. Unlike the kettle and pot rims, the exterior surfaces of the basin rims are not sharply bent to form a vertical

band, but maintain a slight outward flare. This same rim is seen on fragments Cu 17, Cu 18, Cu 19, and Cu 20.

This shallow, wide-mouthed basin would not have been used for preparing or serving liquids or soups, because fluids would be prone to sloshing and spilling from this form. This type may have been used for preparing and serving solid foods, or may have had another purpose altogether. As a copper merchant in the market district Khan el-Khalili in Cairo explained, this form was often used for bathing. The bather would stand in the shallow basin and pour water over his head with a smaller vessel. This method of bathing illustrates a possible non-culinary use for some of the copper basins.

Artifact Cu 21 is a unique basin form. The vessel has sides that flare out slightly to the rim. Approximately midway down the side, there are two pairs of incised lines. At the top of the body the metal is everted creating a broad flat 0.019m-wide-rim with a gentle flare up and out. The rim is then bent up vertically forming a slight lip 0.007m high. The rim is similar to an early Byzantine vessel found at Sardis.¹⁰ The vessel from the Sadana Island wreck is more finely made than the other examples from the wreck, and as a result, may represent a personal possession rather than a part of the ship's supplies.

Unique Large Vessel

Artifact Cu 22 is a very angular form. This large vessel has a maximum diameter of 0.315m at its base. The transition from base to sides is very sharp and the sides taper to a diameter of 0.228m at the shoulder. There is another sharp transition at

the shoulder where the sides turn inward. The rest of the shoulder and possible neck are not present. The base is concave with a 0.076m-diameter circular indentation in the center. This stabilizes the otherwise rounded bottom. This piece has a dent in the bottom and evidence of at least one repair. There is a rivet in the sides near the base. The interior part of the rivet measures 0.015m across. The exterior consists of the rivet surrounded by a teardrop-shaped metal patch. Like the kettles, pots, and basins, this vessel is made from a single sheet of metal. No seams are present. This form may be the bottom of a water ewer. The profile is similar to the base and shoulder profiles of ninth to 10th-century ewers found at Nishapur.¹¹

Small Vessels

Two fragments represent a smaller vessel form unlike the basins. Artifacts Cu 23 and Cu 24 are both in poor condition. Artifact Cu 23 is twisted and deformed while Cu 24 is covered with heavy concretion. However, visible remains indicate they share a similar profile. The sides taper to a narrower neck. The rim begins at the neck with a bend up and out. The metal is then bent vertically forming a lip. This creates a step suitable to hold a lid. Both fragments appear to be short vessels with a wide radius. The side of artifact Cu 24 appears to be intact from the base to the rim. It is 0.083 high, while the rim radius of the intact portion is 0.102m. The overall proportions are of a small, short vessel that was lidded.

Dishes

The single most common type of copper alloy artifact recovered from the Sadana Island shipwreck was a type of shallow dish. Alex Hildred defines a dish as a vessel with a height between one third and one-seventh the diameter.¹² Seven artifacts fit this definition. Artifacts Cu 25, Cu 26, and Cu 27 are complete or nearly complete examples of this type, while artifacts Cu 28, Cu 29, Cu 30, and Cu 31 consist of rims and body fragments. Two additional lots, fragments Cu 32 and Cu 33 may represent bases and a base ring from this vessel form. All these artifacts are shallow with sides that flare to the rim. The rim is simply folded out horizontally. Attached to the bottom of the dish is a metal ring. Two of the four base rings have a height of 0.025m (Cu 30 and Cu 25) while artifact Cu 33 has a base ring height of 0.006m and Cu 27 is 0.004m.

The rim diameters range from 0.230m to 0.349m. The average diameter of the seven surviving rims is 0.262m. This is the size of a large single serving dish or a small communal dish. Similar pieces were found on the *Mary Rose*; however, they were made of wood and pewter.¹³ Many of the plates found on the *Mary Rose* had decorations carved in them that were probably ownership marks. This indicates that these were personal possessions and not shared among the crew.¹⁴ Like the dishes from the *Mary Rose*, artifact Cu 25 also contains an inscription. Unfortunately about one-third of the inscription is unreadable as a result of metal corrosion. This inscription may indicate that a passenger or member of the crew owned the dish. The inscription includes a legible date, 1178, which translates to 1764/65 AD. This provides a late 18th

century date for the sinking of the ship and definitively places the terminus post quem at 1764-65 AD.

Each of the copper dishes from the Sadana shipwreck could also have been used as a small communal dish shared among a group. This custom was described by the Danish observer Carsten Neibuhr. According to his descriptions, the Arabian tables were set with “different copper dishes, neatly tinned within and without.”¹⁵ Arab diners ate directly from these communal dishes with their fingers. This is also illustrated in a miniature depicting the Prophet Mohammed visiting a monastery from the *Siyer-i Nebi* manuscript.¹⁶ A group of four seated figures eat from four large dishes placed between them. A second group of five figures share three dishes. Three figures are scooping the food from the dishes with their hands, while five of the figures are placing the food into their mouths. In addition, all of the seven dishes are shallow with angled sides and a base ring (fig. 4). They bear a striking resemblance to the dishes recovered from the Sadana Island shipwreck. Although the scene illustrates an elaborate feast, two European travelers’ accounts verify that this method of dining was practiced at sea. Henry Rooke supped with the captain of his vessel near Mocha.¹⁷ He described eating with his fingers from large shared bowls of rice. Eyles Irwin wrote of a similar experience at Yambo.¹⁸ These accounts clearly illustrate the practice of sharing food from communal dishes, and represents the method of shipboard dining used by most of the crew.

A single example of a different dish form was found at Sadana Island. Artifact Cu 34 is about the same size as the other dishes with a rim diameter of 0.270m. Unlike

the previous dishes, the sides flare out to the edge of the rim. There is not a separate rim element defined by a bend in the metal. This is similar to a dish found on an Ottoman shipwreck in the Black Sea near Kiten, Bulgaria.¹⁹ Another dish of this type was also recovered from the Sadana Island shipwreck by sport divers. The specimen was turned over to the archaeologists, but has no provenience. This dish is not included in this catalogue.



Fig. 4. Detail from "Prophet Mohammed visiting a monastery."²⁰

Cooking Pans

Two artifacts, Cu 35 and Cu 36, are the remains of cooking pans. Artifact Cu 35 has a diameter of 0.277m and artifact Cu 36 has a diameter of 0.325m. These are, on average, larger than the dishes described above. In addition, the sides gently flare to the top of the rim. There is not a separate rim element defined by a bend in the metal. Both

examples have the remains of copper loop handles. The handles are made by bending a rod of metal with a square profile to form a hook on each end. Each hook fits through a bent loop at the top of a mounting strap. There are two mounting straps for each handle, and each is attached to the sides of the pan with one rivet through the center of the strap. The straps all are bent around the bottom so the last 0.015m of the strap is under the base of the pan. Two handles survive on Cu 35 and one is intact on Cu 36. These handles are crudely made and are taller than the body of the pan. As a result, the handles do not hang freely from the pan. This indicates that these were inexpensive wares. These types of goods would have been common to merchant ships and average households. Similar pans were also found on the Ottoman ship excavated in the Black Sea.²¹

In contrast to the crudely made loop handles, a finely made handle was found still attached to the remains of a vessel. Artifact Cu 37 is a heavier loop handle that is mounted to a bracket by a pin. The bracket has a series of decorative horizontal ridges along the top portion. The bottom tapers and then flares out in a rounded fleur-de-lis pattern. Interestingly, the bracket is mounted to the vessel with two rivets. There is a rough square of metal between the vessel and the interior end of the rivet. This helped strengthen the attachment, but is rather bulky and unfinished compared to the finer craftsmanship of the exterior. This artifact is one of the few decorative copper vessels found on the shipwreck. Compared to artifacts Cu 35 and Cu 36, Cu 37 is a finely made and decorative piece.

Trays

Three large, copper alloy trays were recovered from the Sadana Island shipwreck. The trays range in diameter from 0.660m on Cu 38 to 0.835m on Cu 39. These trays were decorated with incised designs. Artifact Cu 39 is heavily decorated with a repeating floral pattern. The decoration is in courses of concentric circles around the tray. There are winding vines, leaves and elaborate flowers. The rim is bent up to a flat horizontal band. This is also the largest of the trays with a diameter of 0.835m. Artifact Cu 40 is incised with simpler vine pattern and small pendants. The rim is also a simple vertical lip. Artifact Cu 38 is the simplest of the three trays. There is no visible incised decoration. Unfortunately the metal is in such a poor state of preservation that any decoration may be concealed or may have disappeared as the surface of the copper has deteriorated. However, the rim is a very simple type where the metal is bent up vertically to about 0.010m to form a lip.

The three copper alloy trays recovered from the Sadana Island shipwreck were used as tables. As described in Niebuhr's writings meals were eaten on tables with wooden legs and a large copper plate set on top.²² These kinds of tables are still produced today in Egypt, and are used in many homes. The culinary historian Clifford Wright says that meat would be baked directly on the brass or copper tray and then set on a stool and used as a table.²³ Sir Richard Burton described the same eating arrangement in a home in Mecca while traveling there in 1853. The dinner was served on "a *sini*, a plated copper tray about six feet in circumference, and handsomely ornamented with arabesque and inscriptions. Under this was the usual *kursi*, or stool,

composed of mother-of-pearl facets set in sandal-wood; and upon it a well-tinned and clean-looking service of the same material as the *sini*.²⁴ This description of the tray, or *sini*, is so similar to the ones found on the Sadana Island shipwreck, that they would certainly have been used with a *kursi* but the wood did not survive. These tables would have been suited for shipboard use in calm seas because they can be quickly and easily disassembled and stowed. The wooden legs often fold flat so the stowed table would need very little space on a crowded ship. At mealtime the tables could easily be set up on the deck for the crew and passengers. In very rough weather this may have proved a difficult arrangement because there is no evidence that the tables were fastened securely to the ship or deck. If they were not fastened then they would slide about the deck in very rough or stormy seas.

In addition, the tables may have been reserved for the captain and important passengers. There were only three copper trays recovered from the shipwreck. Although there may be more still on the seafloor, they may have been a special privilege of the officers and upper class. The trays were decorated with incised floral patterns. This kind of elaborate decoration is not found on any of the other copper pieces from this shipwreck. Sir Richard Burton's description of the copper items at his meal in Mecca was in the home of an influential and wealthy man who was entertaining other important travelers in addition to Burton.²⁵ This is the only time Burton mentions such items, which indicates that these were special pieces not used by commoners.

The historian C.R. Boxer also made the relationship between shipboard status and eating utensils when he described Dutch East-Indiamen during the 17th and 18th

century. According to his article, the crew and soldiers aboard Dutch East-Indiamen ate from simple wooden spoons, dishes, and boards, while the captain and important visitors dined on tin dishes with tin spoons.²⁶ This shows that eating vessels and utensils varied according to the status of the user. The more elaborate or expensive items, such as the decorative trays, were used by higher ranking crew members or important passengers.

Pitchers

Two pitchers were found on the Sadana Island shipwreck. Pitcher Cu 42 is approximately twice the size of Cu 41, but both have nearly identical shapes. They both have a bulbous base that tapers to a finer neck. Cu 41 is preserved above the neck and slightly flares out at the spout and rim. Both pitchers have cast handles that have been applied to the body, while Cu 41 has a folded spout at the rim. Although the pitchers are essentially identical, artifact Cu 42 is very deteriorated and fragile while artifact Cu 41 is very stable and nearly complete. As a result, details of this form are mostly gleaned from pitcher Cu 41.

The handle has a square profile at the top and splits into two flat, pointed oval shaped portions that provide a surface to rivet the handle to the body at the rim. There is one rivet on each side of the handle. At the rim, the handle is horizontal. The handle then bends down and in close to the widest part of the body. Then it bends slightly outward and then under the curve of the base. The outer surface of the handle has a decorative pattern carved into the metal. A separate, similar handle was also found (Cu

43). There are two thin, flat tabs that protrude up from the handle. Both are penetrated by a hole. This is the hinge point for a lid that is now missing on both pitchers. Artifact Cu 44 is probably a lid to a pitcher or other small vessel. This lid does not fit on either pitcher Cu 41 or Cu 42, but both the lid and artifact Cu 41 have very similar diameters. Pitcher Cu 41 has a rim diameter of 0.093m and lid Cu 44 has a diameter of 0.094m. Unfortunately, the placement of the hinge does not match between the two. The lid is made up of two elements. The hinge is a heavier piece of metal with a vertically-flattened tab that has a hole to attach to the vessel. The hinge is fastened to the lid by three rivets. There is one larger rivet in the center of the hinge. The hinge splits into two curving bands that flare out into elongated teardrop shape. There is a smaller rivet in the center of each teardrop.

Opposite the handle on both pitchers is a spout formed by creases in the metal. The spout of pitcher Cu 41 is asymmetrical and slightly lopsided. The spouts are very different from those of artifacts Cu 45 and Cu 46. These two spouts are long; artifact Cu 45 is 0.172m from base to mouth and artifact Cu 46 is 0.136m long. They are formed by rolling the sheet metal to form a tube. The opening at the base where the spout was attached to the vessel is large. The interior of the base opening of spout Cu 45 is 0.046m and artifact Cu 46's base opening is 0.043m. There is extra metal wrapped around the mouth of the spouts. This creates a bulbous end and helps strengthen the small opening. The mouth opening of spout Cu 45 is 0.006m while the opening of spout Cu 46 is 0.007m. These spouts also have a graceful 's' curve. They are

consistent with the images of ewers that held water or wine. The pitchers were probably primarily used as coffee pots and are similar to a regionally recognized form.

Strainers

Among the preparation vessels in the Sadana Island shipwreck assemblage is a copper alloy strainer, artifact Cu 47. This piece has the same general form as the dishes Cu 25, Cu 26, and Cu 27 except the turn of the base on artifact Cu 47 is stepped and the bottom is perforated with numerous holes all about 0.005m in diameter. There are two concentric circles of holes. The centermost circle of holes is approximately 0.040m from the center hole. The second ring of holes is about 0.025m from the edge of the bottom. The other holes are in a rough pattern of curved lines radiating from the center. None of the patterns are symmetrical or even.

The base of the strainer is convex. As a result, it does not stand well on its own. The stepped base edge may have allowed this strainer to rest securely in a larger vessel. The maximum diameter of the vessel at the rim is 0.365m and the base diameter is 0.305m. This makes it approximately the right size to rest in the mouth of artifacts Cu 2 and Cu 15. It is unlikely artifact Cu 2 is the intended partner to the strainer because its base is also slightly rounded. It is not a very stable vessel, especially in a pitching ship. Artifact Cu 15's flat base makes it the most likely candidate as the strainer's companion.

Similar strainers were recovered from the *Machault* shipwreck in Canada.²⁷ A sheet-brass colander and a long-handled skimmer were found. These are smaller than

the Sadana Island shipwreck strainer, but show that they were cooking tools common to different cultures.

A smaller strainer was also found. Artifact Cu 48 consists of a copper alloy bowl perforated with several holes that is attached to the remains of a straight wooden handle. This heavy object is badly deteriorated, but was probably used as a strainer with one of the large basins. The wooden handle only survives within the metal collar. A smaller, long copper alloy handle was found (Cu 49). This small, heavy, solid handle has the remains of a round vessel or bowl still attached. The handle has a square profile that tapers to 0.030m from the bowl where it widens to about 0.020m. This appears to be the remains of a long-handled coffeepot similar to the ones still used to make Turkish coffee. These coffeepots have a single or double serving size bowl attached to a long handle so the pot can be held over a fire.

Artifact Cu 50 is also the remains of a vessel with a handle attachment. Unlike the tubular collar of Cu 48, Cu 50 has a flat collar with two vertical flat tabs each punctured with a hole. This is probably the attachment point for a hinged lid in addition to a handle.

Braziers

Two of the most complex copper alloy artifacts recovered from the Red Sea are a pair of braziers. Artifacts Cu 51 and Cu 52 consist of a copper alloy shell mounted on a copper alloy tripod. An earthenware liner rests inside the top portion of the shell and a gridiron is set in the liner. Of the two braziers, artifact Cu 52 is more complete than

artifact Cu 51. The shell of each is hourglass shaped with a pinched waist. Only the top half of Cu 51 survives, while Cu 52 is nearly complete. There are fragments of earthenware liner in both specimens. The earthenware is striated on the exterior surface. This may have helped form a bond if an adhesive was used to join it to the copper. It also may have helped dissipate the heat of the fire.

Although badly deteriorated, the gridiron is still in place in artifact Cu 52. The rods of the gridiron are square in profile and are attached to a flat ring that rests on the narrow middle of the brazier. The rods are attached to the ring so a corner of their profile, instead of a flat plane, creates the cooking surface. This gives a good picture of how these artifacts were used. Hot coals were set in the copper base of the brazier. The gridiron was placed above the coals in the narrow part of the body. The upper half was lined with earthenware to help keep the heat within the brazier. The body stood on three legs, which helped keep the heat of the coals away from the ship's deck. There were two loop handles that allowed the object to be easily moved.

Two of its three legs are intact on artifact Cu 52 and are riveted to the base of the copper shell. Each leg is fastened with three rivets, but one rivet is shared between adjoining legs. As a result six rivets are used to fasten the three legs. The three feet are all spade-shaped. Two other tripod bases were found (Cu 53 and Cu 54) without any portion of the body remaining except the base. These may be the remains of more braziers or the base of artifact Cu 51. The legs of tripod Cu 54 have a similar shape to artifact Cu 52, but the legs on tripod Cu 54 do not share rivets. Both tripods' legs are fastened with three rivets set in a triangle. These are visually pleasing and more

decorative than the legs of tripod Cu 53. Tripod Cu 53 has rounded feet and the legs are fastened to the base with two rivets each. Unlike artifacts Cu 52 and Cu 54, the rivets are aligned down the center of each leg. The legs end in irregular straps that overlap. This is a much cruder form than the decorative legs of artifacts Cu 52 and Cu 54.

The use of braziers is well documented. Clifford Wright describes the use of braziers in Morocco.²⁸ During the 17th century, Valazquez painted a depiction of a woman cooking eggs in a dish over a brazier (fig. 5).²⁹ Bread was also cooked in braziers. A ball of dough was placed in the earthenware liner and left to cook over the hot coals. The smaller braziers may also support the idea that sailors ate in small groups and shared food. The small braziers could not cook enough large portions of food to feed the entire crew at the same time. Therefore, it is likely that small groups of men prepared and ate their food together from communal dishes.

In addition to cooking, braziers were and still are used to warm unheated rooms in the Middle East.³⁰ The use of braziers below deck for warmth presents a considerable fire risk. As Carsten Niebuhr noted on his voyage down the Red Sea, a group of women in the cabin below his set some linen they were drying on fire.³¹ This illustrates that although the risk of fire was great, heaters such as braziers were used below decks on ships.



Fig. 5. Seventeenth-century painting of an old woman cooking eggs by Diego Rodriguez de Silva y Valazquez.³²

Still

Artifact Cu 55 is a unique artifact, for it is a component of a still. Stills were used for distilling substances such as medicines, alcohol, and perfume. The object found on the Sadana Island shipwreck is a closed domed vessel made from two pieces of copper soldered together. A small hole 0.041 m in diameter offset from the center top is the only opening. A small flange (0.005m high) surrounding the hole extends out. This hole held a tube or pipe that carried the vapors from the vessel to a receiver where it condensed into a liquid. There are no comparable objects known, but Cu 55 fits a description in a 1652 treatise on distillation equipment.³³ John Rudolph Glauber states that the “copper instrument” must be made from strong copper plates bent into two hemispheres the size of a man’s head. They are tightly soldered together and a pipe is attached to a hole in the side. The diameter of the opening for the pipe should equal to

the breadth of two fingers. The vessel is placed in the furnace with the pipe leading to the receiver.³⁴ The artifact from the shipwreck fits this description as part of a still. There is no evidence that it was used on board the ship. It was likely part of a passenger's belongings or a merchant's cargo. As the ship was carrying aromatic resins³⁵ and perfumes were made throughout the Middle East, this still was probably used for perfume making. It is not surprising to find physical evidence of perfume manufacturing in the Red Sea as it was a common practice throughout the region.

Perfumes and scented oils were used throughout antiquity. Numerous references are known in Ancient Egypt, and classical Greece and Roman. The Arabs did not invent perfumes and ointments, but they improved distillation techniques. Arab alchemists inherited distillation processes from the Syriacs.³⁶ The famous alchemist, Avicenna, is supposed to have been the first to develop rose-water and essential oils by distillation. Jabir was another notable Islamic alchemist who also wrote treatises on distillation. The prophet Mohammed said that he cherished women, children, and perfume most in this world, and perfume was an important part of Muslim life.

Perfume is made by distilling organic material such as flowers, bark, and roots to form a concentrated essence of the plant. Copper stills were used for perfume distillation because copper is relatively inert. Although copper was commonly used, it could react with the some liquids and turn them green or brown. In a French treatise on perfume manufacturing, Simon Barbe warns against making sweet-waters or angel-waters in copper pots or less they become thick and muddy.³⁷ Regardless, copper stills were an important tool for perfume manufacturing. In an early 19th-century guide to

British perfume making, Charles Lillie lists copper stills among the most basic and essential tools for distillation.³⁸ This shows that copper was an important material for perfume distillation into the 19th century.

Hardware

In addition to the galleyware, several pieces of hardware were also found on the shipwreck. Two hasps were recovered, Cu 56 and Cu 57. Cu 56 is straight with a zigzag pattern of dimples on the outer face. There is a small hole at one end and a long square hole at the other. Over the larger square opening is a small hook that rotates on a rivet. Cu 57 is very similar to Cu 56 except that it is bent at about an 80-degree angle. These were probably used to secure chest or lockers. This is important on a ship where the pitching and rolling can send any unsecured items flying around the cabin or deck.

Another, more peculiar piece of hardware is artifact Cu 58. This strap is made of a rolled sheet of copper alloy that forms a tube at one end. Like hasp Cu 57 it, too, is bent in the middle at about an 80-degree angle. The tube is flattened at the bend and remains flattened on one side where the end is curled back on itself. This may be a crudely formed strap that was also used to secure gear on the ship.

A round bracket was also found. Artifact Cu 59 is a copper alloy ring with two of the three original posts radiating from it. There are three rivet holes for the missing post. The posts are diamond shaped and are equidistant from each other. The ring has a maximum diameter of 0.103m. This is likely the collar for a hanging lamp. Lamps made from metal or glass were suspended from the ceiling by three chains. The posts

on the ring bracket are tapered so a chain link would be held securely. This also allowed the lamp to swing freely, and would have been important on board a ship. This type of lamp is depicted in an illustration of Mohammed preaching his farewell sermon from a Turkish manuscript titled *Turk Minyatur Sanati* (fig. 6).³⁹ A bulbous lamp with a flaring top hangs above the Prophet. The lamp is suspended by three wires or chains that attach to a band around the narrow neck. Although this is a stylized image, it does show a type of hanging bracket that may be similar to the one found on the Sadana Island shipwreck.



Fig. 6. Mohammed preaching his farewell sermon.⁴⁰

Lamps were widely used in mosques for practical as well as symbolic purposes. They were also commonly used for celebrations especially during Ramadan when to this day Egyptian children swing a lantern as they walk through the streets singing.⁴¹

As far back as Herodotus in the fifth century BC there are descriptions of the Egyptian feast of the burning lamps.⁴² There is no doubt that lamps and lanterns held symbolic meaning for Egyptians. It is therefore not surprising that we find a second type of lantern on board the Sadana Island shipwreck.

Artifact Cu 60 consists of two pieces that fit together. Each piece is short (less than 0.044m high), but wide (0.219m maximum diameter). The top assembly fits over the bottom piece and has a 0.083m diameter hole in its center to accommodate the center element of the bottom piece. The top has one surviving post the stands vertically. There is a hole directly opposite the post where a second post once stood. There is a hole across the post with some small wood fragments still in place. The rest of the top piece is decorated with raised patterns and pierced with small holes. The bottom piece has a tall central element that consists of a central tube surrounded by another flaring collar. The remaining area is punctured with a ring of slits about 0.010m long. The assembly was found nestled together.

These two copper alloy pieces make up the top and bottom of a lantern. The sides were likely made from folded paper or fabric that allowed the whole thing to collapse in on itself. The two posts on the top piece were used to hang the lantern, while the tube in the base was to hold a candle and catch the melting wax. Van Benesch illustrates a similar object in his catalogue of lamps in Central Europe, but he labels it a Chinese lantern.⁴³ This type of lantern is also called a *fanus* and was a common possession for the inhabitants of Cairo. Every wealthy walled neighborhood had a lantern above the gate and above the entrance to each large house. At night any

resident out walking in the neighborhood had to carry a fanus.⁴⁴ In addition, similar pieces were seen for sale in the Grand Bazaar in Istanbul in 1999. Recently cheap reproductions were for sale at discount stores in Texas and were labeled Turkish lanterns (fig. 7).

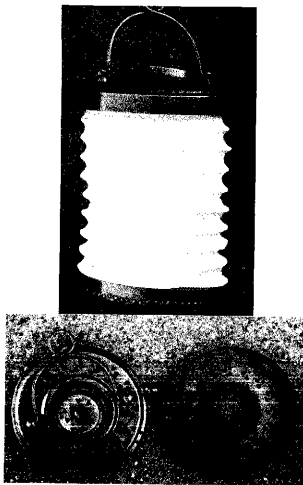


Fig. 7. Modern lantern similar to artifact Cu 60.

Personal Items

Unlike all the other objects found on the shipwreck, two are undoubtedly personal belongings. The first is a small copper box (Cu 61). It is about 0.060m long and 0.040m wide. It has a hinge on the short side. The top has a repoussé decoration of acanthus leaves and a central medallion. The design appears to European, but there are no known parallels. A tobacco leaf was found inside with a flat piece of glass. This is a snuff box, as snuff was very popular through the 18th century.

Another personal possession is artifact Cu 62. This is a pair of copper alloy bracelets that were found linked together. Both cuff-type bracelets are essentially identical: they are solid, hinged, and have pin closures. They are of a type called the *nbail* style, and they are always worn in pairs.⁴⁵ They each have a maximum diameter is 0.055m and are relatively heavy with a height of 0.021m and a thickness of 0.004m. There is a pattern of repeating recessions around the band which may have held stones or enamel, but every recession is empty and there is no evidence of enamel, stone, or adhesive. This may simply be a decorative pattern set into the metal.

Bracelets are common ornaments for Middle Eastern women. Sir Richard Burton described the women of Medina as typical of many “Orientals” in having a variety of jewelry of “brass and spangles to gold and precious stones.”⁴⁶ In describing the Bedouin he noted the women wearing “bracelets, collars, ear and nose rings.”⁴⁷ The heavy jewelry can be still seen during the late 20th century in photographs taken of the Ma’aza Bedouins of Eastern Egypt. A photograph of a woman baking bread shows her wearing a metal headband, a ring, and many thick bracelets on each wrist.⁴⁸ According

to another 20th century ethnography of Egyptian women, jewelry was given as an engagement gift to a bride from her groom.⁴⁹ Wedding money was also used to buy gold bracelets for the bride.⁵⁰ The jewelry was the only valuable a woman could take with her if her husband left. She could also sell it to provide for herself and her family during lean times. As a result, gold was preferred over other types of jewelry, but bracelets of less valuable metals also held importance for Arab women.⁵¹

These two artifacts give us a rare glimpse into the personalities of the people who once sailed aboard this Red Sea cargo ship. Whoever carried the snuff box and the bracelets had a little disposable income to spend on small treasures. But the owners were not very wealthy because both objects were made from relatively inexpensive and less desirable material. The current fashion was for gold or silver bracelets and silver or bone snuff boxes. The copper box and bracelets further show that even luxuries were kept to a minimum.

The entire Sadana Island copper artifact collection suggests that the crew and passengers aboard the ship were common, perhaps poor, individuals. Very few copper objects carry any decoration. Elaborate and expensive cookware was not important or was unattainable for this group of people. The Sadana Island wreck collection may reflect the objects in common people's homes during this time more accurately than museum collections or previously known artifact assemblages. Objects that survive in museum collections are usually beautiful and ornate specimens that were originally owned by the wealthy. Archaeology often provides examples of objects that common people used. Unfortunately there are not any known parallels in the archaeological

record to most of the copper artifacts from the Sadana Island shipwreck. As a result, this catalogue provides the first important documentation of utilitarian wares that were ubiquitous to this region.

Notes

- ¹ Mundell Mango 2001, 93.
- ² Waldbaum 1983, 93.
- ³ Bass and van Doorninck 1982, 269.
- ⁴ Martin 1997, 177; see also Vlierman 1997, 30.
- ⁵ Billy Zildjian 2002, personal communication.
- ⁶ Haldane 1996c, 2.
- ⁷ Ward 2000b, 19.
- ⁸ Renda 1988, pl. 14, 16.
- ⁹ Renda 1988, pl. 14, 16.
- ¹⁰ Waldbaum 1983, pl. 490.
- ¹¹ Allan 1982, 80-1 n. 96-9.
- ¹² Hildred 1997, 67.
- ¹³ Hildred 1997, 67; see also Sullivan 1986.
- ¹⁴ Hildred 1997, 67.
- ¹⁵ Niebuhr 1792, 226.
- ¹⁶ Renda 1988, pl. 19.
- ¹⁷ Rooke 1784, 77-8.
- ¹⁸ Irwin 1787, 36.
- ¹⁹ Troy Nowak 2001, personal communication.
- ²⁰ Renda 1988, pl. 19.
- ²¹ Troy Nowak 2001, personal communication.

- ²² Niebuhr 1792, 226.
- ²³ Wright 1999, 130.
- ²⁴ Burton 1893, 256.
- ²⁵ Burton 1893, 255.
- ²⁶ Boxer 1963, 94.
- ²⁷ Sullivan 1986, 57.
- ²⁸ Wright 1999, 373.
- ²⁹ Wright 1999, 132.
- ³⁰ Rose L. Solcecki and Ralph S. Solecki 2002, personal correspondence.
- ³¹ Niebuhr 1792, 219.
- ³² Wright 1999, 132.
- ³³ Glauber 1652, 185-6.
- ³⁴ Glauber 1652, 185.
- ³⁵ Ward 1998, 4.
- ³⁶ Billot 1975, 21.
- ³⁷ Barbe 1696, 17.
- ³⁸ Lillie 1822, 88.
- ³⁹ Arnold 1965, fig 18.
- ⁴⁰ Arnold 1965, fig. 18.
- ⁴¹ Feeney 1992, 16.
- ⁴² Behrens-Abouseif 1995, 4.

⁴³ Thwing 1963, 153.

⁴⁴ Feeney 1992, 19.

⁴⁵ Stone 1992, 19.

⁴⁶ Burton 1893, 16.

⁴⁷ Burton 1893, 116.

⁴⁸ Hobbs 1989, after 48.

⁴⁹ Atiya 1982, 30.

⁵⁰ Atiya 1982, 38.

⁵¹ Atiya 1982, xxvii.

CHAPTER V

CONCLUSIONS

When a great merchant ship sank near Sadana Island in the late 18th century, the world was about to see dramatic changes. During this period social and political upheavals would have long term and far reaching impacts. The western world often calls the late 18th century the Age of Revolution. The American Revolution and the French Revolution had political and social effects beyond their countries borders. Captain Cook's voyages to the South Pacific also had immediate global consequences, connecting previously isolated cultures on all six inhabited continents. These events had repercussions that affected virtually the whole world.

In addition to political changes, new inventions and industrial processes were introduced especially in Europe. James Watt's steam engine led to the development of the steamship and the railroad that forever changed communication, trade, and transport throughout the world. The industrial revolution began in Europe, but the ideas and machines spread beyond the continent to such disparate places as the Caribbean and South America, the Ottoman Empire, Africa, India, and Southeast Asia.

In addition, trade was conducted on a global scale and a global economy had emerged. Crops in the Caribbean affected markets in Arabia, which in turn affected markets in East Africa, India and the Far East. Within the global economy, regional trade still prospered. The Indian Ocean contained a trade network dating back two thousand years. Many of the same goods traded between the Far East, India, Arabia,

and East Africa were traded in both ancient times and in the 18th century. This stable ancient trade connected different people and cultures. Over the two thousand years of interaction, societies adopted some foreign customs. The land and sea trade networks were pathways to spread ideas and customs throughout the Indian Ocean. This is clearly seen in the spread of Islam from Arabia to many small and remote islands in the Pacific. In contrast, the Indian Ocean region retained a high degree of cultural diversity over the centuries.

Throughout the ages there have been dramatic power shifts within the region. Empires such as the Mamluk, Gujarati, and Chinese have at times controlled regions of the Indian Ocean and dominated trade. Only after trans-Indian Ocean trade had been established for 1500 years did the Portuguese exert their influence by directly entering the trade network. Over time other European nations extended their power both economically and politically in of the Indian Ocean. European presence in the Indian Ocean was similar to previous empires' struggles for control of trade. As a result, the true story is not about East meets West. It is just another version of the power plays that existed in numerous forms for 1500 years.¹

This thesis is a story about a group of people operating within a small portion of the Indian Ocean trade network. They were small players in a vast and complex system that reached from the Pacific to the Mediterranean. Our sailors operated within the last sea-leg of the Indian Ocean trade with the Ottoman Empire. They were not even aware of the dramatic political unrest and the industrial developments that were soon to change their world. Our sailors and merchants were undoubtedly familiar with

European ships, but their trade was primarily within the Ottoman Empire. Their trade could have been conducted without any or with very limited interaction with European merchants and sailors.

Their world existed within the confines of the Red Sea. Mocha in Yemen or Jeddah, the port for the holy city of Mecca, most frequently defined the southern commercial limit of the Red Sea. During much of the year transient merchants and seamen from all corners of the Indian Ocean occupied Jeddah. This made the city a very diverse place with Muslims, Hindus, and Christians intermingling and trading together. There were Persians, Turks, Arabs, Bedouins, Indians, Ethiopians, and Europeans all engaged in the primary business, overseas trade.

Besides supplying the holy cities of Mecca and Medina, Jeddah was also an important jumping off point for the rest of the northern Red Sea. It connected Arabia, Egypt, and the rest of the Ottoman Empire to the trade networks of the Indian Ocean. Although ships from half the world passed through Jeddah, most of the year the port was relatively quiet. However, once a year during the hajj, Jeddah turned into an overflowing city of pilgrims and merchants from all reaches of the Muslim world.

Although we will never know for certain who owned and used the group of copper artifacts found on the Sadana Island shipwreck, these artifacts may tell us something of the world in which their owner's lived. We can speculate that this is the world in which a small Egyptian man scurried through the streets looking for a local merchant's storefront. The morning winds blew the ubiquitous dust into swelling clouds that rushed through the narrow streets and rolled into the open harbor. He

required enough goods to fill his portion of a large ship's hold for a return voyage to Suez. As he stepped into the shop, a man appeared holding two cups of tea. He nodded at the Egyptian to follow him in to a low round table. They each pulled up a small stool and began their negotiations.

The discussion was fixed on goods and prices. The merchant was eager to sell a large portion of Chinese porcelain that was landed three days earlier. These days were tricky for him. Business was highly variable since the busiest season, during the pilgrimage, was still months away. This time of year he had to rely on the Jeddah fleet to coerce enough ships into port to keep him busy. He certainly did not need to be stuck with any cargo he could not dispose of.

On the other side of the table the Egyptian was worried about finding enough goods that were desirable in the Ottoman markets. He also had to be careful not to purchase too much of one product lest the price fall and he lost his investment. As he examined the porcelain, he noted that these patterns were popular among the Ottomans because of their bright colors and leafy designs. The large heavy dishes would also serve as ballast, which optimized his limited hold space. After heated bargaining and many cups of tea, the two businessmen came to an agreement. A promise to deliver the goods to the pier was given with the exchange of money.

Throughout the town this scene was repeated between countless businessmen. Some exchanged coin for goods while others traded newly imported commodities. From fine porcelain, aromatics and silks, to coffee beans, grain, and wood, all sorts of

material was haggled over for fair and agreeable prices. Among all this commerce and trade, other people engaged in different business.

Just around the corner a thin ragged man carried an old metal kettle. He stopped another man on the street to ask directions, only to be brushed aside. As he turned down a side street he spotted a metalsmith's shop with pots and lanterns hung around the open doorway. The ragged man stepped through the doorway into the blinding darkness. The metal had worn dangerously thin and the copper had begun to crack. Holding out two coins, the man asked the smith if he could patch the kettle. Looking at him with disapproval, the smith agreed to fix the pot. Within a few minutes the kettle was repaired with a rough square of metal and a rivet. Normally he would have smoothed the edges and polished the vessel, but he was only paid for the quickest repair. The ragged man thanked the smith and collected his kettle. He stepped back out into the glaring sun and wandered down to the pier.

At the pier he found a group of dusty and sweaty men loading stacks of large porcelain dishes into the hold of the ship. He squeezed through the crates of goods waiting to be loaded and bounded up the gangway. Once aboard he placed several smaller copper dishes inside the newly-fixed kettle and stowed it all away. He knew there was a lot of work to do to prepare the ship for tomorrow's departure.

These are the stories of common people conducting business in the same manner for two thousand years. They are not very different from many merchants and sailors in our own culture. The ship that sank near Sadana Island in the late 18th century tells the story of the people who lived and worked on board. The familiar characters were

merchants and businessmen concerned about their cargoes and making a return on their investments. Less familiar were the people who worked the ship. The sailors were not the sort of people written about in history books, but they too have a story. The belongings that they left behind are the only surviving piece of their story. Careful examination of these objects is our sole opportunity to learn about the people who used them and fill in the gaps of history. Only then do we have a truer picture of the past.

The copper artifact assemblage from the Sadana Island shipwreck consists of a variety of objects that reflect the lifestyle of the crew and passengers on board. The high number of large vessels compared to small vessels indicates an emphasis on communal use over individual possessions. The variety of basin types reflects different uses from cooking and eating to bathing. It also shows that these vessels were not a cohesive collection when they were made and used. The pieces were acquired as needed, unlike on the *Machault*, where sets of nesting copper kettles were found. In addition, many pieces were crudely made and most were very basic designs, without any elaborate decoration. This indicates that the people who used these items were primarily concerned with function. They also could only afford the most basic wares. The only exceptions are the finely decorated trays and a small box. The trays were likely a privilege granted to the officers and important passengers, and the box was one of the few personal possessions found. Interestingly, one of the other personal possessions found was a pair of bracelets. These pieces of jewelry are decorative, but gold and silver were the preferred metals. As this pair of bracelets is copper, the owner was not wealthy, as he could not afford finer jewelry. The copper collection is

mundane, suggesting that the people of the Sadana Island shipwreck were mostly common or even poor members of society.

The Sadana Island shipwreck copper artifact assemblage provides an unprecedented look at the daily lives of sailors and passengers aboard an 18th-century Red Sea merchant ship. This thesis attempts to tell the story of the people who worked and traveled on this ship. As technology opens more of the seafloor to archaeological excavation, more of these tales will be uncovered, filling in the gaps in history and in the history of common people who made their living at sea.

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APPENDIX A
COPPER ARTIFACT CATALOGUE

The catalogue drawings were made from the digital photographs shown in appendix B using Adobe Photoshop software. The profile thicknesses are not to scale.

Code Letter	Measurement
A	Height
B	Length
C	Width
D	Maximum diameter
E	Minimum diameter
F	Exterior diameter
G	Interior diameter
H	Thickness
I	Rim height
J	Rim width
K	Rim diameter
L	Rim thickness
M	Base diameter
N	Base height
O	Base ring width
P	Body depth
Q	Handle length
R	Handle height
S	Handle width
T	Handle thickness
U	Mouth diameter
V	Spout length
W	Leg thickness
X	Leg length
Y	Band height
Z	Hole diameter

Catalogue Key

Artifact #	6-	Catalogue #
1		Cu 58
2		Cu 49
3		Cu 60
5		Cu 6
7		Cu 28
8		Cu 17
9		Cu 22
10		Cu 13
11		Cu 29
12		Cu 30
14		Cu 23
15		Cu 53
16		Cu 51
17		Cu 35
18		Cu 41
19		Cu 45
20		Cu 7
21		Cu 55
22		Cu 43
23		Cu 12
24		Cu 34
25		Cu 52
26		Cu 62
27		Cu 16
28		Cu 18
29		Cu 37
30		Cu 54
31		Cu 57
32		Cu 15
33		Cu 24
34		Cu 14
35		Cu 8
36		Cu 50
37		Cu 42
38		Cu 32
39		Cu 19
40		Cu 36
41		Cu 20
42		Cu 38
43		Cu 33
46		Cu 1
47		Cu 56
48		Cu 2
49		Cu 21
50		Cu 9
51		Cu 25
52		Cu 61
53		Cu 46
55		Cu 31
56		Cu 44
59		Cu 39
65		Cu 10
66		Cu 26
67		Cu 47
69		Cu 3
70		Cu 4
71		Cu 5
72		Cu 11
73		Cu 27
77		Cu 40
78		Cu 48
79		Cu 59

Cu 1. Kettle.

Inv. No. 6-46.

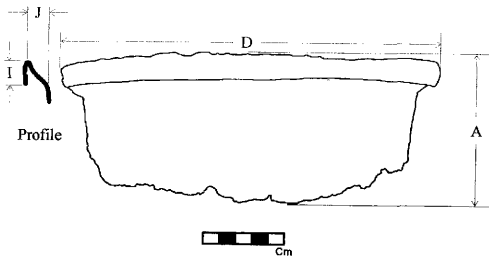
AAO.

H. 0.095; max. diam. 0.235; rim h. 0.017; rim w. 0.014;

Approximately half of the original rim and side of the vessel is present.

Moderately concreted.

Large and deep kettle with sides that slightly taper toward the base. The interior of the rim is stepped to accept a lid. Metal is sharply folded up to form a small horizontal ridge on the outermost edge of the rim. It is then folded out and bent down forming an outer vertical band around the rim.



Cu 2. Kettle.

Inv. No. 6-48.

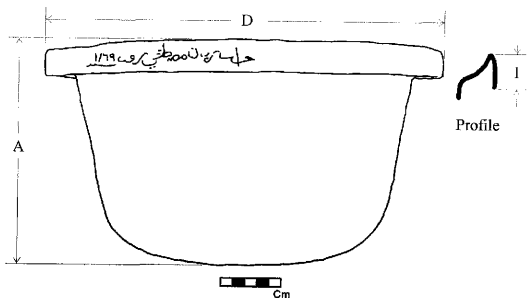
Figs. SI-96-B23: 15,15.

DAG.

H. 0.190; max. diam. 0.330; rim h. 0.028.

The vessel has poor metal preservation and the body is very thin and fragile. It is approximately 75 percent complete with a nearly complete and well-preserved rim. Part of the side and bottom are missing.

Large and deep kettle with sides that slightly taper toward the base. The interior of the rim is stepped to accept a lid. Metal is sharply folded up to form a small horizontal ridge on the outermost edge of the rim. It is then folded out and bent down forming an outer vertical band around the rim. The band of the outer rim contains an inscription that reads *A gift for Mustafa 1169*. This is an Islamic date and translates to 1755-56AD.



Cu 3. Kettle.

Inv. No. 6-69.

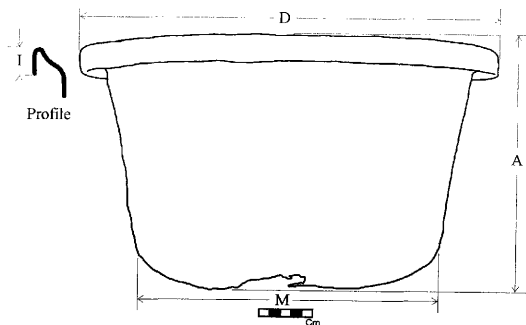
Figs. 6-69.

DEP.

H. 0.230; max. diam. 0.396; base diam. 0.270; rim h. 0.029.

Sides and rim are nearly complete. Bottom is missing. Moderate corrosion.

Large and deep kettle with sides that slightly taper toward the base. The interior of the rim is stepped to accept a lid. Metal is sharply folded up to form a small horizontal ridge on the outermost edge of the rim. It is then folded out and bent down forming an outer vertical band around the rim.



Cu 4. Kettle rim.

Inv. No. 6-70.

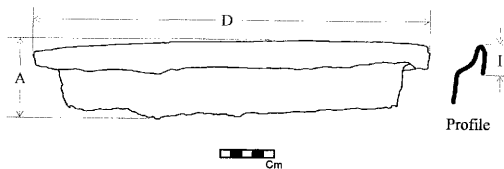
Figs. 6-70.

DCP.

H. 0.076; max. diam. 0.368; rim h. 0.030.

Only about 30 percent of original survives. The rim is intact with some of the upper body. The base is completely missing. The rim is badly deteriorated with very little, if any of the original surface intact.

The interior of the rim is stepped to accept a lid. Metal is sharply folded up to form a small horizontal ridge on the outermost edge of the rim. It is then folded out and bent down forming an outer vertical band around the rim.



Cu 5. Kettle.

Inv. No. 6-71.

Figs. 6-71.

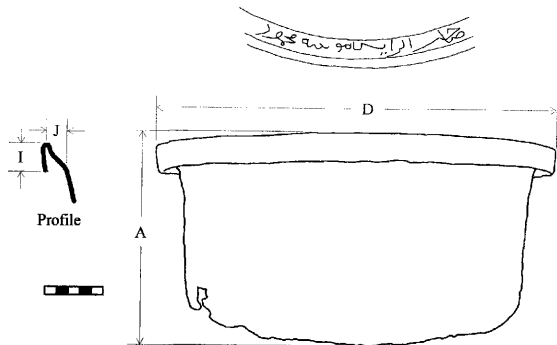
DCI.

H. 0.187; max. diam. 0.344; rim w. 0.018; rim h. 0.022.

The metal toward the rim is in moderate condition but degrades towards the base, becoming very jagged and fragile. Second small fragment appears to be creased but has a similar state of preservation as the basin. About 40 percent is missing. Base is completely missing. Holes in body. Rim is complete.

Large and deep kettle with rounded base. Sides that slightly taper toward the base. The interior of the rim is stepped to accept a lid. Metal is sharply folded up to form a small horizontal ridge on the outermost edge of the rim. It is then folded out and bent down forming an outer vertical band around the rim.

There is a clear inscription on the flat lid ledge on the interior rim surface that reads *Sahibi Ra'is Musa Mahmood*, which translates as *the owner, captain Musa Mahmood*.



Cu 6. Kettle with lid.

Inv. No. 6-5.

Figs. B10: 16A-21A.

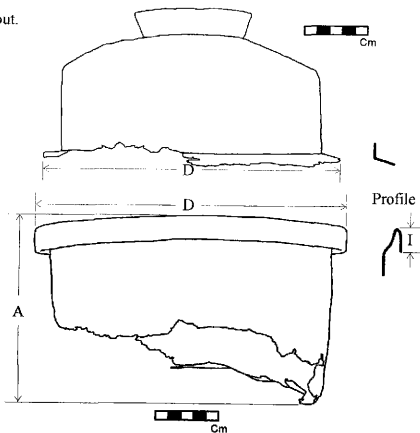
Wreck Plan zilla KV.

Basin h. 0.151; rim diam. 0.248; rim h. 0.018.

Lid rim diam. 0.236.

Kettle is 60 percent intact. Lid is better preserved with approximately 75 percent intact.

Lid found nested inside basin. Large and deep kettle with sides that slightly taper toward the base. The interior of the rim is stepped to accept a lid. Metal is sharply folded up to form a small horizontal ridge on the outermost edge of the rim. It is then folded out and bent down forming an outer vertical band around the rim. The lid has a simple horizontally folded rim similar to Cu 11. The sides are vertical and bend in to a ring handle on top. The ring handle flares out.



Cu 7. Kettle.

Inv. No. 6-20.

Figs. B23: 23.

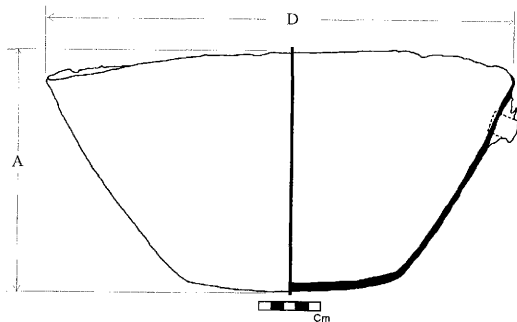
ADS.

H. 0.201; max. diam. 0.441.

Complete or nearly so. One side is dented in. Metal is in very good condition.

Large, heavy kettle with outward tapering sides. Hammer marks are present.

There are remains of rivets where two handles were once attached.



Cu 8. Pot.

Inv. No. 6-35.

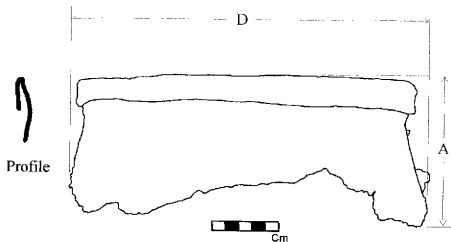
Figs. SI-96-B14: 9.

Qulal field below KV and BI.

Pres. h. 0.115; max. diam. 0.269.

Base is missing. The rim and the top portion of the body are intact.

Body narrows towards the rim. The interior surface of the rim is slightly bent out to an upper ridge and then sharply folded down forming a vertical exterior surface 0.020m tall.



Cu 9. Pot.

Inv. No. 6-50.

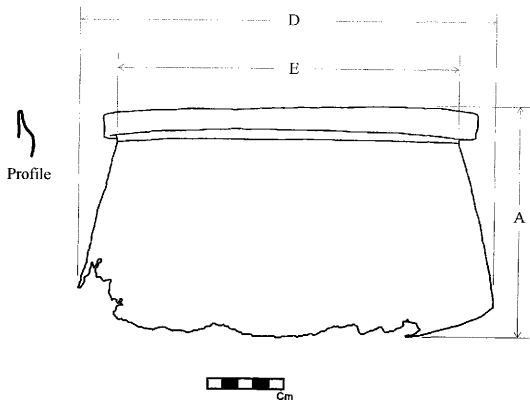
Figs. SI-96-B37: 25.

AAU.

H. 0.155; max. diam. 0.275; min. diam. 0.228.

Approximately half of original vessel is present. Base is missing. Sides are broken and incomplete. Metal is in good condition.

Sides of vessel taper from base up to a narrower neck. Remains of base are rounded. The interior surface of the rim is slightly bent out to an upper ridge and then sharply folded down forming a vertical exterior surface 0.020m tall. Turning marks are visible on the exterior, but none appear to be decorative.



Cu 10. Pot

Inv. No. 6-65.

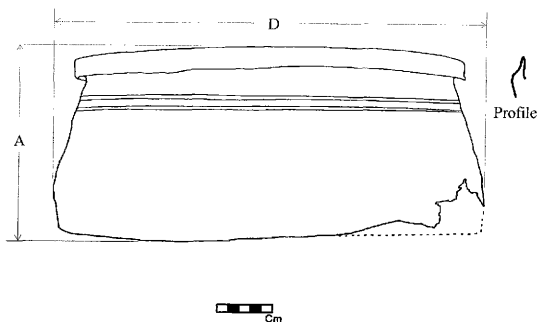
Figs. 6-54.

DVX.

H. 0.181; max. diam. 0.392.

The pot is in two pieces. 40 percent of the artifact is present and is very fragile.

Sides of vessel taper from base up to a narrower neck. Remains of base are flat. The interior surface of the rim is slightly bent out to an upper ridge and then sharply folded down forming a vertical exterior surface. There are two pairs of incised lines around the middle of the body.



Cu 11. Pot rim.

Inv. No. 6-72.

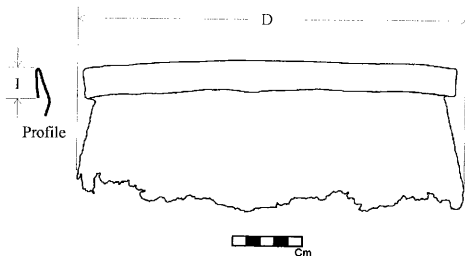
Figs. 6-72.

DCZ.

Pres. max. diam. 0.280; rim h. 0.020.

Only rim remains in entirety. Portion of upper body still attached to rim. Base and most of body is completely missing. Surface is in fair condition with some corrosion.

Sides of vessel taper from base up to a narrower neck. The interior surface of the rim is slightly bent out to an upper ridge and then sharply folded down forming a vertical exterior surface.



Cu 12. Stacked pot and lid rims.

Inv. No. 6-23.

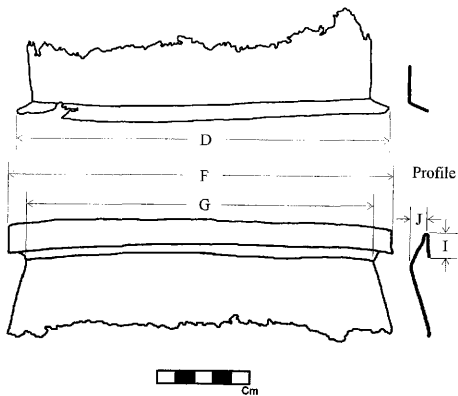
Figs. B23: 32.

Ul.

Basin max. exterior diam. 0.209; max. interior diam. 0.190; rim h. 0.016; rim w. 0.010; lid rim max. diam. 0.201.

Both rims are complete. Both have some body remaining. Neither base survives. The lid rim has moderate corrosion while the pot rim is in better condition.

Pot with lid rim found stacked inside. The pot sides taper from base up to a narrower neck. The interior surface of the rim is slightly bent out to an upper ridge and then sharply folded down forming a vertical exterior surface. The lid sides are nearly vertical. The metal is folded out horizontally to form a simple rim.



Cu 13. Lid rim.

Inv. No. 6-10.

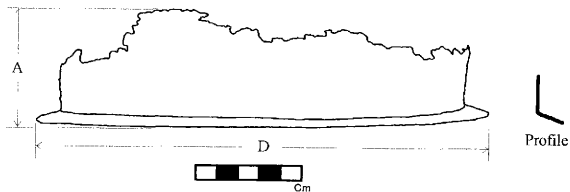
Figs. B15: 13, 14.

Wreck Plan lower artifact field.

Pres. h. 0.057; max. diam. 0.214.

Metal is thin, eroded, and fragile. Portion of body is present. Rim is complete.

Flat, horizontal rim.



Cu 14. Lid fragment.

Inv. No. 6-34.

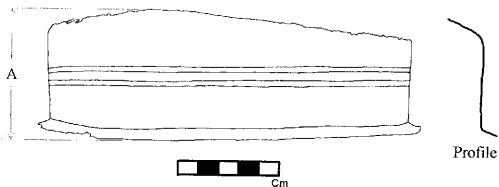
Figs. SI-96-B14: 10.

Location unknown.

Pres. h. 0.066; est. rim diam. 0.110.

Lid is two fragments that are badly eroded. Most of body is present, but very little of the top is intact.

Lid has straight vertical sides with a rounded corner to the top. There are two double bands of incised lines around the center of the body. Rim is flat out horizontally.



Cu 15. Lid ring handle.

Inv. No. 6-32.

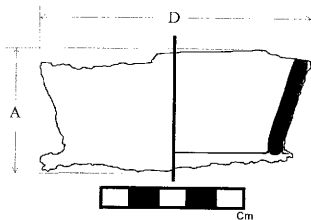
Figs. SI-96-B14: 3.

Qulal field below anchor fluke.

Pres. h. 0.047; max. diam. 0.095.

Good metal preservation of this lid ring. Very little of the body remains.

The ring has a slight flare up and out.



Cu 16. Basin.

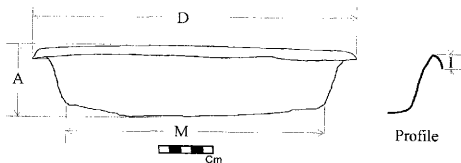
Inv. No. 6-27.

UW.

H. 0.068; max. diam. 0.300; base diam. 0.236; rim h. 0.013 .

Base is broken and eroded.

Sides are straight with a slight outward flare toward the rim. The widest diameter is at the rim. The interior surface of the rim is everted and bent down, forming the outer rim band. The exterior rim surface exhibits a slight outward flare.



Cu 17. Basin rim fragment.

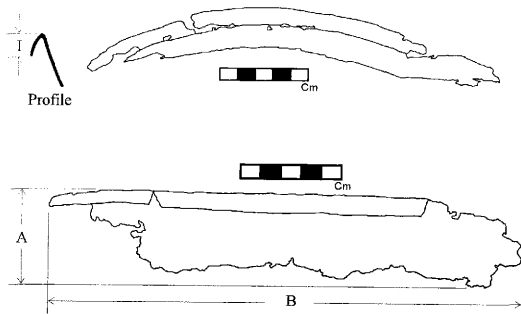
Inv. No. 6-8.

Figs. B15: 22

Pres. h. 0.046; est. rim diam. 0.360; pres. l. 0.234; rim h. 0.013.

Approximately 20 percent of rim surviving. No body is present.

The interior surface of the rim is everted and bent down, forming the outer rim band. The exterior rim surface maintains a slight outward flare.



Cu 18. Basin rim fragment.

Inv. No. 6-28.

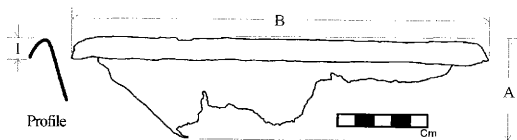
Figs. SI-96-B5: 29, 30.

Qulal field near CCB.

Pres. h. 0.063; est. rim diam. 0.480; pres. l. 0.232; rim h. 0.014.

Approximately 27 percent remains of the rim. There are two fragments and both are badly eroded.

The interior surface of the rim is bent up and outwards before bending down forming the outer rim band. The exterior rim surface maintains a slight outward flare.



Cu 19. Basin rim fragment.

Inv. No. 6-39.

Figs. SI-96-B14: 23.

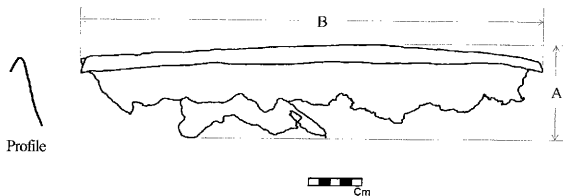
1.5m west, below KV.

Pres. h. 0.091; pres. l. 0.433; est. rim diam 0.574.

Forty-five percent of the rim remains. Portion of the body is also present.

Curve of vessel is partly intact while one end is bent out of original shape.

The interior surface of the rim is bent up and outwards before bending down forming the outer rim band. The exterior rim surface maintains a slight outward flare.



Cu 20. Basin.

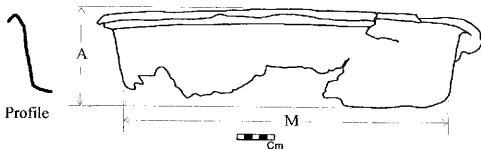
Inv. No. 6-41.

Qulal field below KV and BI.

H. 0.135; base diam 0.433.

Very poor condition. Fragile and concreted. Approximately 60 percent of basin is intact.

Sides are straight with a slight outward flare toward the rim. The widest diameter is at the rim. The interior surface of the rim is bent up and outwards before bending down forming the outer rim band. The exterior rim surface maintains a slight outward flare.



Cu 21. Basin.

Inv. No. 6-49.

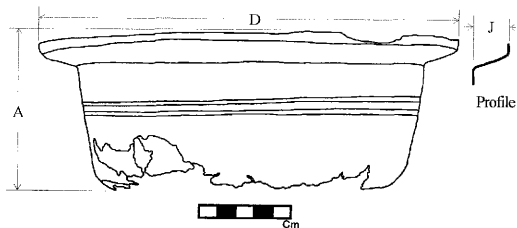
Figs. SI-96-B37: 23.

AAM.

H. 0.090; max. diam. 0.229; rim w. 0.023.

Approximately 60 percent complete but fragmentary. Base is missing. Rim is complete and the sides are broken. Metal is in good condition with some pitting.

Sides slightly flare out to the rim. Rim is broad and nearly flat. The rim is bent up vertically forming a slight lip. There are four inscribed lines around the outside of the mid-body.



Cu 22. Vessel.

Inv. No. 6-9.

Figs. B15: 28,29.

Wreck Plan lower artifact field.

H. 0.220; max. diam. 0.315.

Base and portion of shoulder remain. Nothing above the shoulder remains.

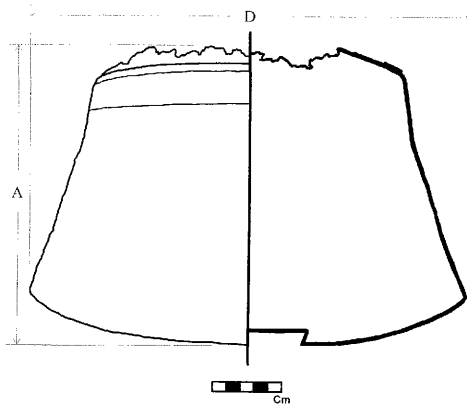
Areas of base have eroded away, leaving holes.

The base of the body is wide but tapers in the shoulder in a bell shape. The shoulder is a sharp transition between the flaring body and the almost flat angle of the shoulder with a slight lip that is bent downward. There are three incised lines along the top of the body. In the lower portion of the body just before the turn-in of the base, there is an extra rivet with a tear-drop shaped patch around it. It protrudes from the body on the outer surface slightly but on the inner surface it is more pronounced. In the center of the base there is a recessed circle 0.076m in diameter. This probably functioned as a stabilizer for the otherwise rounded bottom. Finally, there is a dent in the otherwise rounded base. It is narrow and extends from the center, recessed circle to the outer edge of the body. The dent is just below the repair. Although it is possible that the dent occurred during deposition, as it is associated with the repair this could indicate a long and rough career for this vessel. However, it is not certain that the dent can be associated with the repair. Found inside the vessel were a juglet (1-71), another cupreous vessel (Cu 29), a plate (2-24), qulal sherd (lot VK), organic stopper (4-4), and other organic remains including pepper and allspice (VK).

Cu 22. Vessel.

Inv. No. 6-9.

(continued)



Cu 23. Small vessel.

Inv. No. 6-14.

Figs. B15: 23.

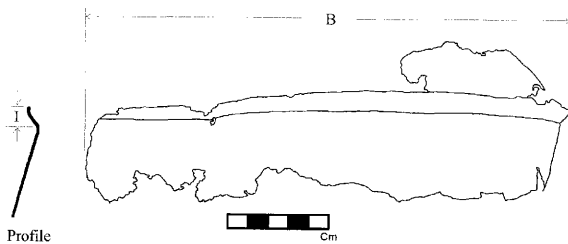
Wreck Plan lower artifact field.

Pres. l. 0.240; rim h. 0.009.

Partial rim with some body intact. Approximately 50 percent of rim survives.

Fragment is twisted with several holes caused by erosion.

Rim is flared outward and lacks any decoration.



Cu 24. Small vessel.

Inv. No. 6-33.

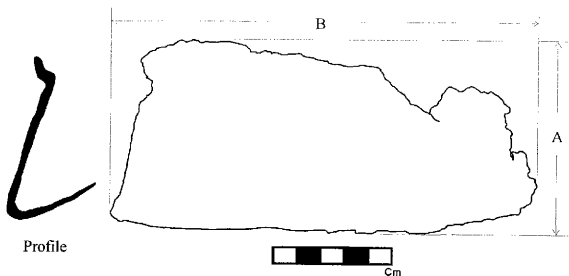
Figs. SI-96-B14: 8

Qulal field below KV and BI.

Pres. h. 0.083; est. diam. 0.204; pres. l. 0.188.

Forty-three percent of vessel remains. Heavily concreted.

This body fragment is complete from rim to base and may be a small canister. The rim is stepped as to accept a lid and is folded outward.



Cu 25. Dish.

Inv. No. 6-51.

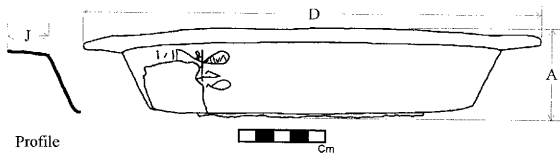
Figs. SI-96-B37: 24.

PN.

H. 0.045; max. diam. 0.269; rim w. 0.023.

Artifact is stable and well preserved. Approximately 90 percent survives. A portion of the rim is missing. In addition there are a few holes in the base and body.

The dish has a broad flat rim with one incised line near the outside edge. The sides slope at a sharp angle to the base. There is a base ring on the bottom. There is also a badly damaged inscription that is only approximately 50 percent intact. A date is visible and reads 1178. This is an Islamic date and translates to 1764-65 AD.



Cu 26. Dish.

Inv. No. 6-66.

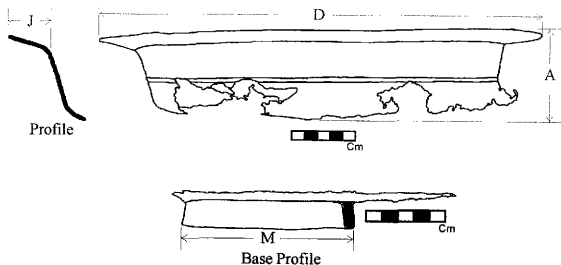
Figs. 6-66.

DXD.

H. 0.074; max. diam. 0.349; base ring diam. 0.109; rim th. 0.001; rim w. 0.032.

The dish is in two separate pieces, the base and the body with rim. Approximately 65 percent is present. Some corrosion present and the surface is abraded.

Larger fragment is of complete rim and most of the sides. There are two incised lines that circle the mid-body. The rim is broad and flat. The smaller fragment is the base ring and a portion of the bottom. The base ring was made by bending the thin copper alloy sheet around a separate metal ring set in the base of the sheet. The ring is flared out and is badly corroded.



Cu 27. Dish.

Inv. No. 6-73.

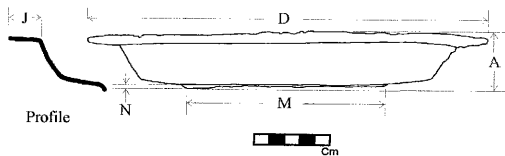
Figs. 6-73.

DCZ.

H. 0.040; max. diam. 0.264; base h. 0.004; base ring diam. 0.139; rim w. 0.022.

About half of original object remains. Object is heavily corroded with some of the rim and body bent inward. Overall the piece is in poor condition with much of the base, and some of the body and rim missing.

The rim is broad and flat. The transitions between the rim and body and the body and base are sharp. The pan is shallow and there is a base ring on the flat bottom. The base ring is similar to the other dishes in the assemblage.



Cu 28. Dish rim.

Inv. No. 6-7.

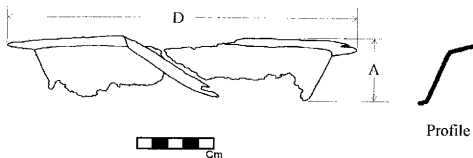
Figs. B15: 15.

Pres. h. 0.043; max. diam. 0.230.

Two vessel rim fragments. One fragment is about 42 percent of the original and the second is about 40 percent complete. Metal is corroded and very fragile.

There is not any body present. The rim of one fragment is bent out of shape.

Dish has a broad flat horizontal rim.



Cu 29. Dish rim.

Inv. No. 6-11.

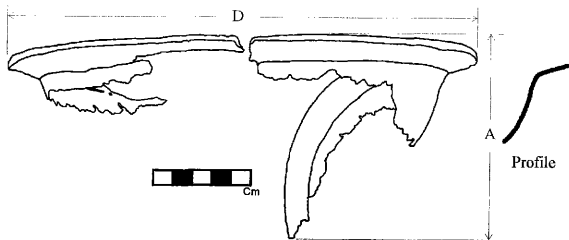
Figs. B15: 26,27.

Wreck Plan inside 6-9.

Max. diam. 0.240; Pres. h. 0.107.

Rim is complete but broken into two pieces and twisted in an s-shape.

Flared, flattened rim. Originally rim was flat and horizontal.



Cu 30. Dish.

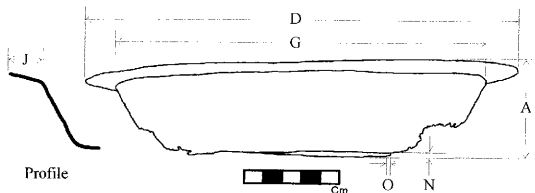
Inv. No. 6-12.

Figs. B15: 24.

H. 0.050; max diam. 0.228; interior diam. 0.194; rim w. 0.017; base ring h. 0.003; base ring w. 0.002.

Most of the rim and sides are intact. The raised ring base is partially intact. Additionally, two base fragments were found.

Shallow bowl with a flat rim that flares slightly upward. The only decoration is an incised double line on the interior of the upper rim.



Cu 31. Dish rim fragments.

Inv. No. 6-55.

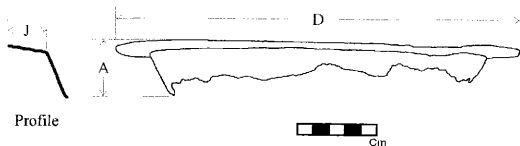
No photos.

GHL.

Pres. h. 0.037; max. diam. 0.255; rim w. 0.023.

Rim in two pieces and corroded. One fragment is 50 percent of original, while the second fragment is about 30 percent of the original rim. No body or base fragments present.

Rim is a simple flat horizontal rim.



Cu 32. Vessel base fragments.

Inv. No. 6-38.

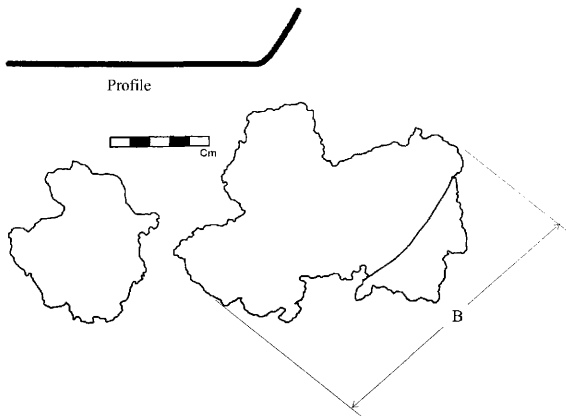
Figs. SI-96-B14: 6.

1m. west of KV.

Pres. 1. 0.144; est. diam. 0.210.

Poor condition. About 10 percent of base remains.

Probably a base fragment with some body attached.



Cu 33. Two vessel base fragments.

Inv. No. 6-43.

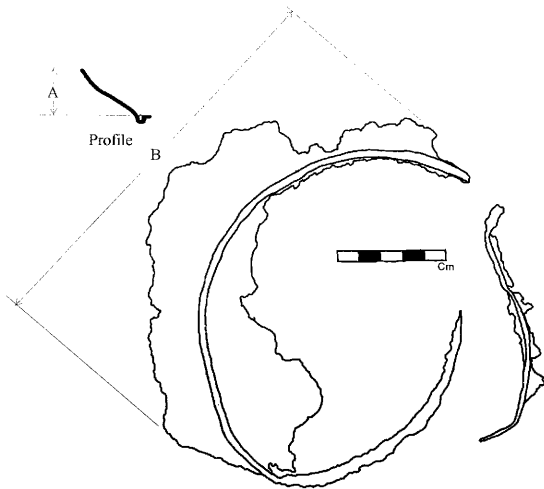
Figs. SI-96-B18: 37.

CKI 1/2.

H. 0.025; pres. l. 0.180; est. base diam. 0.100.

One fragment consists of 85 percent of base ring with 15 percent of vessel base and sides. The second fragment is the remaining portion of the ring. Both fragments are bent and corroded.

The base ring was formed by bending the body around a solid ring.



Cu 34. Dish.

Inv. No. 6-24.

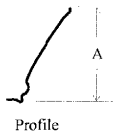
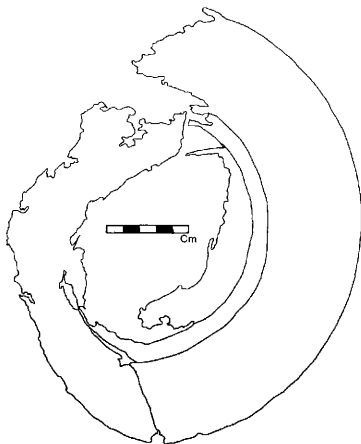
Figs. B23: 33.

UY.

H. 0.064; est. max. diam. 0.270.

Base is almost completely eroded with only 10 percent remaining. Approximately 80 percent of the rim is intact.

Dish is shallow with flared sides and has a raised ring base.



Cu 35. Cooking pan.

Inv. No. 6-17.

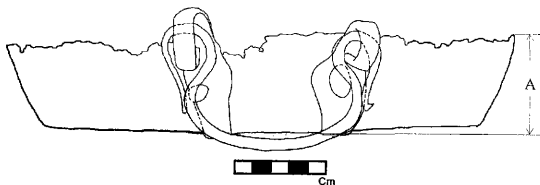
Figs. B23: 27, 28.

Near BI/KV.

H. 0.049; max. diam. 0.288, th. > 0.001.

Two fragments make up approximately 70 percent of original pan. Pieces of charcoal are concreted to exterior surface of the pan. The metal is thin with one fragment containing one handle. The second handle is still attached to a smaller body fragment. There are two additional smaller body fragments.

Shallow, flat-bottomed pan with two intact handles. The handles are bent loops with a square profile. The handles are each attached to two curved straps riveted to the body. The handle attachments are longer than the body and are therefore bent underneath the bottom of the pan. The loop handles hang lower than the body and cannot hang freely from their attachments when the pan is sitting on a surface. This indicates low quality workmanship.



Cu 36. Cooking pan.

Inv. No. 6-40.

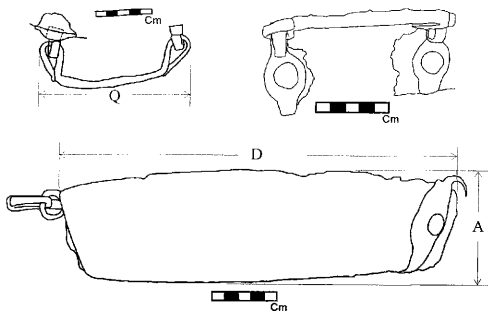
Figs. SI-96-B14: 21.

CMS.

H. 0.088; est. max. diam. 0.307; handle l. 0.134.

Approximately 40 percent of the rim and sides are intact. One complete handle is attached to the rim. Half of a second handle attachment is present opposite the existing handle. Very little of the base is present.

Sides are straight. The band handle is looped through a flat diamond shaped straps. The straps are each riveted to the body.



Cu 37. Pan handle attached to body fragment.

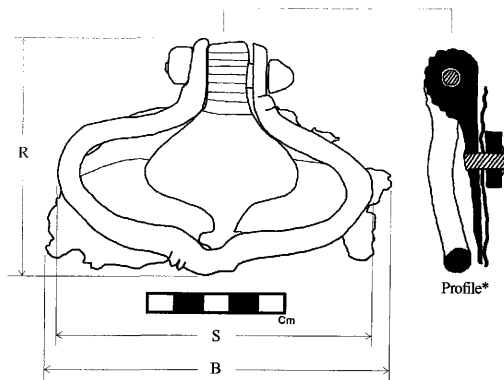
Inv. No. 6-29.

Figs. SI-96-B5: 31.

Max. l. 0.126; handle h. 0.083; handle w. 0.105.

Body fragment badly eroded. Handle intact with minimal erosion.

Body fragment with attached handle. Handle is loop that is a widened tear-drop shape. It is riveted to a looped strap protruding at a 90 degree angle from



*After drawing by Netia Piercy.

Cu 38. Tray.

Inv. No. 6-42.

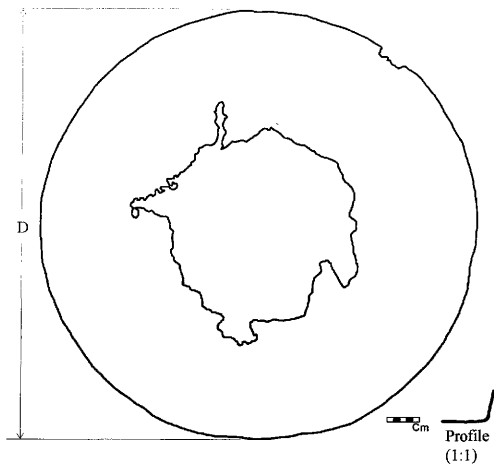
All.

Max. diam. 0.660.

Rim is nearly complete. Tray is missing center area and is approximately 60 percent complete. The surface is in very poor condition with severe corrosion.

There are numerous flakes of metal associated with this tray.

No visible decoration. The rim is simply bent vertically creating a 0.010 lip.



Cu 39. Tray.

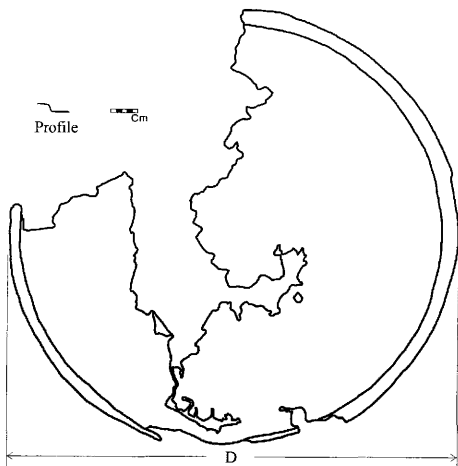
Inv. No. 6-59.

DEH.

Max. diam. 0.835.

Approximately 70 percent complete. Surface is in poor condition.

The tray is decorated with an incised vine pattern. This pattern is very difficult to distinguish due to the poor condition of the metal. The rim is bent vertically and then out horizontally.



Cu 40. Tray.

Inv. No. 6-77.

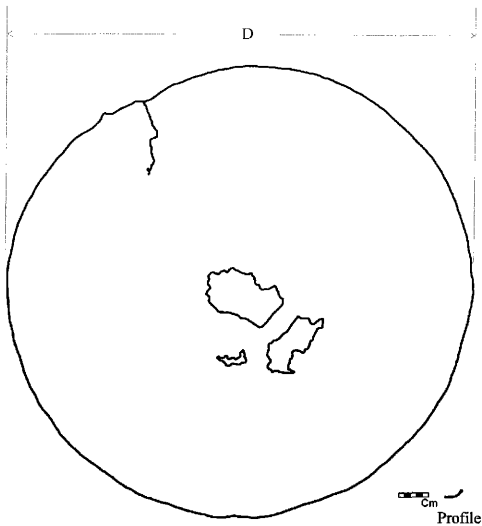
Fig. 6-77.

DCF.

Max. diam. 0.785.

Tray is nearly complete. Bent along the middle. Surface is in poor condition. Original surface is difficult to distinguish.

The tray is decorated with an incised floral motif. The pattern is difficult to distinguish due to the poor condition of the metal. The rim is formed by simply bending the metal vertically to form a lip.



Cu 41. Pitcher.

Inv. No. 6-18.

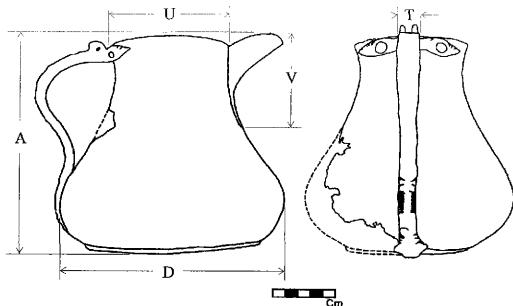
Figs. B23: 25, 26.

Base of KV.

H. 0.179; max. diam. 0.180; mouth diam. 0.093; spout l. 0.079; handle max. th. 0.017.

Lower body and base have been eroded. Approximately 65 percent of the vessel remain. Lid is missing. There are two dents on the wide portion of the body near the base of the spout.

The body is full and round and tapers to below the spout. There is a slight flare just under the rim. The spout is asymmetrical and extends above the rim. The spout is creased to the wide portion of the body to form the transition between the body and the spout. The handle extends from the rim to the base and has two lid hinge attachments, although lid is not present. Where the handle meets the rim the handle splits into two parts where rivets fasten it to the body. The handle is decorated with triangular and square notches in both the shaft and rivet attachments. The bottom end of the handle is flattened into a spade shape with several notches along the outer edges.



Cu 42. Pitcher.

Inv. No. 6-37.

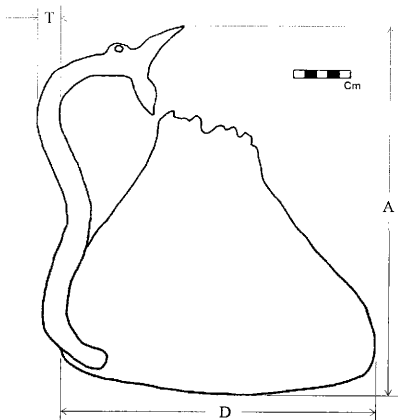
Figs. SI-96-B14: 22.

Qulal field below KV and Bl.

H. 0.330; max. diam. 0.280; handle diam. 0.020.

One side intact with handle except for rim. Handle completely intact. May have had lid that is now missing. Spout is missing. Approximately 60 percent complete. Very fragile and poor condition.

This pitcher has a flat base with a full rounded lower body. The body tapers to a thin neck. There is a raised band around the neck. The handle is a bent strap that is riveted to the bottom of the base and the rim. At the top of the handle there may be a hinge for a now missing lid.



Cu 43. Handle.

Inv. No. 6-22.

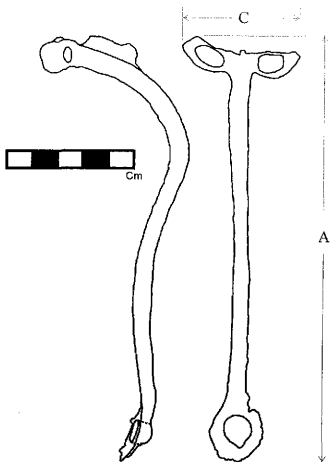
Figs. B23: 31.

AKE.

H. 0.170; max. w. 0.046.

Handle intact with small vessel fragment attached to lower rivet.

Decorative handle with square cross section. Handle has a graceful reverse curve along its length. At one end there are two flat almond-shaped pieces that each are bent at a 90 degree angle to the handle. On each of these almond shapes there were rivets that held the handle to the vessel. At the other end, the handle ends in a single rivet. Along the top of the handle there is a raised section that appears to be an attachment point for a lid.



Cu 44. Vessel lid.

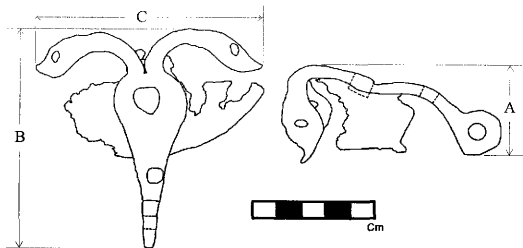
Inv. No. 6-56.

GSM.

H. 0.039; l. 0.091; w. 0.094.

The lid consists of two pieces. Approximately 50 percent of lid is present with hinge.

The hinge consists of one piece of metal that forms three straps. One strap is bent over the side of the lid and flattened vertically as the attachment point for the lid to the vessel. The other two straps are bent to the opposite sides and are flattened horizontally to attach the hinge to the lid. In the center of the hinge there is also a flattened area where the hinge is riveted to the lid. The lid's profile slopes down from the center rivet of the hinge then tapers to the narrowest point before slightly flaring out at the base. There are two additional fragments that are concreted together and fit under one of the flattened rivet attachments.



Cu 45. Spout.

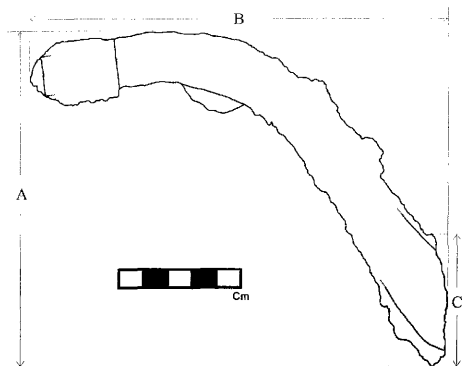
Inv. No. 6-19.

Figs. B23: 29

H. 0.141; l. 0.172; max. w. 0.058.

Heavily concreted.

Hollow interior. Spout tapers from 0.050 to 0.025. Curves at about a 90 degree angle. Object is similar to Cu 43 but has a larger head.



Cu 46. Spout with body fragments.

Inv. No. 6-53.

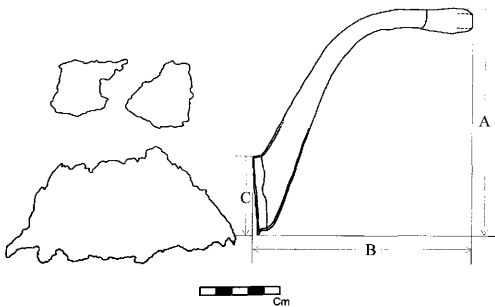
No photos.

DAY.

H. 0.136; l. 0.130; max. diam. 0.049.

Seam is corroded. Mounting flange is still in place. Four fragmentary body pieces were found in association with the spout.

The spout has a gentle s-curve with a seam on the upper side.



Cu 47. Strainer.

Inv. No. 6-67.

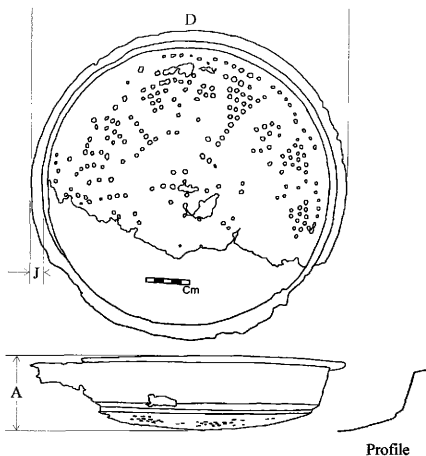
Figs. 6-67.

DXD.

H. 0.088; max. diam. 0.360; rim w. 0.017.

Approximately 30 percent is missing. The surface is abraded and some is corroded. The metal is very thin and fragile. Many of the holes are filled with concretion.

The strainer is pan shaped with pierced holes in the bottom. The bottom is rounded with a stepped transition with the sides. The holes are in a general pattern but are not symmetrical.



Cu 48. Strainer.

Inv. No. 6-78.

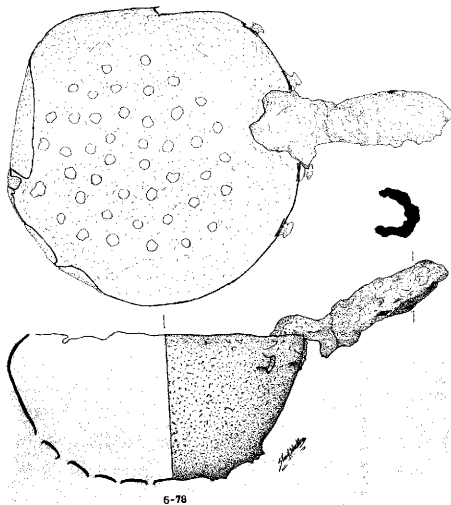
Figs. 6-78.

GCE.

H. 0.120; max. diam. 0.260; handle l. 0.160; handle th. 0.040.

Badly concreted. Bowl appears complete.

Hemispherical strainer that is punctured by small holes and has a metal sleeve. A wooden handle was probably attached as there is wood concreted to the sleeve.



Cu 49. Handle.

Inv. No. 6-2.

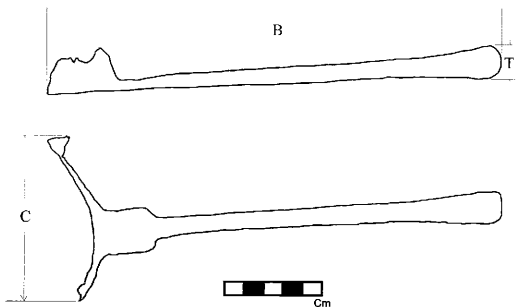
Figs. B4: 35.

Wreck Plan zilla BI.

L. 0.234; max. w. 0.089; max. th. 0.017; est. body diam. 0.110.

Solid copper alloy handle with remains of vessel or bowl still attached. Vessel badly corroded. Only 28 percent of vessel rim remains attached to handle.

Small, solid handle with a square profile.



Cu 50. Handle attachment.

Inv. No. 6-36.

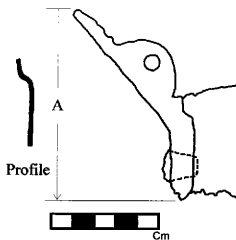
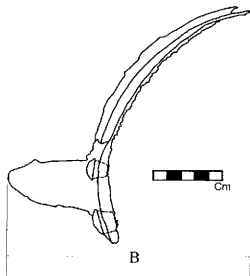
Figs. SI-96-B14: 12.

1m west of KV.

Pres. h. 0.093; pres. l 0.177; est. diam. 0.214.

Only a small body fragment is present and approximately half of sleeve.

Sleeve is riveted to the small body fragment. The sleeve appears to have some notching around its edge.



Cu 51. Brazier.

Inv. No. 6-16.

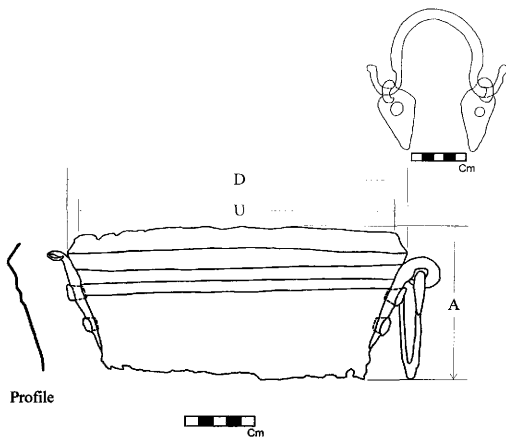
Figs. B15; 17-2.

Wreck Plan near zilla BJ.

Pres. h. 0.170; max diam. 0.245; inner mouth diam. 0.232.

Moderately concreted. One is handle missing. Bottom is missing and gridiron is broken.

Sides flare out toward rim. The rim is bent in. There are two raised ridges about the upper body. The handle is looped through a diamond shaped strap that is riveted to the body. There is an earthenware sherd from the interior of the vessel. The remains of a gridiron fits in the bottom.



Cu 52. Brazier.

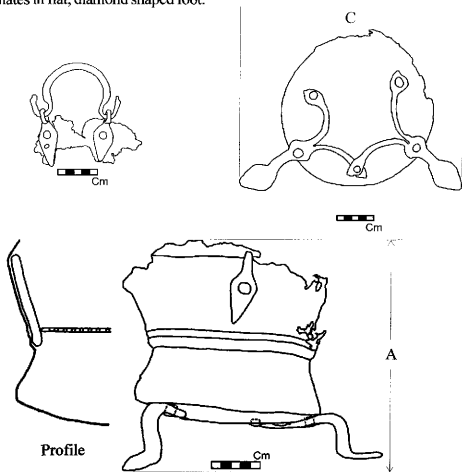
Inv. No. 6-25.

VR.

H. 0.242; max w. 0.304.

Body is broken and eroded. One leg is missing. An earthenware liner is present but heavily concreted. A gridiron is present but badly corroded.

Body appears to be a solid vessel that is pinched in the center to form an angular hour glass shape. Above the narrow waist there are two raised ridges around the vessel. Earthenware sherds were found inside the vessel and were a liner. The two loop handles were looped through almond shaped straps that were riveted to the body. The two surviving legs each have an inverse s-curve that terminates in flat, diamond shaped foot.



Cu 53. Tripod base.

Inv. No. 6-15.

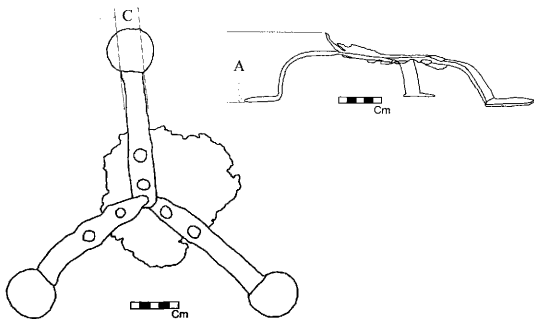
Figs. B16: 15.

Near zilla DH.

H. 0.089; leg w. 0.022; ave. leg l. 0.193.

Small portion of the vessel base remains attached to the tripod. Tripod legs are complete.

Tripod consists of three metal straps that are fastened to the base of a vessel with two rivets each. The riveted ends of the straps overlap. The legs curve down at approximately a rounded 90-degree angle from the vessel and end in a flat circular foot. This tripod is much more simple in design than Cu 49 and Cu 51 as the upper ends of each leg are not neatly finished and merely overlap in the center of the base.



Cu 54. Tripod base.

Inv. No. 6-30.

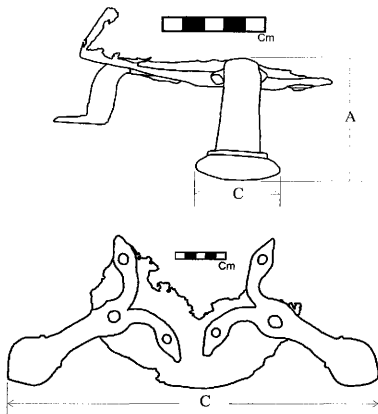
Figs. SI-96-B14: 7.

Qulal field between CCB and CAJ.

Leg h. 0.062; pres. w. 0.323; foot w. 0.042.

Approximately half of the base and one leg are missing.

Each leg is riveted to the base at three points on the bottom of the vessel base. One rivet at the centerline of the leg near the edge of the vessel base and two additional rivets on each side of the centerline fasten each leg. After the first rivet, each leg divides into two pieces that bend away from the centerline and form attachment points for two more rivets. The feet are spade shaped with a squared portion that acts as the transition between the leg and the foot. In addition, there are two small triangular notches set in either side of the leg where it bends to meet the body.



Cu 55. Still.

Inv. No. 6-21.

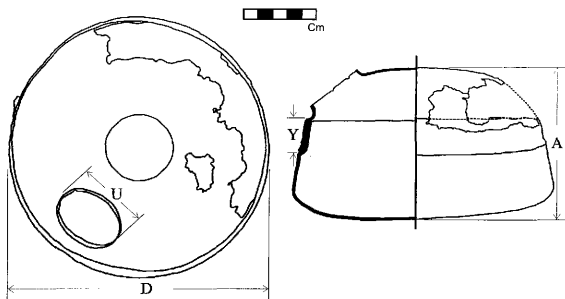
Figs. B23: 30.

AKE.

H. 0.103; max. diam. 0.180; mouth diam. 0.041; band h. 0.019.

Metal is in good condition except for holes caused by erosion in lower body and base. Approximately 90 percent intact.

The body is a low rounded dome shape with a small circular opening off center on the top surface. The vessel consists of two pieces, a top and a base. These were fitted together with the bottom half fitting inside the upper creating a band 0.019 high. A substance was found along the seam that is currently being tested. This may be flax or another substance used to weld the metal together. The opening on the top is off center and there is a protruding flange approximately 0.002 tall. There are two notches that appear to be cut into the flange along one side of the opening. There is also an incised ring around the center top of the dome. This circle is 0.047 in diameter and is the only decoration on the vessel.



Cu 56. Hasp.

Inv. No. 6-1.

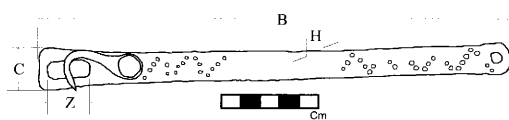
Figs. B4: 33, 34.

Wreck Plan zilla BI.

L. 0.243; max. w. 0.023; max. th. 0.002; hole l. 0.021.

Very well preserved with a movable hook riveted to the wide end.

At the smaller end there is a small round hole while at the wider end there is a oblong hole with a hook over it. There is a zig-zag pattern marked in dimples on the front surface.



Cu 57. Hasp.

Inv. No. 6-31.

Figs. SI-96-B37: 22.

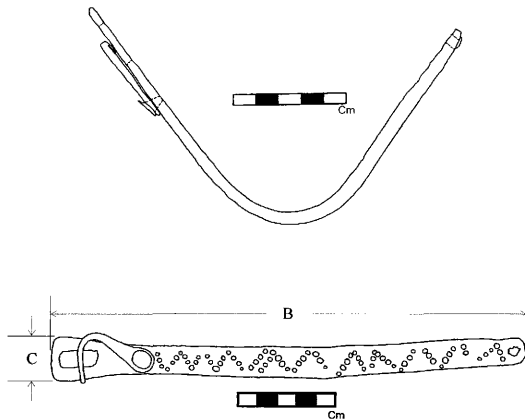
West of All.

L. 0.330; max. w. 0.024.

Complete hasp in excellent condition with a hooked hasp intact on one end.

Hasp is bent approximately half way down its length at about an 80-degree angle.

Decorative dimples in a zigzag pattern adorn one side down it's length. There is a small hole at one end for a rivet.



Cu 58. Strap.

Inv. No. 6-47.

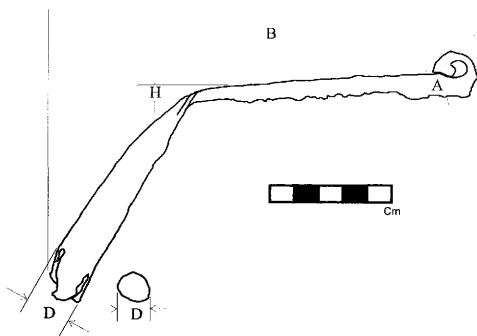
Figs. SI-96-B22: 21

DCS.

L. 0.176; max. diam. 0.017; max. h. 0.030; th. 0.005.

Hollow end of strap is broken off and missing. The existing object is in good condition.

The strap has a bend approximately half way down its length and is flat on one end and a hollow tube at the other. The flat end has a rounded loop possibly to accept a hinge. The bend is at approximately 100-degree angle.



Cu 59. Bracket.

Inv. No. 6-79.

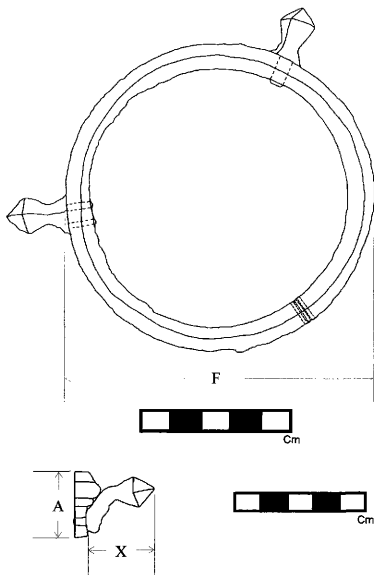
Figs. 6-79.

GKW.

H. 0.026; ex. diam. 0.103; post l. 0.023.

Very good condition. One post is missing.

End of each post is diamond shaped. They are riveted to the ring. There are three holes where the missing third post was attached.



Cu 60. Lantern.

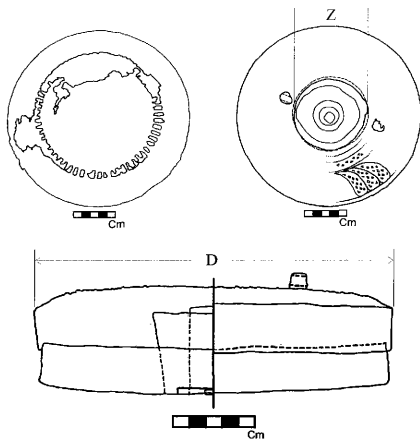
Inv. No. 6-3.

Figs. B10: 5A-9A.

Max. diam. 0.291; central hole diam. 0.083.

Moderately concreted, yet surface is fairly well preserved under concretion.

Two circular, dish shaped pieces, one inside the other. The inner piece has a beveled edge and three concentric vertical sleeves in the center. There is a circle of small square openings around the bottom of the base. The top half is pierced with triangular holes in a ring around the center opening. Anterior to that there are bent, teardrop-shaped, raised areas that are also pierced with triangular- and diamond-shaped holes. There is a post set on the top piece along the inner opening. There is wood present inside the post hole.



Cu 61. Box.

Inv. No. 6-52.

Figs. Si-98-B10-20a.

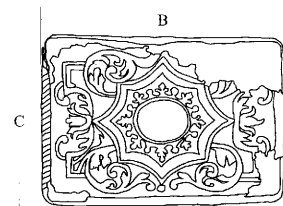
DAS.

H. 0.016; w. 0.046; l. 0.064

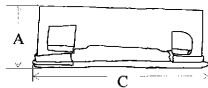
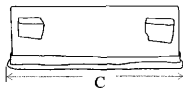
Base in good condition. Lid in moderate condition. Base is nearly complete.

Lid is approximately 80 percent intact. Lid is bent out of shape.

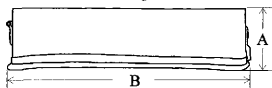
Top surface is highly decorated with scrollwork and leaves. Attached on one side there is a rod that is possibly a hinge. Metal is yellowish, which is unlike any other copper alloy artifact in this assemblage. A tobacco leaf and glass sheet were found inside the box.



Lid



Base side profile



Cu 62. Bracelets.

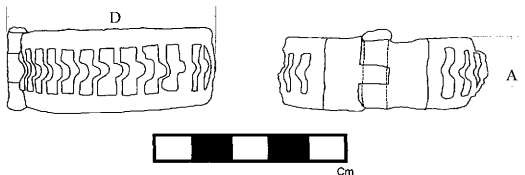
Inv. No. 6-26.

Base of KV.

Max. h. 0.022; max. diam. 0.055.

Originally the two linked bracelets were intact. During treatment, however, they broke into nine pieces. The hinges remain intact. Both pieces are in stable and good condition.

The bracelets are both solid, hinged, cuff-style with pin closures. The exterior surface is covered with repeating recessions. No other substances were found in these recessions.



APPENDIX B
ARTIFACT PHOTOGRAPHS

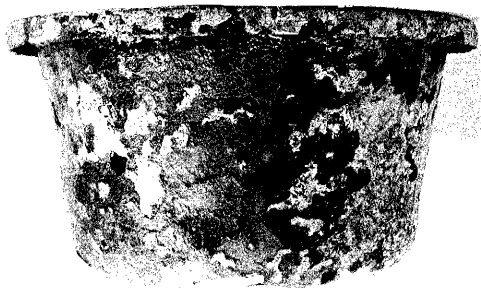
The photographs were taken digitally at the Alexandria Conservation Laboratory for Submerged Antiquities in May 2000.



Cu 1. Kettle.



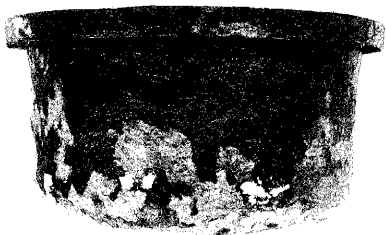
Cu 2. Kettle.



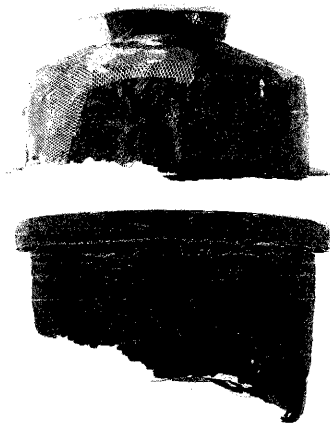
Cu 3. Kettle.



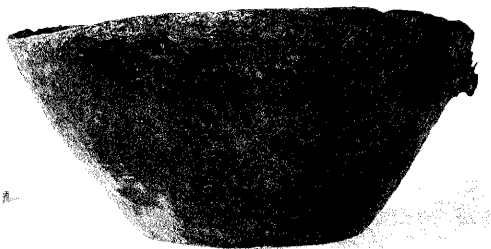
Cu 4. Kettle rim.



Cu 5. Kettle.



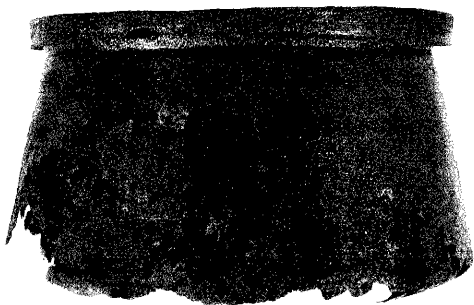
Cu 6. Kettle with lid.



Cu 7. Kettle.



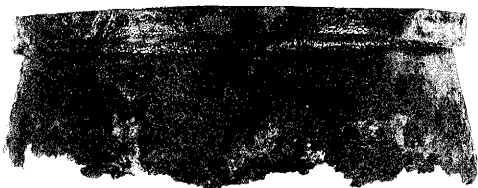
Cu. 8 Pot.



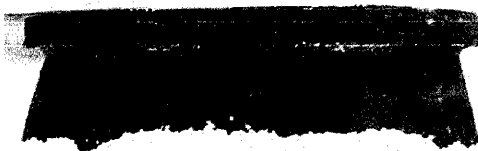
Cu 9. Pot.



Cu 10. Pot.



Cu 11. Pot rim.



Cu 12. Stacked pot and lid rims.



Cu 13. Lid rim.



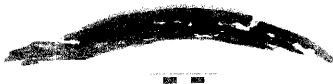
Cu 14. Lid fragment.



Cu 15. Lid ring handle.



Cu 16. Basin.



Cu 17. Basin rim fragment.



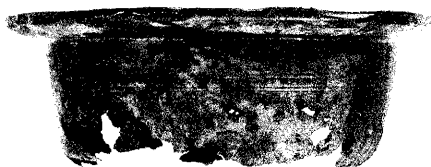
Cu 18. Basin rim fragment.



Cu 19. Basin rim fragment.



Cu 20. Basin.



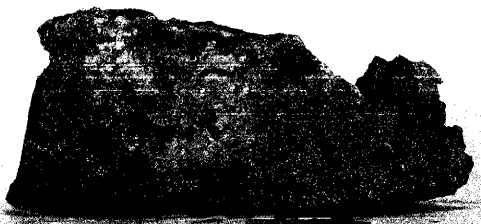
Cu 21. Basin.



Cu 22. Vessel.



Cu 23. Small vessel.



Cu 24. Small vessel.



Cu 25. Dish.



Cu 26. Dish.



Cu 27. Dish.



Cu 28. Dish rim.



Cu 29. Dish rim.



Cu 30. Dish.



Cu 31. Dish rim fragments.



Cu 32. Vessel base fragments.



Cu 33. Two vessel base fragments.



Cu 34. Dish.



Cu 35. Cooking pan.

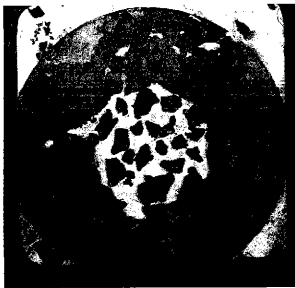


Cu 36. Cooking pan.



0 1 2 3 4 5 6 7 8 9 10

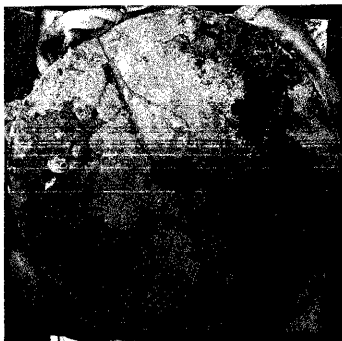
Cu 37. Pan handle attached to body fragment.



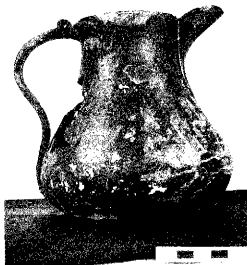
Cu 38. Tray.



Cu 39. Tray.



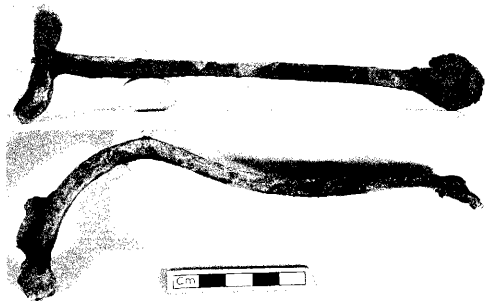
Cu 40. Tray.



Cu 41. Pitcher.



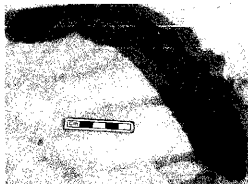
Cu 42. Pitcher.



Cu 43. Handle.



Cu 44. Vessel lid.



Cu 45. Spout.



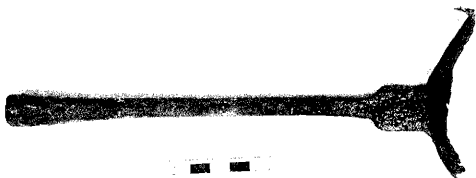
Cu 46. Spout with body fragments.



Cu 47. Strainer.



Cu 48. Strainer.



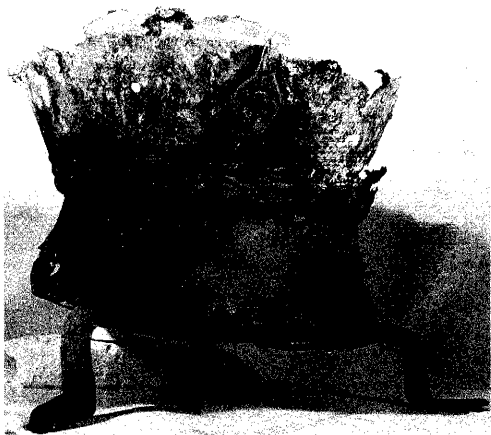
Cu 49. Handle.



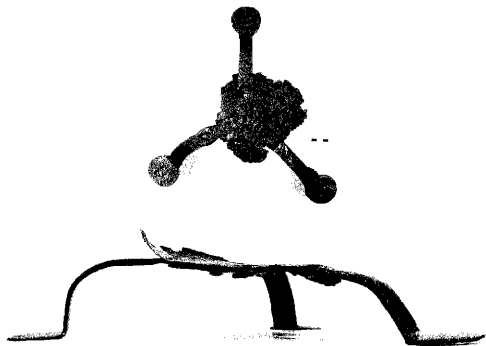
Cu 50. Handle attachment.



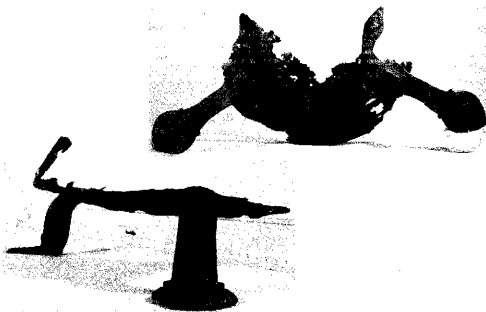
Cu 51. Brazier.



Cu 52. Brazier.



Cu 53. Tripod base.



Cu 54. Tripod base.



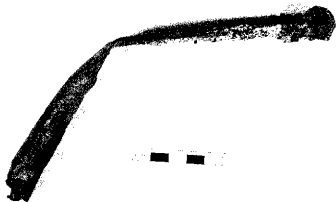
Cu 55. Still.



Cu 56. Hasp.



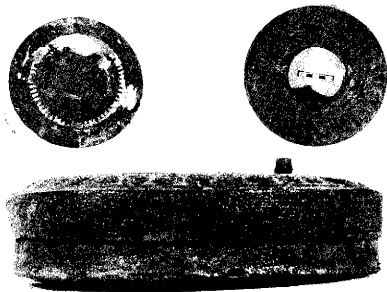
Cu 57. Hasp.



Cu 58. Strap.



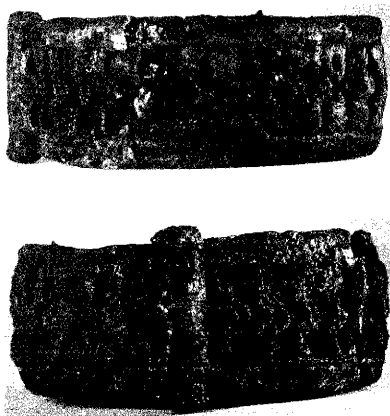
Cu 59. Bracket.



Cu 60. Lantern.



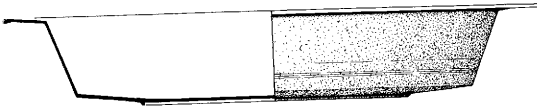
Cu 61. Box.



Cu 62. Bracelets.

APPENDIX C
ARTIFACT DRAWINGS

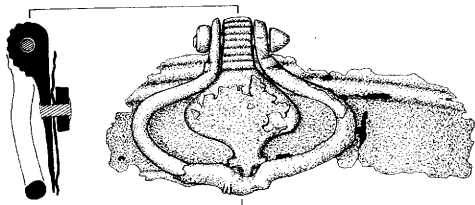
The artifact drawings were done by staff artists. They were provided by Cheryl Ward.



6-51
12/26/50

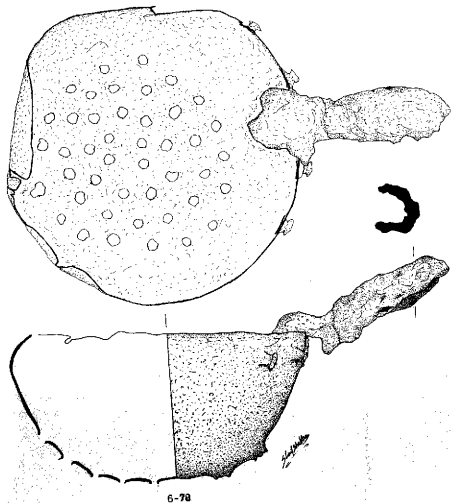
PROLIMINARY DEG.

Cu 25. Dish.

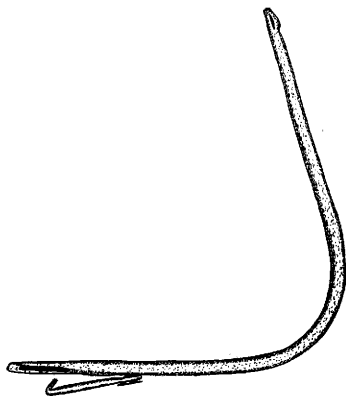
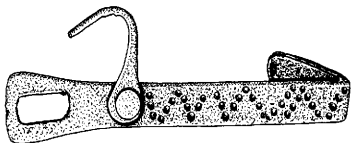
6-29
mb/dp

NOTE: SECTION - FOR THIS PURPOSE, THE UPPER NUT & BOLT HAVE BEEN MOVED 1 CM TOWARDS THE CENTRE

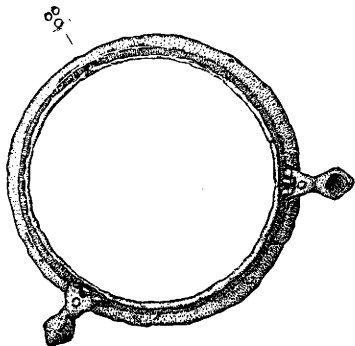
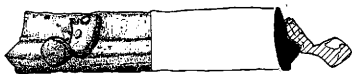
Cu 37. Pan handle attached to body fragments.



Cu 48. Strainer.

G - 31
11/20/54

Cu 57. Hasp.



6-79

13 00 - POWER RISE HEADS TIGHT HOLDING ATTACHABLE

Cu 59. Bracket.

VITA

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- August 2002 **Texas A&M University, College Station, TX.**
M.A. in anthropology.
- May 1996 **University of Rhode Island, Kingston, RI.**
B.A. with honors in anthropology and art history.

Professional Experience:

- 2000-2002 **Hicks and Company, Environmental, Archaeological, and Planning Consultants, Austin, TX.**
GIS and graphics specialist.
- 1999-2000 **Hicks and Company, Environmental, Archaeological, and Planning Consultants, Austin, TX.**
Field laboratory technician.
- 1998 **Mystic Seaport Museum, Mystic, CT.**
Shipyard intern.
- 1997 **R. Christopher Goodwin and Associates, New Orleans, LA.**
Field archaeologist.

Field Experience:

- 1999-2000 **Institute for Exploration/Institute of Nautical Archaeology, Black Sea Trade Project, Black Sea.**
Participated in deep-sea survey using side-scan sonar and remotely operated vehicles.
- summer 1998 **Institute of Nautical Archaeology, Bozburun Byzantine Shipwreck Excavation, Bozburun, Turkey.**
Field archaeologist.
- 1996-1998 **Rhode Island Marine Archaeology Project, Newport, RI.**
Ground truthed side-scan sonar targets. Documented shipwrecks.
- summer 1995 **Society for the Preservation of New England Antiquities, Casey Farm Archaeological Field School, North Kingstown, RI.**
Field archaeologist.

Publications:

- Oct. 2001 Ballard, R.D., F.T. Hiebert, D.F. Coleman, C. Ward, J. Smith, K. Willis, B. Foley, K. Croff, C. Major, and F. Torre. 2001. "Deepwater Archaeology of the Black Sea: The 2000 Season at Sinop, Turkey." *AJA* 105.4: 607-623.