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Artifacts of Exchange: A Multiscalar Approach to Maritime Archaeology at Elmina, Ghana

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ABSTRACT

This dissertation focuses on the excavation and interpretation of two European ships discovered at Elmina Ghana, the coastal site of the first and largest European fort in sub-Saharan Africa. Discovered in 2003, the first vessel, located 1.5 miles offshore of the castle, is largely comprised of remnants of cargo exposed on the seafloor. European trade wares recovered from the site suggest a mid-seventeenth century vessel, most likely of Dutch origin. AMS radiocarbon dates obtained from several fragments of wood recovered in cores taken at the site support this assumption. The second vessel was discovered by accident during the 2007 dredging of the Benya River, a small lagoonal system that empties into the sea at Elmina. Largely destroyed during the operation, identifiable remains included fifteen timbers and three cannon. Dendrochronology and ship construction techniques indicate the remains to be those of an early eighteenth century Dutch vessel. The two ships thus represent different time periods, historical settings, and archaeological contexts. Yet, the value of both to the reconstruction of the West African past lies with both their local and global contexts. On one hand, they represent unique insight into the construction of the European ships that traded on the coast and their cargoes. On the other, data on their cargoes and associated artifacts provide information on trade and exchange in a world area that has received little attention from underwater archaeologists.

Often times the work of underwater archeologists has been criticized for producing particularistic interpretations lacking wider context and theoretical synthesis. Shipwrecks were investigated for their intrinsic value, an emphasis was given to spectacular objects, and the literature resulting from these excavations was primarily descriptive in nature. In my dissertation I argue that such deficiencies can be countered

by incorporating a theoretical framework which engages both the nomothetic and particularistic. To a large extent, the questions that confront studies of shipwrecks are problems of scale: how do we move from the minutia of cargoes and the specificity of an event to wider social processes? Methodologically, how do we decide what data are to be collected and evaluated? Conceptually, what is it that we seek to understand from our studies? Grappling with these questions I draw upon the methodological and conceptual insights afforded by microhistory, the *Annales* school, and Braudel's three scales of history. I propose a dialectical interpretation of shipwrecks attentive to the intersection of local patterns and global forces in the shaping of history. Utilizing macro-scale historical generalizations (i.e. trade patterns, cargoes, ship, and artifact characteristics) archaeologists can interpret, and identify the micro-scale event (nationality, date, vessel name, wrecking event). Once done, the particulars of the site in turn afford means of understanding large-scale social processes.

ARTIFACTS OF EXCHANGE: A MULTISCALAR APPROACH TO MARITIME ARCHAEOLOGY AT ELMINA, GHANA

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DISSERTATION

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We, the members of the Oral Examination Committee,
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CHAPTER ONE: INTRODUCTION

Central to this dissertation is the excavation and interpretation of two European vessels discovered at Elmina, Ghana. The two sites, referred to as the Elmina Wreck site and the Benya Lagoon site, represent different time periods, historical settings, and archaeological contexts. The Elmina Wreck site is located 1.5 miles (2.41 km) offshore of the *Castelo de São Jorge da Mina* (Figure 1.1), the first and largest European fort in sub-Saharan Africa. Discovered in 2003, the site is largely comprised of the remains of the vessel's cargo lying exposed on the seafloor. Analysis of the artifact assemblage and AMS radiocarbon dates suggest a mid-seventeenth century ship, likely Dutch in origin. The second vessel was accidently discovered in 2007 during dredging of the Benya Lagoon carried out by the Belgium firm Dredging International. Largely destroyed as a result of the operations, identifiable remains include fifteen timbers and three cannon. Dendrochronology, ship construction, and armaments indicate the remains to be those of an early eighteenth century Dutch vessel.

This is also a dissertation about scale. Its focus is on African-European interactions on the Gold Coast during the seventeenth and eighteenth centuries, as viewed through the 2007 archaeological investigation of the two European ships associated with the European trading entrepôt located in Elmina, Ghana.[1] The archaeology of these wrecks is cached in the long-term and large-scale research of the Central Region Project

[1] The term "Gold Coast" is commonly used by historians and archaeologists alike to refer to the general area of coastal land that now comprises the modern nation of Ghana. Originally, in the fifteenth century Portuguese sailors, the first Europeans to reach this land, referred to the stretch of east Guinea coast from which gold was obtained as *a mina de ouro* (the mine of the gold) or simply *da Mina*. The English, arriving on the coast in the sixteenth century, instead adopted the term Gold Coast and from 1821 to 1957 it was the official name of the British colony in West African. Throughout this dissertation I use the terms Gold Coast, Mina, and Ghana interchangeably regardless of historical context. Elmina refers only to the specific town or entrepôt.

(CRP). Headed by Christopher DeCorse of Syracuse University, the CRP has investigated socio-political transformations concomitant to African-European interaction in Ghana's Central Region through archeological, historical, and cultural studies for over twenty-five years. Shifting trade relationships between European merchants and their West African counterparts was a major precipitator of change during the period of the Atlantic World. Central to these relationships was the exchange of imported European manufactured goods for African resources such as gold, ivory, and slaves.[2] Consequently, we can view the material culture of trade as the material record of transformations.

Figure 1.1 View of Elmina Castle (Photo by A. Pietruszka)

[2] Here and throughout the remainder of the dissertation, the term manufactured goods is used to denote finished products complied from raw materials. It should not be confused with wares mass-produced in an industrial sense. The sinking of both ships predates the industrial revolution by some time. Although some of the goods imported into West Africa by the Europeans during this time were produced on a large scale, the mode of production remained artisanal and small-scale.

Maritime archaeology brings a unique component to the study of African-European interactions in coastal Ghana. Materials from both sides of the exchange, European imports and African exports, were carried exclusively to and from Africa in the hulls of European ships. Though selective, the excellent preservation properties of maritime sites are well documented (Adams 2001:293; Dean et al. 2000:31; Coles and Lawson 1987; Nutley 2009:8-9; e.g. Green 1989; Redknap 1997); finding the archaeological remains of European ships allows for the recovery and analysis of trade materials that often eludes terrestrial archaeologists working in the same areas.
The artifact assemblages recovered from such submerged archaeological sites represents the material remains of African-European exchange. Material transactions of these goods necessitated cross-cultural relationships, and these relationships led to wide ranging economic, cultural, and socio-political transformations along the coast. As goods often demanded by African buyers and destined specifically for the African market, archaeological study of European ships in the African trade not only tells us about the Atlantic economy, but are purveyors of African cultural patterns and African agency.

Throughout this dissertation, I focus on a multiscalar approach to archaeological investigation and the interpretation of shipwreck sites. I draw inspiration from microhistory, as well as macrohistorians such as Braudel and Wallerstein.[3] This dissertation is as much about the interpretation of two archaeological sites as it is about the broader underlying socio-political and economic structures of African-European exchange on the coast. Similarly, my interpretive methodology is not constrained to my

[3] In particular much of my conceptual framework is rooted in the works of microhistorians such as Levi (2001), Ginzberg (1993), Davis (1983), and Chartier (1982). This is discussed in further detail in Chapters Two and Six.

specific sites or region of focus but is universally applicable to the investigation of historic shipwrecks found anywhere and from any time.

1.1 Scale and its Epistemological Affects

First used in the fifteenth century, scale comes from the Latin word *scala*, meaning ladder or staircase. As a verb, it means to pattern, make, regulate, set or estimate according to some rule or standard. As a noun, it is often defined in reference to standardization, graduated series, proportions, patterns, or regulations. Being rigid, discrete, and standardized scale is considered to be a valuable, objective tool of measure appropriate to the rigors of the modern scientific process. There are, however, several issues related to scale that are fundamental to the task of explanation (e.g. Gibson et al. 2000; Hagget 1965; Turner et al. 1989a, 1989b). One such concern is how scale, extent, and resolution affect the identification of patterns. Patterns that appear at one level of resolution or within a chosen extent's boundaries are not always discernable in others. The implication is that a researcher's choice of scale can preclude data and alter the outcome of research.

The ramifications of scale on the outcome of our observations are vividly illustrated by a famous mathematical question: How long is the coast of Great Britain? This question was first posed by the physicist, L. F. Richardson. Richardson, a Quaker, was an ambulance driver during World War I. Marred by the atrocities he laid witness to, he set out upon his return to scientifically study war surmising that he could ascertain its cause in measurable properties of nations or people that correlated with these deadly conflicts. For example, he questioned if two nations sharing a longer common border were more or less likely to wage war against one another than those sharing shorter common borders. To answer this question, Richardson first needed to measure these boundaries and this led him to ask "how long is the coast of Great Britain?" In the process he discovered that borders had some very peculiar properties that, up until that time, had largely gone unnoticed (Richardson 1960a, 1960b, 1961).

To measure the British coast, Richardson applied a set of dividers to a series of maps. Adjusting the divider to a prescribed set opening, he then proceeded to walk the divider—alternately swinging one point to a new position on the map while the other remained fixed—along the entire coastline. Knowing the length of the divider's opening (x), the total length of the coastline is simply calculated by multiplying (x) by the tally of steps needed to circumvent the coast. Testing the repeatability of his calculations, Richardson applied the same method to several different maps of Great Britain. At a coarse resolution the coast of Great Britain appears jagged, making it difficult to measure using a static straight line. Expecting a smoothing effect, Richardson recalculated the distance using a finer resolution map but, to his dismay, this only revealed the same jaggedness just at a new scale. Even with reducing the length of the divider, the newly resolved bays and peninsulas increased the measured length of the coast.

The reason for this phenomenon is obvious when we consider scale. When a bay or peninsula on a 1:100,000 scaled map is observed on a map scaled 1:10,000, once unobservable sub-bays and sub-peninsulas now become apparent; scaling down to 1:1000 reveals subsub-bays and subsub-peninsulas. We could continue so on and so forth, each revelation adding to the measurable length. The same happens when the unit of measure is reduced. If we were to subsequently decrease the opening of the divider, each time repeating the process of measurement, we might expect to settle into a well-defined, more accurate value for the length of our coastline called the true value; or in other words, we might expect the jaggedness of any coast observed at coarse resolution to be resolved, or appear smoother as we moved to a finer resolution. However, what is observed both mathematically and physically is something quite different; the length tends to increase without limit, as our dividers get smaller the jaggedness is replicated on all levels regardless of resolution. And this is what Richardson observed as he decreased the opening of his divider. Ultimately, what Richardson discovered then was that there is no correct answer to the question "how long is the coast of Great Britain?" because length scales, or changes, with the resolution of the instrument used to measure it.

Historians and archaeologists are confronted with a similar problem when they try to piece together the past. Like Richardson, our observations about the past are limited by the scale we choose to view it. Whether through historical records, the material culture of archaeology, or a combination of both as is the case with historical archaeology, researchers must decide at what scale they wish to make their measured observations and understand the ramifications of this choice. Scholars have suggested a multitude of analytical frameworks to deal with this question of scale. Historians such as Braudel (1972a, 1981, 1982, 1984) and Wallerstein (1974, 1980, 1986) sought to smooth history's jagged coast through a history of the grand-scale with long time frames and an emphasis on large cultural processes like the rise of capitalism. In contrast, microhistorians like Levi (1988), Davis (1983), and Ladurie (1978) would use fine-grain resolution focused on, for example, a single peninsula, lending itself to an exquisitely detailed history of a specific event or place. However, this approach may miss the forest for the trees; or, in this case, the coastline for the peninsula. Archaeologists are faced with a similar dilemma as they struggle to place individual sites within a broader historical and cultural context while understanding how these have affected the site they are working. Likewise, they have adopted a wide range of analytical and interpretive frameworks including: World Systems Theory, *Annales* school of history, and microhistory.[4]

1.2 Scale in the Central Region

A perspective of scale incorporating multiple vantages is relevant to the study of the Central Region of coastal Ghana. The Central Region was the focal point of African-European contact in West Africa—a relationship that has persisted for over five hundred years. The Central Region has been the focus of DeCorse's examination of the resultant transformations in the region's political economy (DeCorse 1987a, 1987b, 1988, 1992b, 1993, 1998, 2001a, 2005; DeCorse et al. 2000). Initially, DeCorse's (1987a, 1987b, 1989, 1992a, 1992b, 2001a) work centered on the archaeological assessment of the African settlement at Elmina, dating between the fifteenth through nineteenth centuries, as a means of understanding the emergence of the Atlantic economy, particularly with regards to change and transformation at the local level.[5] He utilized a variety of methods

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[4] For examples of World Systems Theory see (Baugh 1991; Chase-Dunn and Hall 1997; DeCorse 2001a; Dunaway 1994, 1996a, 1996b, 1996c, 1997; Hall 1986, 1987, 1989a, 1989b, 1991; Peregrine and Feinman 1996; Harris 1990; Kardulias 1990; Mathien and McGuire 1986; Meyer 1990, 1991, 1994; Peregrine 1992, 1995; Faiman-Silva 1997; Himmel 1999; Friedman 1991), *Annales* (Little and Shackel 1989; Blintiff 1991; shipwreck sites see Staniforth 2001, 2003a, 2003b; Dellino-Musgrave 2006), and microhistory (DeCorse 2008; Beaudry 2008; Lightfoot 2008).

[5] Despite Elmina Castle being the most significant European trading entrepôt on the West African coast, no systematic work had been undertaken at the site prior to DeCorse's work in 1985. Lawrence (1963:169) noted the presence of stone foundations but says nothing else. In the 1960s Calvocoressi (1968, 1977) excavated at *Veersche Schans*, a small redoubt constructed in 1811 on the landward side of Elmina peninsula, west of old town. Although he did not prove the oral tradition that the site was the location of a French outpost predating the arrival of the Portuguese, he did uncover material predating its construction including burials and early midden deposits. In 1969 Bernard Golden (1969) evaluated the site as part of a wider coastal survey but, deemed it to have little to no archaeological potential due to excessive disturbance. Davies (1976:109) conducted a limited surface survey of the old town noting the presence of stone foundations as well as collecting Dutch brick, local ceramics, and European pottery.

including surface surveys, test excavations, trenches, and large area excavations in an effort to delineate site, determine chronology, and describe material culture present. Most of DeCorse's intensive archaeological work focused on areas closest to the Castle, particularly portions of the site to the west and southeast, believed to be the earliest and most densely settled sections of town.

Beginning in the 1990s, DeCorse (1998) extended his research to neighboring areas in order to frame the Elmina site in a broader cultural and historical context. This broader regional work has come to be known as the Central Region Project (CRP). While the immediate objective was to locate and retrieve diagnostic artifacts, to establish some chronological control, and to foster increased understanding of late prehistoric and historic occupations in the areas around Elmina, today the CRP has a multitude of objectives aimed at investigating the socio-political transformations concomitant to African-European interactions in Ghana's Central Region during the Age of the Atlantic (e.g. Carr 2001; Chouin 2002, 2008, 2010; Cook and Spiers 2004; DeCorse 2001a, 2005; DeCorse et al. 2000; DeCorse et al. 2009; DeCorse and Spiers 2009; Spiers 2007). For example, Spiers (2007) has coupled archival research and data from archaeological survey and excavation to establish a regional chronology and settlement history for the Kingdom of Eguafo. His dissertation research suggests that beginning in the eighteenth century along coastal hinterlands, polities such as Eguafo generally organized a complex relationship between ritual power and ideological foundation in clan-oriented forms of kingship. Chouin's (2010) dissertation research on sacred groves has demonstrated their utility as indicators of archaeological sites and sources of history. His excavations, especially those at the Akrokrowa earthwork site, have shed new light on continuities and transformations over the last two millennia. His work challenges past assumptions concerning chronological frameworks of societal evolution, particularly those posed by Ivor Wilks (1993) “big bang” theory.

The CRP's most recent foci have included large-scale, regional archaeological surveys of both terrestrial and maritime cultural sites (DeCorse et al. 2000, Cook and Spiers 2004; DeCorse et al. 2009). The survey area extends from the coast fifteen kilometers into the interior and is roughly limited by the Pra River in the west and the Kakum River in the east (Figure 1.2). These boundaries encapsulate the area marked by the most dramatic changes in African societies corollary to European contact and trade. In addition to multiple African polities that dominated coastal trade, the project area includes several of the earliest and most important European trade entrepôts (Shama, Elmina, Dutch Komenda, and English Komenda), all focal points of maritime trade. In the future, the CRP intends to conduct maritime surveys in association with each of these settlements but as of 2011 the work has been concentrated only at Elmina.

Study of the maritime aspects of the trade sites of coastal Ghana began in 1998 with Greg Cook’s interviews with Fante fishermen and the observation of modern fishing practices (Cook and Spiers 2004; DeCorse et al. 2000). In 2003, Cook, then a doctoral candidate at Syracuse University, in conjunction with the Ghana Museums and Monuments Board, conducted the first systematic shipwreck survey in sub-Saharan Africa. This survey of submerged archaeological resources utilizing side-scan sonar proved that intact shipwreck sites are preserved in Ghana’s coastal waters. Over fifty

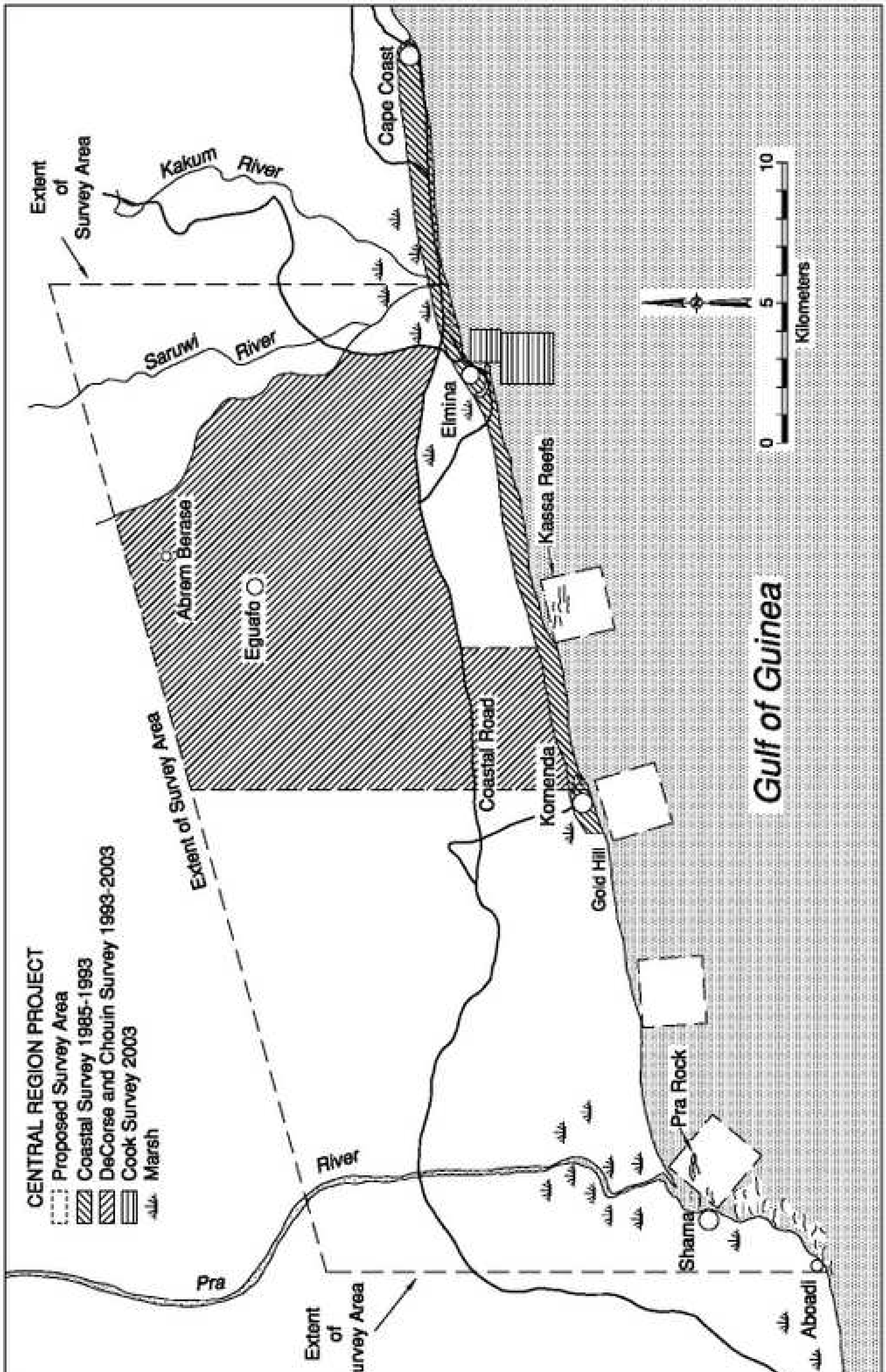

Figure 1.2 Central Region Project survey map (Map by S. Spiers).

targets were identified, including a sonar anomaly offshore of Elmina Castle that proved to be a dense mass of cultural material, composed largely of brass trade wares and iron cannon initially believed to represent a mid-nineteenth century wreck (Figure 1.3) (Cook and Spiers 2004) but now known to date to the seventeenth century.[6] Subsequent field seasons were carried out on the Elmina Wreck and within the Elmina survey area in 2005, 2007, and 2009 (Cook in progress; DeCorse et al. 2009; Horlings 2011).

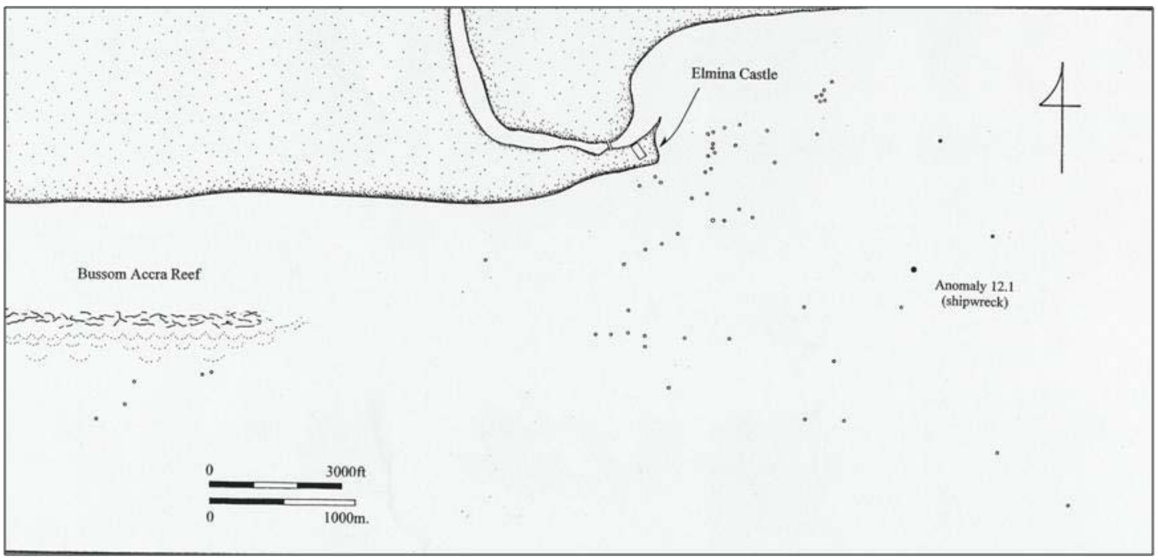

Figure 1.3 Sonar anomalies recorded during the 2003 remote-sensing survey (Map by G. Cook).

In 2007, a second site was unexpectedly discovered during dredging operations in the Benya Lagoon, a minor drainage flowing through the center of Elmina (DeCorse et al. 2009). The Benya site was discovered by employees of Dredging International, a Belgium company contracted by the government of Ghana to dredge the lagoon. In the

[6]Initially, Cook planned on using both an EG&G 866 proton magnetometer and Marine Sonics 600 kHz side-scan sonar for the detection of submerged shipwrecks; however, "ambient iron naturally occurring in rock and sediment around Elmina affected the magnetometer, causing erratic readings that limited its usefulness in locating potential shipwreck sites" (Cook and Spiers 2004: 20). The survey was therefore carried out utilizing only side-scan sonar. Covering four square kilometers of sea floor, the survey resulted in the demarcation of 52 sonar anomalies listed for future testing. Though the focus of the 2003 season was centered on data acquisition through geophysical testing, groundtruthing by diving was conducted on 3 anomalies resulting in the discovery of a wreck located approximately 1.5 miles off of Elmina resting in 32 feet of water (Cook n.d.; Cook and Spiers 2004: 20).

process, a large number of old timbers and four historic cannon were discovered in the dredge spoil from a single area of the lagoon. Unfortunately, the dredging was carried out by a clamshell scoop excavator and much of the context of the cultural remains was destroyed. The materials that did survive, however, made it evident that the cannon and timbers were the remains of an historic European vessel.

An important aspect of the Central Region Project has been the integration of both underwater and terrestrial archaeology into a single theoretical and logistical framework. Recognizing the differences in the types of data sets that are represented—and, consequently, the types of research questions that might be addressed by each—the work on terrestrial and underwater sites has been conceptualized as a single project, broadly framed in terms of the examination of African-European interaction and trade. Materials shipped in the holds of European vessels fueled the Atlantic trade, making the study of maritime sites particularly relevant. Shipwreck sites present a new perspective on the early contact period by providing well preserved assemblages of trade goods. Although ship manifests were recorded, these are far from complete, and the vague descriptions provided often makes it impossible to relate them to specific items found archaeologically (DeCorse 2001a:146-147; also see Alpern 1995). Goods that reached the African brokers on the coast were quickly dispersed into the hinterland, leaving only a fraction to enter the terrestrial archaeological record.

Although terrestrial sites allow archaeologists to view change and continuity over the *longue durée*, this time depth obscures the archaeological evaluation of the impact of any particular nation or trading interest, and investigations into more specific time periods can be ambiguous (DeCorse 2001a:146-47). In West Africa, terrestrial excavations have proven that various trade commodities are difficult to assess due to limited documentation and poor archaeological visibility (DeCorse 2001a). In contrast, shipwrecks were catastrophic events and the resulting archaeological sites preserve materials absent from terrestrial contexts. Archaeological investigations of these sites will allow the examination of a wide variety of material culture involved in African-European interactions with the likelihood of tight temporal contexts and concrete national identifications, providing unique insight into European trade goods and their chronology. These data have been of critical importance in developing chronologies for terrestrial sites in other world areas (e.g. Avery 1997; Deagan 1987; Goggin 1960; Majewski and O'Brien 1987; Marken 1994; Noël Hume 1969).

My evaluation of European shipwreck sites associated with the anchorage off Elmina, Ghana incorporates a unique theoretical approach utilizing multi-variant scale in the understanding of these sites in terms of indigenous change during the period of European contact. Shipwrecks are uniquely suited for a study of this type as they often represent idiosyncratic "time capsules" separated from other cultural remains (Nutley 2009; Peterson 1969:xiii-xiv; Shomette 1995:6; see Adams 2001: 296-297; Gould 2000: 12-13). A wreck's detachment, sometimes thousands of miles from its associated nation-state, has often led to interpretive frameworks that are particularistic in focus and myopic in scope. In particular, this is true for Africa where the limited number of excavations of European ships have focused on salvage work, more particularistic questions of ship technology and often, the more spectacular associated artifacts (e.g. Auret and Maggs 1982; L'Hour et al. 1989; Lightley 1976; Marsden 1976; van der Pijl-Ketel 1982; Werz 1999). In opposition to this approach, I propose a dialectical interpretation of shipwrecks attentive to the intersection of local patterns and global forces in the shaping of history. Specifically, this perspective uses the archaeology of an event to illuminate wider social, political, and economic issues, (see Little and Shackel 1989; Blintiff 1991; for shipwreck sites, see Staniforth 2001, 2003a, 2003b; Dellino-Musgrave 2006) while bringing these broader processes to bear on the interpretation of specific sites.[7] Utilizing macro-scale historical generalizations (i.e. trade patterns, cargoes, ship, and artifact characteristics) archaeologists can interpret, and identify the micro-scale event (nationality, date, vessel name, wrecking event). Once completed, the particulars of the site in turn afford a means of examining large-scale social processes. In this manner, the archaeologist engages in a dialectical interplay of interpretations where large-scale patterns contextualize the microhistorical milieu, while specificity of the site elucidates a macrohistorical vantage. Multiscalar analysis allows researchers to place the particularistic elements of archaeological minutia within a context provided by a macroscopic model, leading to a fuller site-specific interpretation that conversely contributes insight into large-scale social change (DeCorse 2006).

1.3 Organization of the Dissertation

The dissertation consists of six chapters. Chapter Two provides the theoretical underpinnings upon which I have drawn on in examining the shipwreck sites. I begin with a review and critique of theoretical approaches to underwater archaeology,

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[7] The event is something that has garnered a great deal of attention in anthropology, sociology, and archaeology over the past couple of decades. Notably, Sahlins (1991, 2004) and Sewell (1996, 2005) have defined the event as an action or happening that transforms the articulation of social structures. Archaeologically this definition has been applied by Beck Jr. et al. (2007) as an explanatory model for unexpected ruptures in material culture patterning in what they call eventful archaeology. However, in this dissertation the term event is used in a broader sense as proposed by Braudel (1972a) and subsequently used by Little and Shackel (1989), Blintiff (1991), and Staniforth (2001, 2003a, 2003b). Rather than a sociological phenomenon resulting in change, here the event is viewed as a scalar phenomenon representing small-scale, short-term actions or happenings regardless of their effect on social structure.

examining the consequences for the interpretation of shipwreck sites. I utilize a multiscalar approach contextualized by a discussion concerning the role of scale in archaeology. Finally, I submit the benefits of a multiscalar approach specific to the study of shipwreck sites. Chapter Three provides a historical context summarizing the past 600 years of African-European relations in West Africa. The history of the Gold Coast provides the necessary link between the shipwrecks I examine and large-scale cultural processes. In addition, the historical analysis introduces the macro-scalar backdrop germane to my interpretation and analysis of the two archaeological sites. Chapters Four and Five consist of two in-depth case studies based on the archaeological excavations I directed in 2007 as part of the Central Region Project. Here I demonstrate how understanding macro-scale historical processes can aid in the interpretation of the archaeological minutia. For example, the dendrochronology of timbers recovered from one site revealed a felling date of 1700-1701 with a North German provenience. Using this data as an endpoint, I seek an explanatory starting point in the macro-scale cultural processes of production and consumption. My interpretation of large-scale trade patterns, in particular the European timber and ship building trades, lead me to conclude the vessel was constructed in Holland at the turn of the century. In my final chapter, I invert the scale, this time moving from micro to macro. I conclude by suggesting that micro-scalar investigations, like the archaeological excavations of shipwreck sites, can elucidate our understanding of macro-scalar cultural processes. Manifestations of African socio-political changes are apparent in the concomitant shifting economic trade patterns between Africans and Europeans and are readily accessible to archaeologists through the examination of shipwreck sites. Transformations regarding demand, desire, and volume for particular imports and exports played out in the holds of transatlantic vessels and therefore are visible archaeologically through the detailed examination of European wrecks and their associated cargos. The two ships I have investigated represent very different time periods, historical settings, and archaeological contexts. Yet the value of both to the reconstruction of the West African past lies with both their local and global contexts. On one hand, they represent unique insight into the construction of the European ships that traded on the coast and their cargoes. On the other, data on their cargoes and associated artifacts provide information on trade and exchange in a world area that has received little attention from underwater archaeologists.

CHAPTER TWO: THE PARTICULARS OF THE EVENT AND CULTURAL PROCESSES: A MULTISCALAR APPROACH TO SHIPWRECK ARCHAEOLOGY

In this chapter I evaluate progress in the field of underwater archaeology over the last forty years, highlight the unique insight afforded by the archaeological examination of shipwrecks, and explore current and future theoretical frameworks for the investigation of long-term cultural processes. What proceeds is an explanation of the central theoretical tenets born out of my examination of two European shipwrecks associated with the European trade entrepôt at Elmina, Ghana. I have a perspective that places sites within the wider cultural milieu of which they were part. Thus, European wrecks can be understood in terms of the cultures that built and sailed them, and also in terms of the cultures to which they journeyed. In West Africa, European trade goods preserved in the cargoes of lost trading vessels are the material record of African consumption during the Atlantic trade that had a profound effect on the local socioeconomic, political, and cultural practices. Locked in these goods are the African's values, beliefs, and desires that dictated the items exchanged, terms of exchange, and concomitant socio-cultural change and continuity. Unlocking the full potential of these sites requires a multiscalar approach whereby micro-scale events and macro cultural processes are recognized as one in the same—each event the culmination of a multitude of interconnected processes, each process an infinitesimal number of events. The archaeological remains of an unidentified shipwreck can be contextualized by understanding component processes. Once interpreted, the event likewise can be used to better understand the cultural processes in which it occurred. This approach is particularly suited for the archaeological study of shipwreck sites and the historic period. As opposed to many terrestrial sites, wreck sites often represent the material traces of a single event. The documentary record is an invaluable source regarding cultural processes, one that has long been recognized by historical archaeologists for its utility in contextualizing archaeological sites (e.g. Beaudry 1988; DeCorse and Chouin 2004; Dethlefsen and Deetz 1966; Little 1992). Furthermore, the field of history has a long-standing tradition of tracking and identifying long-term cultural processes. Beginning in the twentieth century, many historians adopted concepts from other social sciences and many of these shared tenets form the basis for many of the discipline's subfields such as economic, political, labor, and military history.

This chapter begins with a summation of the field of underwater archaeology and the role of anthropological theory. Although demonstrative in my approach, my aim is not meant to downplay its many advances.[8] Rather, I seek to contextualize critical perceptions of the field while providing a frame of reference for my theoretical paradigm. As the cliché goes, you can't know where you are going until you know where you have been.

2.1 Shipwreck Archaeology: A Theoretical Discipline or Atheoretical Discipline?

Since its inception in the 1960s, underwater archaeology has struggled to gain acceptance within mainstream archaeology.[9] Central to this struggle has been a perception of the field's inability or unwillingness to adopt many of the explanatory paradigms which terrestrial archaeology has utilized, most importantly an anthropological

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[8] These are discussed both directly and indirectly later in the chapter.

[9] Though the undersea exploration of many cultural remains predate 1960, the inception of underwater archaeology as a scholarly endeavor is often marked by the excavation and publication of the Cape Gelidonya Bronze Age shipwreck excavated by George Bass in the early 1960s (Bass 1967). Likewise, Crumlin-Pedersen's (1958, 1968) investigation of the Skuldelev ships in the late 1950s marked a turning point in shipwreck archaeology in Europe.

perspective and theoretical underpinning. Such criticism is born out of underwater research that is often seen as particularistic, historiographic, and atheoretical by non-practitioners. The theoretical trends that have informed terrestrial archaeology over the past fifty years have generally not been applied to underwater archaeology (c.f. Adams 2001; Dellino-Musgrave 2006; Flatman 2003; Staniforth 2001, 2003a, 2003b;).

The field's ineffectiveness in addressing such issues stems from a longstanding theoretical void rooted in its unique history, specifically the field's connection with advocational archaeology, its focus on methodological advancements, and its detachment from conventional archaeology (Flatman 2003:143-144). From its inception, underwater archaeology, more so than any other archaeological sub-discipline, has had a strong advocational character. [10] For the most part this can be attributed to the field's necessary dependency on SCUBA diving, a skill obtained and practiced in the recreational sector rather than the academy. A pointed illustration of this is seen in the field's first generation of practitioners, a group by and large comprised of divers who learned "archaeology" (Gibbins and Adams 2001:286). While many such advocational archaeologists went on to pioneer the investigation and protection of submerged cultural sites, others, who were often more vocal, chose plunder (see Lyon 1982; Stenuit 1975, 1978; Wagner 1965). [11] Unfortunately, the lines between pioneer and plunderer were often blurred and, though today numerous examples of its benefits can be cited (e.g. the Cleveland Underwater Explorers, Inc. and Maritime Archaeology Survey Team in the United States; the work of the Nautical Archaeology Society in England; and the

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[10] A strong and prominent advocational contingent can be the technological requirements (i.e. SCUBA diving) and the diving community's long-standing interest in shipwrecks.

[11] Though greatly reduced the field is still battling to erase the stigma due to its association with salvers and treasure hunters still seen in the use of "underwater archaeologists" employed by treasure hunters and the popular medias' portrayal of treasure hunters and salvers as archaeologists.

Maritime Archaeological Association of Western Australia, Society for Underwater Historical Research, and Maritime Archaeological Association of Victoria in Australia), the reputation of underwater archaeology remains sullied by its advocational roots.[12]

As a growing number of academically trained archaeologists became involved in the field, they sought to separate themselves from the work of salvers and the negative reputation that plagued the previous generation. This, and the rigors of working in a Martian-like environment, has driven the professionally trained underwater archaeologist to focus heavily on the development of methodological advances. At the time, not just archaeological, but all work underwater was still in its infancy and new techniques had to be developed and refined in order to apply the strict scientific standards that were, by then, deeply entrenched in archaeology. Today the rigors of working in a largely unknown, unpredictable, and dynamic environment, one that necessitates specialized equipment, techniques, and technology, continue to pose a challenge for the field's practitioners who often emphasize methodology rather than theoretical queries (e.g. Green 2004; Dean et al. 2000).

The late 1970s and early 1980s marked the beginning of a vocal call for a reevaluation of the field's aims and an incorporation of greater theoretical frameworks. One of the first and most important of these was by Keith Muckelroy in his book *Maritime Archaeology*. Classically trained in the Department of Archaeology at Cambridge University, he drew upon the works of Grahame Clark, Gordon Childe, and Sir Mortimer Wheeler as inspiration in pursuit of an underwater archaeology free of its own antiquarianism past. His work greatly contributed to the early development of a

[12] See www.clueshipwrecks.org; www.Ohiomast.org; www.nauticalarchaeologysociety.org. For an overview of advocational groups in Australia see Souter (2008).

coherent theoretical framework for the field. He insisted that "the primary object of study is man" and championed a maritime archaeology "concerned with all aspects of maritime culture" including social, economic, political, religious, and others. Nautical archaeology, or "the specialized study of maritime technology", was a sub discipline of this (Muckelroy1978:4). And he warned against simply producing "counterfeit" maritime history, a role that he saw as "little better than that of an academic maid-servant, collecting interesting facts for historians to interpret" (Muckelroy1978:6).[13] Instead, he proposed a three-tiered hierarchy of investigation and analysis that included shipwreck, ship, and maritime cultures. At the level of the shipwreck, he was one of the first to provide a detailed analysis of site formation processes; at ship, he suggested multiple renderings—as a machine, an element of military or economic systems, or as a closed community—and addressed how archaeological assemblages can teach us about each; and at cultures, he challenged us to move beyond a "systematic study of a series of interesting past events in isolation" and to understand the development of affairs over periods of time and across regions" (Muckelroy1978:226).[14]

Another seminal push to counter the field's perceived theoretical deficiencies came in 1982 when a group of archaeologists congregated at the School of American Research to discuss the intersection of shipwrecks, archaeology, and anthropology (see

[13] In some respects, historical archaeology faced similar concerns regarding a theoretical perspective and its own portrayal as merely a handmaiden of history (see Harington 1978; South 1977)

[14] The first model specific to the site formation processes of marine environments was developed by Muckelroy (1978) in the late 1970s. Although his model (conceived specifically for shipwrecks) was narrow in focus, its main tenets describe the principal forces acting on wrecks, thus transcending his imposed boundary "shipwreck" and applying it to all submerged sites. Central to Muckelroy's model, two processes—scrambling and extracting—are operative on every site. Extracting filters (e.g. wrecking, salvage, and disintegration) are those forces that lead to the loss of material from a site. Scrambling refers to forces causing a rearrangement of the "constituent parts arranged in a specific order" that make up a site just prior to its entering the archaeological record (Muckelroy 1978:169). Examples of scrambling include the wrecking of a vessel, where artifacts are often displaced from their original position, and the shifting of materials over time due to environmental action.

Gould ed. 1983). The gathering included pioneers in the field of underwater archaeology, as well as terrestrial archaeologists. The group was pointedly diverse in research orientation, including representatives of the historical, classical and anthropological traditions in archaeology, as well as researchers with foci in ethnoarchaeology and cultural resource management. The seminar's discussions underscored differences in the perceived objectives of underwater archaeology, as well as important epistemological and methodological divides between terrestrial and underwater archaeology. While the participants uniformly recognized the unique potential of underwater research, many also underscored its unrealized potential. The contributors also outlined directions for future work that would allow for greater synthesis and wider frame of reference.

The conference participants identified several goals necessary for the further development of the field. These were to direct archeologists investigating shipwrecks to implement stringent research designs emphasizing systematic sampling, regional perspectives, problem-oriented excavation, and ethnoarchaeological approaches. The aim, many of the participants argued, was an understanding of shipwrecks as purveyors of human behavior with the objective of positing generalizations about the past and present. Inherent in many of the papers was a explicitly nomothetic—hypothetical deductive—approach to data collection and evaluation.

For the seminar's participants, the push for the nomothetic interpretation of shipwreck sites was reactionary, a move to counter what they saw as the predominance of particularistic interpretation in shipwreck archaeology that lacked wider context and theoretical synthesis. Shipwrecks were investigated for their intrinsic value, an emphasis was given to spectacular objects, and the literature resulting from these excavations was primarily descriptive in nature.[15] While the authors of *Shipwreck Anthropology* recognized the value of such particularistic studies—the development of chronologies and typologies, for example—they vehemently argued that these were not ends in and of themselves. In opposition, they called for a generalist approach incorporating shipwrecks and their archaeological material into our understanding of large-scale cultural processes such as trade, warfare, consumption, and culture contact.

Unfortunately, the immediate impact of *Maritime Archaeology* and *Shipwreck Anthropology* was negligible as little else was published during the remainder of the decade that either incorporated their central tenets or posited new challenges. A resurgent push for underwater archaeology's inclusion into mainstream archaeology and new interpretations of its engagement with broader theoretical topics emerged in the 1990s. In 1993, Gale (1993) attempted to show how maritime studies could and should be properly situated in archaeology through the adoption of a framework of intersecting planes—subject of study, source for study, process of study—which she termed hydroarchaeology.[16] Two years later, Cederlund (1995:12) argued that "it is essential that scholars in maritime studies continue to broaden our understanding of the maritime sectors of society, without isolating themselves or their results from mainstream archaeology." He went on to call for a continuous discussion of theoretical aspects which he saw as the same for both marine and terrestrial archaeology. Similarly, he suggested an integration of marine archaeology university studies with mainstream archaeology. In Europe, two new concepts concerning the field's orientation emerged sparking theoretical

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[15] A similar conclusion was drawn by Gifford et al. (1985:374). In a critique of articles published in the *International Journal of Nautical Archaeology* from 1972-1982 they noted that "most published articles…consist of single site excavation or survey reports" and that "there is a severe lack of interpretive, analytic, or synthetic work based on comparison or deduction from many sites."

[16] Gale's concept of hydroarchaeology never appears to have caught on.

debate: the maritime cultural landscape (Cederlund 1995; Crumlin-Peterson and Munch-Thye 1995; Firth 1997; Jasinski 1993, 1999; Maarleveld 1995; McErlean et al. 2002; Myhre 1985, Westerdahl 1992, 1994) and the idea of the ship as a symbol (Cederlund 1994, 1995; Crumlin-Peterson and Munch-Thye 1995; Wedde 1996, 2000; Adams 2001; Gibbins and Adams 2001), while some practitioners in the United States continued the hypothetico-deductive, processual stance of the previous decade (Babits and Van Tilburg 1998; Gould 2000 12-20). And, for the first time since Muckleroy (1978), new models regarding site formation processes emerged (Stewart 1999; Ward et al. 1998, 1999).

One of the reasons for the slow development of theory in underwater archaeology and its scholars' detachment from conventional archaeological paradigms rests with the intellectual milieu in which it developed. Beginning in the late 1970s programs such as the Institute of Nautical Archaeology at Texas A&M, the Program in Maritime Studies at East Carolina University, and the Maritime Studies program at St. Andrews University (Scotland) sought to expand the academic pursuit of submerged archaeological sites, continue developing methodological techniques, and provide formal training to the next generation. While these programs, as well as subsequent ones, have served a monumental role in the professional development of the field, advancing our understanding of past maritime activities, and preserving our cultural heritage, their isolation from mainstream archaeology perpetuates the perception of an atheoretical rogue subfield. Only one program was affiliated with an anthropology/archaeology department, faculty were overwhelmingly made up of specialists, and the curricula focused on methodology, maritime history, conservation, and ship construction while conspicuously void of the traditional anthropological/archaeological method and theory required for an advanced degree in other archaeological subfields.[17]

These factors still impinge on the field's theoretical advancement and approach to shipwreck archaeology today. While today's underwater archaeologists are highly trained professionals, the world's waterways continue to remain the domain of recreational divers and many sites are susceptible to legal plunder. Therefore, site protection continues to be a primary goal of the field and many practitioners choose advocational outreach or cultural resource management over theoretical debate. In the United States, the majority of the academic programs training underwater archaeologists remain segregated from anthropology departments either physically or in their core curriculum, and few underwater archaeologists hold positions in a department outside these specialized programs. Coincidently, although a theoretical discourse in the field has been steadily growing since the mid-1990s, the overwhelmingly majority of this discourse is from Europe and Australia and very little has been contributed by scholars in the US (e.g. Adams 2001; Babits and Van Tilburg 1998; Cederlund 1994, 1995; Crumlin-Peterson and Munch-Thye 1995; Delino-Musgrave 2006; Flatman 2003; Gibbins and Adams 2001; Jasinski 1993; Maarleveld 1995; McErlean et al. 2002; Staniforth 2001, 2003a, 2003b; Wedde 1996, 2000; Westerdahl 1992, 1994;). Furthermore, many underwater archaeologists chose to remain outside the theoretical discourse of mainstream anthropological/archaeological journals, publishing much of their work in specialized journals such as *International Journal of Nautical Archaeology* or the *Journal of Maritime Archaeology*, the pages of which are full of descriptive reports

[17] Of the original three programs, only the Institute of Nautical Archaeology at Texas A&M was affiliated with that university's anthropology department.

and methodological papers. While they have garnered acceptance into the Society for Historical Archaeology, their work has been predominantly absent from other professional organizations such as the Society for American Archaeology and the American Anthropological Association.

Since the mid-1990s, however, a sustained advocacy and a substantial contribution to the development of theoretical frameworks in maritime archaeology has come from Mark Staniforth (1995, 2001, 2003a, 2003b). Notably, through what he has termed the "archaeology of the event," Staniforth (2003a:19) seeks to shift the focus of shipwreck archaeology from "a site specific level to more general considerations of human behavior, cultural continuity and change over time." This analytical framework is built upon several key tenets of the French *Annales* school of history. First, is an interdisciplinary approach to the past that draws from a variety of fields—history, sociology, geography, psychology—in addition to archaeology and anthropology for the formulation of research agendas, interpretive models, and conclusions. The second is Braudel's three scales of history: the short-term concerned with *événements* (events) or individual time, the medium-term of *conjonctures* (processes) or social time, and the *longue durée* focused on *mentalitiés* (structures) or geographical time.

This interconnected, tripartite division of history provides a mechanism by which maritime archaeologists may move beyond the specifics of the site (Staniforth recognizes shipwreck sites as the archaeological remnants of the event) to the examination of cultural processes and structures. And this leads to the last tenet, which is found among the writings of members of the third and/or fourth generation of *Annales* scholars, such as Jacques Le Goff (1980) and Emmanuel Le Roy Ladurie (1978), whose works focused largely on the lives of ordinary people. Examining the interactions between variable time-scales, this later generation refocused their attention away from the *longue durée* in turn recognizing the event as a valuable source of information on people's world views. As an example, Staniforth (2003a:28) cites Ladurie's (1978) classic work *Montaillou: The Promised Land of Error* in which a detailed series of events surrounding the fourteenth century Inquisition in southern France reveal the underlying culturally determined attitudes, behaviors, and relationships that synthesize the *mentalities* or world views of medieval French peasants. Similarly, in the "archaeology of the event," Staniforth argues that shipwrecks offer a way to examine larger-scale processes and underlying *mentalités*. It is "by incorporating the event into the longer-term, and the larger scale (*conjonctures, mentalités*, and the *longue durée*) that maritime archaeology potentially has some of its most powerful explanatory value" (Staniforth 2003a:30). Methodologically, this is achieved by comparing particular events (i.e. multiple shipwrecks) so as to assess change over time, and, more importantly, by drawing forth generalizations about the cultural processes entangled within any particular case study.

In the "archaeology of the event" Staniforth rightfully has recognized the need for maritime archaeologists to move beyond the particulars of the event and simple description, a sentiment shared by my own multi-scalar approach. Yet, while he recognizes the Pompeii premise/time-capsule aspect of shipwrecks as the material remnants of singular events, he is seemingly dismissive of this quality in his zeal to address large-scale cultural processes. Accordingly, Staniforth notes that a focus on the uniqueness or singularity of the shipwreck event lends itself to the criticism of shipwreck archaeology as simply being "historical particularism." He worries that this "leaves the archaeology of the event potentially open to the challenge that it has little of relevance in anthropological scholarship or to an understanding of culture" (Staniforth 2003a:30). Although correct in both points, maritime archaeologists in pursuit of processes should take caution so as to not throw the baby out with the bathwater. Yes, shipwreck sites should be examined through an anthropological lens and, yes, the movement of our studies beyond mere description and cataloguing to an understanding of processes is long overdue, but let us not forget that the utility of shipwrecks in this endeavor is the very fact that they are individual and unique time-capsules, a rare phenomenon in other archaeological contexts. Contextualized properly, the particularism of the event can be a very powerful tool in the study of past cultures.

Here, I believe, microhistory offers a better entre into interpretation. First, the *Annales* school is most often associated with founding members such as Marc Bloch and Lucien Febvre or its second generation, notably Ernst Labrousse and Fernand Braudel, than its later generations. Second, despite conceptualizing a historiography of multivariate timescale, many of the school's practitioners emphasized the medium or long-term over the event. Braudel (1972a:1:21) once described a *histoire événementielle* (the history of the event) as merely the history of "surface disturbance, crests of foam that the tides of history carry on their strong backs." And although he would come to acknowledge the utility of small-scale observations in our understanding of large-scale structures, he remained wary of the event, that "most capricious and deceptive form of time" (Braudel 1972b:14-15, 1979).

In contrast, microhistory emerged in Italy in the 1970s as a response to the *longue durée* serial history dominant in the French *Annales* school (see Ginzberg 1993; Ginzberg and Poni 1991; Muir 1991).[18] Although both schools of thought shared a common agenda focused on the history of commoners, microhistorians rejected the quantitative methods and historical demography of the *Annales* approach, choosing instead a focused detailed analysis of smaller-units. Its practitioners urged a return to narratives and sought hidden meanings embedded in cases (Walton et al. 2008:4). The phenomena of individuals, families, small communities, or even a single event reveal diversity, anomalies, and the subjectivity of the motives that underlie decisions and actions. Yet, this self-conscious reduction in the scale of observation should not be confused with a preoccupation of local and small-scale systems. As the microhistorian Giovanni Levi (2001:101) points out "it becomes immediately obvious that even the apparently minutest action of say somebody going to buy a loaf of bread, actually encompasses the far wider system of the whole world's grain markets." Instead, this reduction of scale is an analytical procedure, an "explanatory stance" meant to reveal previously unobserved factors (Levi 1991:95-97; Maddox 2008). As Roger Chartier (1982:32 cited in Walton et al. 2008:5) observed "it is on the reduced scale, and probably only on this scale, that we can understand without deterministic reduction, the relationships between systems of beliefs, of values and of representations on one side and social affiliations on the other."

The conceptual vantage and methodological approaches afforded by microhistory provide a useful way of conceptualizing the multiple scales of analysis needed to synthesize the results of underwater archaeology. As the material remains of an event, shipwrecks offer archaeologists unique insight into the local, the specific, and the incident. Yet, microhistory teaches us that our fine-grained, detailed analysis need not be

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[18] Since its inception microhistory has been heavily aligned with the *histoire des mentalités* of the French *Annales* school, the German *Altagsgeschichte*, and historical anthropology.

confined by this. Rather than being a constraint, the minutia of the site and the reduction of scale can be our analytical procedure. This is the stance taken by a multiscalar approach to shipwreck studies.

2.2 Contextualizing Social Change Through Scale

Archaeologically, especially in North America, the study of cultural contact between Europeans and non-Europeans has largely become the focus of historical archaeology; however, the emphasis of much of this work has been Eurocentric in both its questions and the principle findings suggest a critical disjuncture between historical archaeology and the study of the indigene (see Lightfoot 1995). One likely explanation for this phenomenon lies in the fact that historical archaeology is defined by some of its practitioners as the study of European expansion into the non-western world, or the genesis of global capitalism (Deetz 1977, Orser 1996). When coupled with a reliance on a documentary record (largely European in origin) that provides limited insight into those indigenous populations encountered, it is easy to understand historical archaeology's European prevalence.

With regards to African archaeology this conception of historical archaeology has been critiqued as limiting, while the lack of documentary sources for much of the continent until the nineteenth century bolsters, rather than detracts from, a strong archaeological interest in the indigene (Agbaje-Williams 1986; DeCorse 1996; Pikirayi 1999). An historical archaeology driven by a methodological reliance of multiple sources (i.e. archaeological, historical, oral) rather than a restrictive topical definition has proven to be a successful tool in studying transformations in African societies, especially during the period of African-European contact. Most notably DeCorse’s (2001a) and Stahl's

(2001a) recent works examining African societies during the period of the Atlantic World have sought to "understand how non-western societies [African] mitigated, transformed or reshaped imported ideas, technologies, and economies in a myriad of different ways" (DeCorse 2006). Approaching the interpretation of the archaeological record from this perspective has allowed for the contextualization of the appearance of European trade goods and changing African social structures through an understanding that "European objects were entangled in local cultures and ascribed with multiple meanings and values" (DeCorse 2006).

This perspective, one giving credence to indigenous agency, is particularly relevant to the study of African-European relations along Ghana's Gold Coast and the concomitant changes that took place over 500 years of cultural contact. As DeCorse (2001a:12) has noted "although European interaction in West Africa can be painted in broad strokes, active agency on the parts of African societies in shaping the nature of the contact setting and the diversity of the interactions that occurred needs to be underscored." While popular, highly generalized perceptions of a European domination over passive African tribesman still abound; localized histories in which power and relations are understood as fluid and susceptible to change over time reveal a different story. A European dominated colonialism eventually did take hold in the later part of the nineteenth century, but much of the European-African contact prior to this (especially prior to 1650) was predicated on African desires.

Trade brought Europeans to Africa and it was in this arena that African-European activities took place. As such, many researchers have framed their examination of African-European relations over the past 500 years in terms of economic impact studies and changing trade relations (Austen 1987; Curtin 1975; Dike 1966; Gemery and Hogendorn 1979; Henige and McCaskie 1990; Hopkins 1973; Polanyi 1966; Wallerstein 1986; for Ghana, see Daaku 1970; Kea 1982; Priestley 1969; and Reynolds 1974). One of the more prevalent models for understanding the incorporation of non-western states into the world economy has been Immanuel Wallerstein's (1974, 1980) world-system theory. World-system theory was developed as a way of conceptualizing the political and economic connections that have shaped the modern world—specifically the development of capitalism and its role in European expansion—over the past 500 years. As such, archaeologists interested in the examination of European expansion and the relationships of non-western societies and the world economy have long recognized world-system theory as a framework for their studies (Baugh 1991; DeCorse 2001a; Dunaway 1994, 1996a, 1996b, 1996c, 1997; Hall 1986, 1987, 1989a, 1989b, 1991; Peregrine and Feinman 1996; Harris 1990; Kardulias 1990; Mathien and McGuire eds 1986; Meyer 1990, 1991, 1994; Peregrine 1992, 1995; Faiman-Silva 1997; Himmel 1999).

Two of its most useful applications are as a contextualizing agent for the appearance of European trade materials in the archeological record and as a facilitator of comparative analysis at a global level. The allure of such a model is its ability to provide a macroscopic vantage of the contact setting in which the political, economic, and historical processes shaping European expansion over the past 500 years are brought to the forefront in an almost nomothetic conceptualization. However, while a globalized macro-scaled model provides an important and necessary contextualization of African transformations during the period of contact, it falls short in its explanatory value when it comes to internal developments of African societies. As DeCorse notes: "In fact it is precisely at the point where world-systems perspectives stop and are least informative that archaeological analysis becomes most useful: the documentation of local trajectories of social and cultural change" (DeCorse 2006).

Understanding how change occurs is best examined through case studies or individual societies. Though macro-scaled models such as world-system theory are useful tools for conceptualizing these changes globally, they fall short as an explanatory model that sees indigenous agency as an equal precipitator of change. As Wolf (1982:23) first pointed out world-system theory suggests a "top down" model of cultural change whereby developments in the core, transmitted to and amplified in the periphery, drive cultural change. Therefore, a multi-scalar archaeological approach, one utilizing both micro and macro conceptions of history in the examination of African transformations over the past 500 years provides the contextualization of macro-scale models while addressing change on a micro-scale. With regards to my specific research, the micro-level study of European shipwrecks and their associated cargoes, once contextualized through macro level models, can elucidate our understanding of African transformations as well as those of their European counterparts.

While Wallenstein’s world system theory and Braudel's (1981, 1982, 1984) three scales of history recognize multiscalar action, they focus on macroscalar explanations of cultural change. In opposition, some archaeologists have adopted a multiscalar approach that sees both macro and microscalar explanations as preceptors of change (Ames 1991; Lightfoot 1995; Lightfoot and Martinez 1995; Lightfoot et al. 1998; Little and Shackel 1989; Marquardt 1989, 1992; Marquardt and Crumley 1987a; Wilkie and Farnsworth 1999). In archaeological terms, Marquardt and Crumley (1987b:2) have defined scale as "the grain of the unit of analysis relative to the matrix as a whole" while an effective scale is "any scale at which pattern may be recognized and meaning inferred."[19] In broader social terms, people operate in a world of varying scales whether it be the individual, family, state that are interconnected through a series of complex relationships (Marquardt 1992; McGuire 2002:138). A multiscalar approach to archaeological research recognizes this plurality of scales and adapts it to one's research. As an operative, a multiscalar approach provides fluid movement between micro and macroscalar vantage points resulting in the elucidation of multiple patterns from a single archaeological context. Utilizing multiple scales of analysis allows for multiple contextualizations of singular archaeological data. It understands that neither the individual (microscale) nor the structure (macroscale) can exist, one without the other, or as Yentsch (1990:24) notes, "one cannot understand the parts of an entity without some sense of the whole which they compromise nor can one comprehend the whole until one has seen the parts from which it is made." A multiscalar approach is a way by which archaeologists can move from the sites they study to the wider world in which these sites are situated (Marquardt 1989,1992).

The use of multiple scales in archaeological research is largely rooted in an opposition to what some have seen as an overemphasis by archaeologists on macroscalar theories as explanatory models of social change. While multiscalar practitioners largely recognize the benefits of contextualizing archaeological sites and observed phenomena through large-scale drivers of cultural change like world systems, they have also criticized their deficiencies. These include an ignorance of both indigenous and individual agency, a failure to recognize a multiscalar world, and a reductionist approach

[19] For a review of the concept of scale and its numerous uses in anthropology see (Marquardt 1985:69-70).

to social processes. Many who employ a multiscalar approach in their work have followed Wolf's (1982:23) lead, criticizing Wallerstein's approach for his emphasis on core domination/periphery subjugation that seemingly ignores aspects and developments unique to the periphery and its effects on the core. However, through the use of a multiscalar approach "research can be undertaken that considers the mediation of the world system at the local level" (Lightfoot and Martinez 1995:477). An understanding of how global structures play out on the local level gives credence to the role of individuals as active agents rather than passive participants (see Wilkie and Farnsworth 1999).

Conversely, working in a single scale often reduces social process to an overarching, juggernaut-like force solely responsible for social change. This way of thinking seems to assume that even if we as individuals were capable of recognizing the forces acting upon us, we are powerless to break free of them. While this concept may play out when viewed in large-scale spatial and temporal ranges, it does not hold up to the scrutiny of a multiscalar analysis. Macroscalar explanations confuse the interconnectedness of process along multiple scales for reducibility. Thus explanations of cultural change can be reduced to large-scale economic models. But, while processes occurring at different scale are interconnected, they are not reducible (Marquardt and Crumley 1987b:2). While the incorporation of cultures into large-scale economic schemes undoubtedly played a vital role in societal change, so too did the individuals that made up that society. Without understanding change on the local scale we will never fully understand it on the global scale.

In a second but related fashion, McGuire (2002: 150-167) sees a multiscalar approach as a way of moving beyond the abstract directional categories provided by cultural evolution (i.e. state, family) to the concreteness of contextualization. His approach allows the researcher to break free of uniscalar abstractions and embrace a history unfolding on multiple scales. In his words, we must "understand each historical instance in terms of its own context and the historical processes that created it. Further, it must allow us to examine the role of human action and struggle by focusing on the relations between social groups and individuals" (McGuire 2002:164).

Once we choose to recognize that people operate in multiple scales then epistemologically we must confront the fact that, as researchers, we think along varying scales. We must, therefore, be cognizant of the role scale plays in our research. The scale we choose to conduct our research in directly affects the results of that research by either allowing or denying us access. As McGuire (2002:170) puts it: "our choice of an effective scale...brackets an area for study, allowing us to view a particular set of social relations, while denying us access to sets visible at other scales." Various scales can provide very different insights into organization principles, worldviews, and identities of individuals, groups, and communities (Lightfoot et al. 1998:202). As a consequence, varying scales of analysis potentially may produce contradictions in our results. These contradictions, however, "rather than showing the inadequacy of either analysis...only demonstrates the complexities of daily life" (Orser 1986:186). They highlight the complexity of social relations between individuals and the whole. The scale we choose to work in is dependent upon research goals; the advantage of a multiscalar approach is that multiple scales provide multiple resolution and multiple answers.

2.3 European Shipwrecks and the Indigene

Due to their ability to transverse great distances with relative ease, ships have served as one of the primary movers of people, goods, and ideas for thousands of years. The significance of this role is perhaps best demonstrated by the fact that "in any pre-industrial society...a ship was the largest and most complex machine produced" (Muckelroy 1978:3). As such, ships and shipwrecks have been recognized by archaeologists as a manifestation of the society from which they were derived (Adams 2001:300; Castro 2005). However, when these same vessels are understood not just as a reflection of their society, but also as vehicles of cultural contact, they can provide valuable information regarding the processes involved when systems communicate and modify each other through contact, a premise crucial to a systematic understanding of culture (Bass 1983:92). Lastly, when placed in the proper context, these vessels also represent the societies for which they were bound, as their cargoes speak volumes concerning the wants and needs of indigenous trading partners.

Shipwreck sites have long been recognized as closed and closely integrated archaeological phenomenon for producing, what Binford (1981:19-20) calls, "fine grained assemblages," as "all associated characteristics of the deposit are consequences of the same event" (Bass 1975; Gibbins 1990:377; Muckelroy 1978). While other site types, such as burials, produce similar results, their inferential value is compromised by the intentionality regarding the selection of the deposited material. Shipwrecks therefore are rather unique as they represent a contemporaneous group of materials not intended for discard (Gibbins 1990:377; Gibbins and Adams 2001:280). While a synchronic or time-capsule interpretation of shipwrecks has been critiqued as historically particularistic and consequently irrelevant to anthropological studies (see Gould 1983, Martin 2001:384; Staniforth 2003a), it is this very attribute, when properly contextualized as a part of a wider system—whether trade, communication, technology, etc.—that makes it a powerful tool for the study of human behavior. In addition to providing tight temporal control for assemblages, shipwrecks provide a rare freeze-frame of the cultural processes for which they were tools. Furthermore, when expanded to a regional level, multiple shipwrecks provide a series of "synchronic snapshots of material culture over a given period," providing archaeologists with an interplay between static events and the dynamics of cultural processes (Lenihan 1983:57). Regional studies of shipwrecks provide invaluable insight into trade by elucidating commodity patterns and revealing fluctuations in the intensity of traffic over time with a clarity far exceeding anything comparable from land sites alone (Parker 1992; Adams 2001:299).

The delicate interplay between synchronic historical particularism and the elucidation of broader cultural processes can be achieved through the incorporation of a proper theoretical framework in the study of shipwreck sites. The potential of shipwreck sites to advance our understanding of large-scale cultural processes—especially colonialism, capitalism, and consumption—is long in recognition, but short in results (Bass 1983; Gibbins 1990; Gibbins and Adams 2001; Gould 1983; Leone 1983; Martin 2001; Murphy 1983; Schmidt and Mirozowski 1983; Staniforth 2001; Watson 1983).

Recently, however, archaeologists have successfully demonstrated the utility of shipwreck assemblages in broadening our understanding of these processes. Although adhering to a historical particularistic approach often overlooked because of its long-term and detailed analysis of materials, such processes are implicit in much of the work conducted by archaeologists from the Institute of Nautical Archaeology and Texas A&M University. For example, Bass' (1967) work on the Cape Galidonya shipwreck revolutionized our understanding of trade patterns in the Bronze Age Levant. Likewise, the analysis of the materials recovered from the Uluburun site—including the ship's construction, founding of the copper ingots, provenience of resinous materials, capacities of the amphorae, and the systems of weights and measures used on board—has contributed greatly to what is known about Bronze Age trade in the Mediterranean (Bass 1986; Bass et al. 1989; Pulak 1988, 2001, 200, 2002, 2008; Stern et al. 2008). The seventh century Yassi Ada site has provided a fine-grained, detailed reflection of Byzantine trade, the analysis of which has been framed within a broader cultural and political context (Bass et al. 1982). More recently, in his analysis of the Pepper Wreck—a seventeenth century Portuguese Indiaman wrecked at the mouth of the Tagus river—Castro (2005) contextualizes the vessel's construction within the worldviews, objectives, and technologies available to the people who built and sailed it. Using the vessel as an interpretive lens, Castro successfully demonstrates the correlations inherent between the Indian trade, vessel production, and technology.

A more explicit approach to the study of large-scale cultural process through the archaeological investigation of shipwreck sites is most notable through the "archaeology of an event" (Dellino-Musgrave 2006; Staniforth 2001, 2003a, 2003b). Incorporating an interdisciplinary approach to the past, these archaeologists have drawn upon Braudel's (1981, 1982, 1984) three scales of history—*evenements, conjonctures,* and the *longue duree*—as a framework for raising the focus from a site-specific level to a more general consideration of human behavior over time. However, the unidirectional movement from micro (shipwreck) to macro (cultural processes) successfully achieved by Staniforth and Dellino-Musgrave is only one side of the equation. In both of their studies, the archaeologist worked with assemblages from identified shipwrecks; in Staniforth's case, the *William Salthouse*, *James Matthews*, and *Eglington* and in Dellino-Musgrave's, the *HMS Swift and HMS Sirius*. When confronted with a regional study like the proposed Elmina project, where multiple unidentified shipwrecks may be present, researchers must work from both sides of the equation. Utilizing macro-scale historical generalizations (i.e. trade patterns, cargoes, ship, and artifact characteristics) archaeologists can identify and interpret the micro-scale event (nationality, date, vessel name, wrecking event) in preparation for an examination of large-scale social processes. In this manner, the archaeologist engages in a dialectical interplay of multiscalar interpretations where macro contextualizes micro while micro elucidates the macro.

Examination of global capitalism and the intersection of Europe with the non-western world has emerged as a major focus in the social sciences (e.g. Cusick 1998; Lightfoot 1995; Lightfoot et al. 1998; Orser 1996; Sahlins 1981; 1985; Stahl 1999, 2001a, 2001b; Stein 2005; Wolf 1982; Wallerstein 1980, 1986). Archaeological research has focused on the ways in which indigenous societies were dramatically transformed by interactions with Europe, yet recreated in distinctly indigenous ways. Although the impact of an increasingly Eurocentric global economy is manifest, a great deal of research has demonstrated how non-Western societies mitigated, transformed, or reshaped imported ideas, technologies, and economies in a myriad of different ways. While underwater archaeologists have successfully engaged the examination of global capitalism through the study of shipwreck sites, their work remains Eurocentric in focus.

Due to its subsequent failure to engage its data with regard to indigenous societies, this debate remains outside the realm of underwater archaeology.

The Central Region Project's underwater component has sought to break new ground by examining European shipwrecks and their associated cargoes in terms of their impact on indigenous societies. This is achieved in two ways. The first, which I call the *transitive approach*, is through the collaboration of terrestrial and underwater archaeologist working on the Central Region Project. Similar to Lightfoot's (1995) symbiosis of prehistoric and historic archaeologies for a more complete understanding of culture contact in North American archaeology, a symbiosis of terrestrial and underwater archaeologies, each with their own unique data-sets, will provide a more complete understanding of indigenous transformations during the period of European-African contact. Materials recovered from shipwreck sites can often be precisely dated through their association with a specific wrecking event. Due to the specificity with which the archaeology of the event (i.e. shipwreck) provides, they provide a greater degree of temporal control with the potential to provide a more concise understanding of the rate of change when compared to similar items encountered on terrestrial sites. In addition, precisely dated European items can be used to date associated objects of African manufacture, such as metal vessels, gold weights, beads, and ceramics (DeCorse 2001a:6). The second, or what I call the *associative approach*, examines the data recovered from wrecks in terms of contemporaneous social changes, both indigenous and non. In this manner, static artifacts captured in the event are understood as a representation of the ongoing dynamics of social change which are in a constant state of flux. European trade sites, including shipwrecks, not only offer insight into European trade goods, but also speak to the overarching social, political, and economic structures enmeshed with this process while communicating the desires and tastes of coastal Africans who played a key role in West African markets (see Akyeampong 1996; Alpern 1995; Metcalf 1987a, 1987b; Richardson 1979). European objects were "entangled" in local cultures, ascribed with multiple meanings and values, and helped to redefine local crafts, industries, and technologies (e.g. Thomas 1991; DeCorse 2001a:175-192). Thus, commodity shifts visible in the archaeological record of shipwrecks are understood as a manifestation of associated social, political, and economic changes in either or both of the parent cultures. The central role of material culture in mediating these exchanges underscores archaeology’s special contribution to the social history of cross-cultural encounters.

2.4 Conclusion

A correlation exists between the political and economic transformations occurring along the Gold Coast during the Atlantic Age and transitions in the commodities that drove the African-European exchange. Furthermore, the transitions in commodification and therefore, the transformations in society are most recognizable archaeologically through the study of submerged cultural sites in the form of European shipwrecks and their associated cargoes. The remains of European vessels and their associated cargoes are not only the purveyors of a European history, but also have the potential to speak profoundly of the societies for which the trade goods that filled their hulls were bound. As archaeological sites, these vessels can broaden our understanding of indigenous transformations resulting from cultural contact and the incorporation of non-western societies into the developing world economy. The temporal specificity that may be ascribed to European artifacts recovered from shipwrecks can provided tight chronological control compared to similar objects occurring in terrestrial indigenous sites. These controls provide both a more accurate timeframe, and a rate of change. The artifact inventories of wreck sites must be understood not only from the standpoint of the societies that produced them but also in a context of the societies for which they were bound. This gives credence to indigenous agency in a cross-cultural milieu. Using a multi-scalar approach allows researchers a way to navigate between the archaeology of the event—where change is most recognizable—and the contextualization provided by the *longue durée*. This relationship is dialectical in that the contrasting perspectives facilitate the understanding of each other.

CHAPTER THREE: EUROPEAN MARITIME TRADE ON THE GOLD COAST (1471-1873): A HISTORICAL CONTEXT

The focus of this chapter is the interactions between Africans and Europeans along coastal Ghana between the fifteenth and the nineteenth centuries, with particular regard to the maritime trade at Elmina, West Africa's principal European trade entrepôt. *Castelo de São Jorge da Mina*, founded by the Portuguese in 1482, was the center of Portuguese trade on the West African coast until the fort was captured by the Dutch in 1637, and the castle subsequently remained the Dutch headquarters in West Africa until it was ceded to the British in 1872. The town's longstanding prominence among European entrepôts is a testament to its importance in the intersection of West African commerce and European maritime traffic. Other European nations traded at Elmina and elsewhere along the West African coast, but because of the principal role Elmina played for the Portuguese and Dutch this discussion focuses on their maritime trade.

Framed within the archaeological investigation of two associated European shipwrecks, the historical study of trade at Elmina provides a broad overview of the commercial and political movements of European maritime commerce. Concomitant with lesser known and more poorly understood indigenous social, political, and economic transformations, they provide a generalized context within which both sites are to be interpreted. Archaeological evidence suggests that the Ghanaian coast and immediate hinterland remained peripheral to many of the important developments of the first millennium A.D., the larger settlements being located in the interior (DeCorse 2001a:18). Prior to European contact these interior settlements were indirectly linked by a thriving trans-Saharan gold trade to a burgeoning European world-system (Braudel 1981, 1982, 1984; Wallerstein 1974, 1980; Wilks 1993). Comparatively, coastal villages practiced a subsistence economy utilizing lagoonal resources that supported a population density that was quite small. Although empirical evidence is limited, politically, small coastal polities were likely included in the larger sphere of interior settlements. After African-European contact, cores of political power emerged along the coast and small coastal villages like Elmina emerged as large population centers (DeCorse 2001a; Elbl 1986:375-415; Hair 1994b; Vogt 1979). The impetus for such socio-political transformations was rooted in the reorientation of the trans-Saharan trade southward to Europeans on the coast and the subsequent shifts in the centers of trade that began with the arrival of the Portuguese in the late fifteenth century.

3.1 Europeans in West Africa: Venturing Southward, Ceuta to Elmina

European expansion and the subsequent emergence of the Atlantic economy began on the African coast (Blake 1977; Boxer 1969:15-38; Ellis 1969:12-33; Smith 1993). With the settlement and development of the Atlantic islands of Madeira, the Azores, and the Canaries between 1340 and 1427, Portuguese expansion looked southward to Africa. In 1415, King D. João I of Portugal obtained a permanent foothold along the African coast with the capture of the Moor controlled city of Ceuta, located in modern day Morocco. Following the fall of Ceuta, Portuguese sailors pushed southward undertaking a series of reconnaissance forays along the African coastline to Cape Bojador. Dating as far back as ancient times, this Cape stood as the mythical point of no return for sailors, for beyond this point it was believed that the earth became so hot that the waters boiled and men's skin turned black. In 1433, the Portuguese mariner, Gil Eanes, rounded Cape Bojador, opening the door for southern exploration and eleven years later, Nuno Tristão reached the mouth of the Senegal River, the northern boundary of populous sub-Saharan Africa.

In 1460, Portugal's leading maritime benefactor, Prince Henry, died initiating a brief period of stagnation for Portuguese exploration; however, by 1469, exploration of the African coast resumed when the Portuguese crown leased the Guinea trade beyond Sierra Leone (the furthest boundary at the time) to Fernão Gomes. In exchange for a five-year monopoly, Gomes agreed to pay the king an annual rent of 200,000 *reis* and explore one hundred leagues further along the coast. Gomes' subsequent explorations led to the European discovery of the Gold Coast and the beginning of over five hundred years of European-African trade relations in this region.

When they arrived on what is now coastal Ghana in 1471, Portuguese merchants found a pre-existing West African markets offering a variety of commodities including gold, ivory, peppers, kola-nuts, and slaves.[20] In terms of profitability, however, the commodities were not equal: at the time the European market for slaves was small; there was little demand for kola-nuts; West African pepper was inferior to the East Indian version Europeans were already accustomed to; and the ivory trade was unreliable because it took time for it to accumulate on the coast. Conversely, gold was readily available and highly prized by Europeans. Thus gold became West Africa's chief export commodity, and coastal Ghana, its chief regional exporter (Fage 1969:54).

Following a pattern developed during the previous fifty years, the Portuguese sought to establish and maintain a monopoly on the Gold Coast trade. But news of the lucrative gold trade spread rapidly through Europe enticing rival nations to break

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[20] For a detailed discussion concerning preexisting markets see (Garrard 1980:1-37; Hair 1994b:3; Wilks 1993:1-40)

Portugal's monopoly. Portugal's Iberian neighbor, Spain, was the first to challenge their claim. Almost immediately following Portugal's discovery of the Gold Coast, Castilian ships began arriving along the coast, siphoning away trade.[21]

Initially, trade between Europeans and Africans on the Gold Coast took place aboard ships anchored off the various African settlements encountered while proceeding along the coast. It did not take long, however, for the Portuguese crown to realize the advantages offered by a permanent base. In addition to acting as a deterrent to interlopers who were arriving in greater numbers each year, a fortress allowed for the accumulation and storage of commodities prior to a ship's arrival (DeCorse 2001a:21). Thus, in January of 1482, twelve Portuguese vessels under the command of Diogo de Azambuja, arrived at Elmina with a contingent of soldiers, servants, masons, carpenters, and craftsman.[22] The rocky peninsula on which the fort was to be constructed provided a defensible position, while the adjacent Benya Lagoon and natural depression along the coastline provided an area for careening vessels and a relatively protected anchorage. The development of Elmina as a longstanding permanent headquarters for trade along the Gold Coast must be closely linked to its facility for shipping. A natural harbor, extremely rare along Ghana's rocky coastline, is created by an extreme curve in the coastline. Some historic accounts went as far as proclaiming it the best and most secure on the whole coast; and the River Benya, which empties into the bay behind the fort, was said to admit ships upwards of 100 tons (*Koninklijk Instituut voor Taal-Land-en Volkenkunde* [Kon. Inst]. Leiden. Report of Jan Vlakenburg, September 1659. H65a. cited in Porter 1974:14; Also see Barbot 1992:374).

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[21] By 1481, some twenty Castilian vessels had visited the coast (Hair 1994:2).
[22] For a detailed examination of the three primary contemporary works concerning the founding of the Castle, see Hair (1994).

3.2 Challenges to the Portuguese Monopoly

Although the advantages afforded to the Portuguese by the newly constructed fortification at Elmina were many, the lure of the lucrative West African gold trade remained too great and Portugal's monopoly was soon challenged. As early as the end of the fifteenth century, French corsairs began targeting Portuguese vessels returning home from the African coast. Over time though, French policy shifted from raiding Portuguese trade to the establishment of their own trading networks and by the 1540s individual French merchants began undertaking trading ventures to the Gold Coast (Teixeira da Mota and Hair1988:10; Vogt 1979:96-98). French activities on the coast remained a threat until the middle of the century, when they were supplanted by the English as the greatest threat to Portuguese trade (Ward 1963:71).

French and English vessels trading on the Gold Coast in the sixteenth century were independent enterprises, relying on individual merchants for financing, rather than state sponsored companies. To minimize risk, merchants formed small venture companies whose pooled resources raised enough capital to finance a small number of ships. If the venture was successful, subsequent trips might follow. This system was less regular than the Portuguese state sponsored trade and without state support, neither country attempted to establish permanent positions (i.e. forts or lodges) along the coast during the sixteenth century. The lack of a centralized cohesive effort resulted in the abandonment of the Gold Coast trade by both countries within decades of initiating it. By the 1570s, virtually all French and English activity in Guinea had ceased. Finding the plundering of Spain's treasure fleets and colonies in the New World more lucrative than the Gold Coast trade, both countries focused their limited naval resources to challenging Spain's power in the Americas (Blake 1937:169-172; Fage 1969:56).

New problems arose for Portugal with the union of the Portuguese and Spanish crowns in 1580. Though Portugal retained its autonomy over both its homeland and colonies, it was forced to relinquish its independence in global affairs and adopt Spain's enemies as her own. Portugal, which had maintained positive relations with other European states, abruptly abandoned its peaceful northern-orientated foreign policy, and at once found itself at war with both the United Provinces and England. Further tension arose from Phillip II's embargo on Dutch trade and the subsequent arrest of Dutch ships in Spanish and Portuguese ports from 1585 onward. The Dutch, already a burgeoning maritime power, were forced to develop their own global commerce, as they could no longer rely on Portuguese supply lines (Israel 1989:12-37). What resulted on the Gold Coast was the gradual appearance in the late 1580s and 1590s of a new challenger to the Portuguese trade, the Dutch. After 1590, Dutch vessels could be found trading regularly to the Azores, Madeira, Canaries, and Cape Verde Islands and by 1595, the Dutch had established trading factories as far south as the Senegambia (Porter 1974:10). The earliest record of a Dutch vessel trading on the Gold Coast dates back to 1592, when it was reported that an Amsterdam vessel anchored near modern day Cape Coast (Porter 1974:19).[23]

The Dutch West African trade grew rapidly and by 1598 Dutch trade was flourishing along the Gold Coast. Like their predecessors, for the most part this initial

[23] Due to the porous nature of surviving records, very little is known concerning the early period of Dutch trade on the coast. A possible negative impact on Portuguese trade is evidenced by the fact that the company controlling the crown's monopoly in the late sixteenth century surrendered its claims, citing it was no longer worth the crown's rent.

trade was conducted aboard vessels anchored offshore from the various African settlements. However, seeking to establish more permanent trading relations, the Dutch began establishing small factors along the coast.[24] At Elmina, the Portuguese quickly found themselves hedged by small Dutch trading lodges at Mori, Butri, Kormantine and Komenda (Ward 1963:76). By the seventeenth century, the Dutch maintained a continual presence along the coast.[25] From 1599-1608 over two hundred Dutch ships sailed to West Africa (Israel 1989:61).[26]

As the Dutch rapidly expanded their trade along the Gold Coast, Portugal's waned as a consequence of its Spanish union. From 1609 to 1621, Spain and the United Provinces entered into what has become known as the Twelve Years' Truce. The terms of the treaty, which sacrificed Portuguese interests for Spanish ones, opened large portions of the Portuguese commercial empire to the Dutch in exchange for barring Dutch trade in Spanish America. In addition, the treaty gave legitimacy to Dutch positions on the Gold Coast. Initially, Portuguese policy was to ignore the terms of the treaty, maintain their monopoly, and attack Dutch shipping along the Gold Coast. In 1609, Portugal sent two galleys, a caravel, and a contingent of soldiers to the coast with the intention of harassing Dutch shipping (Porter 1974:25). Two years later the Dutch got their retaliation when they sunk 13 Portuguese ships along Africa's west coast (Porter 1974:12). Following the attack, the Portuguese became more compliant, honored the

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[24] However, the vast majority of trade during this time was still conducted shipboard. Real change in this policy did not come until 1637 with the Dutch capture of Elmina.

[25] It was said that 20 to 25 Dutch ships could be found lying off the Coast at one given time.

[26] Like their Portuguese counterparts, Dutch traders came to the coast largely seeking gold. In exchange, the Dutch provided their African trading partners with the usual European goods: linen and other cloth; copper and iron both as ingots and articles; beads; and other smaller trinkets. A typical ship's cargo from 1610 included the following commodities: 200,000 yards of linen; 40,000 lbs. of copper basins kettles and other hardware; 100,000 lbs. of beads and other cheap articles; and various provisions (Daaku 1970:11; Porter 1974:76). In return, homeward bound vessels carried gold, ivory, wax, pepper, and grains.

terms of the treaty, and allowed the Dutch to establish their first fort, Fort Nassau at Mouri. The Dutch also harried Portugal on land, unsuccessfully attempting to capture *São Jorge de Mina* in 1596, 1603, 1606, 1615, and 1625. In each case, with the help of Africans from Elmina the Portuguese were able to hold off the advancing Dutch force (Chouin 1998:39-45; de Marees 1987:108, 209; Feinberg 1989:30-31; Vogt 1979:148, 155-157, 166-167, 179-184). However, by 1621, the compounded effects of Portugal losing almost an entire fleet, the suspension of harassment to Dutch shipping, the establishment of a Dutch fort, and the Dutch ability to underprice Portuguese goods enabled the Dutch to supplant the Portuguese as the Gold Coast's principal European trading power.[27]

During this early period of Dutch trade (1592-1621), a gradual evolution occurred in the backing and organization of the various trading ventures. At the outset, trading voyages were the enterprises of individuals, but investors, seeing the advantages of shared risk, soon consolidated into small companies. At times, as many as eight Dutch companies were said to be operating along the coast (Garrard 1980:90). Over time, these small companies merged until eventually, following contemporary European commercial trends, a strong nationally backed monopoly for all the Guinea trade was formed. The last step in this commercial progression came on June 3, 1621, with the chartering of the West India Company (WIC). Thus beginning in 1621, a new era of trade, one in which all legitimate Dutch trade on the Gold Coast was channeled through a single entity, was ushered in.

[27] Dutch trade supremacy was manifested in their sheer volume of trade; close to 40 ships a year returning from the Gold Coast supplied practically all of the gold used in the minting of the United Providence's gold coinage (Boxer 1965:21; Garrard 1980:90).

It was not a coincidence that the founding of the Dutch West India Company (WIC) coincided with the expiration of the Twelve Year's Truce. Prior to the truce's expiration, forces inside the United Provinces were conspiring to expand Dutch commercial ventures while at the same time crippling those of their competitors. In the midst of this nationalistic fervor, the WIC was formed and given wide reaching powers and privileges. From its inception, the company was to serve a dual purpose as both a commercial venture, as well as an instrument of war for the state (Boxer 1965:24, 49). Commercially, it was granted a twenty-four year monopoly over an immense portion of the globe including: most of the Western hemisphere, the Pacific Islands as far west as New Guinea, and all of western Africa between the Tropic of Cancer and the Cape of Good Hope. Financial help came in the form of state sponsored subsidies and exemptions from multiple import and export duties. Furthermore, the company was given near complete autonomy to exercise judicial and administrative functions, to declare war or peace and enter into treaties with indigenous states, to maintain naval and military forces, and to acquire possessions. All combined, the WIC had many of the attributes of sovereignty (Porter 1974:58).

The first WIC vessels arrived on the Gold Coast in 1623, it taking two years for the company to secure sufficient capital. Once the initial capital was raised, the company aggressively expanded its African trade, which, from the beginning, provided a large profit margin. In 1624, the WIC sent five ships and three yachts to West Africa with a total cargo valued at ₤60,000.[28] In return, these vessels carried home nearly ₤90,000 worth of gold in addition to considerable quantities of both ivory and pepper (Porter

[28] The term *jacht* in contemporary Dutch accounts denotes a lighter vessel, similar to an English pinnace, with a burden (denoting vessel size) of less than 50 tons.

1974:85). Two years later, the company had expanded its possessions to include nine ships and three large yachts intended for use in the African trade (Goslinga 1971:489).

3.3 Dutch Primacy: The Capture of Elmina and the Rise of the Slave Trade.

As Portuguese, English, and French ventures to the Gold Coast increased competition for African trade, the Dutch looked to retain their position as the coast's dominant European trading power. In 1637, the Dutch took a decisive step toward expanding their dominance of the Gold Coast trade when they successfully captured the Portuguese stronghold, Elmina, largely eliminating their longtime rival on the coast. Elmina remained the Dutch headquarters in West Africa from its capture in 1637 until it was ceded to the British in 1871 (see DeCorse 2001a). Throughout this period Elmina remained the center of Dutch mercantile activity. It was the largest Dutch outpost in West Africa, with the largest staff. Elmina was also the principal place where enslaved Africans were held to await shipment to the Americas. With the capture of Elmina, Dutch policy shifted away from reliance on trading leggers and towards a preference for the establishment of permanent trading lodges or forts (Porter 1974:179).[29] Within just two years of capturing Elmina the WIC had expanded its possessions to include forts at Elmina, Mouri and Shama, lodges at Komenda and Cape Coast, and leggers stationed off Kormantin and Accra.[30]

Elmina Castle, already the most formidable European structure in West Africa, was enlarged and strengthened, surpassing Mouri as the chief Dutch trading entrepôt by 1645 (Porter 1974:253). With control over the mouth of the River Benya, Elmina also gave the Dutch a secure place to refit its vessels and maintain its merchant and military

[29] Ships permanently stationed for trade were called leggers and were differentiated from ordinary cruisers.
[30] As a corollary, we see a rise in WIC shipping activities as they gained more possessions along the coast; five ships were recorded in 1639, eight in 1640 and thirteen in 1641 (Porter 1974:196).

fleet. Described as being “10-11 feet deep at its mouth” the river was capable of receiving vessels of “100-120 tons, which enter it in order to be caulked and careened” (Barbot 1992:374; also, see Porter 1974:14). By mid-century a series of warehouses erected on the river’s bank opposite the castle house the company’s naval and ships-carpenters’ stores. About this same time, the Dutch erected the town’s first bridge spanning the river. Of course it had a “break in the middle [forming a drawbridge] to let ships pass further up the river in order to refit” (Barbot 1992:380). Additional forts were erected at Shama and Butri in place of pre-existing small trading posts while new lodges were constructed at Accra, Anamabu, Kormantine, and possibly Cape Coast (Ward 1963:81).[31] [32]

The mid-seventeenth century also saw an expansion of the burgeoning slave trade. WIC involvement in the West African slave trade dates back to the 1620s. Initially, operations were of a small scale, as the Dutch lacked a significant market for this commodity. This changed in 1630 when the Dutch captured lands in the Pernambuco province of Brazil, "then the richest sugar-producing region in the world" (Boxer 1957:32). Further conquests in 1633 and 1635 provided an even larger market and the increased demand for Dutch slaves reverberated across the Atlantic, manifesting itself in

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[31] Commodities purchased at the outpost were sent to Elmina (Daaku 1970:14).

[32] The 1640s also saw a widening of Dutch trade through the expansion of both the regional Gold Coast trade as well as a widening amount of subsidiary trade along the Ivory and Slave Coasts. The expansion of Dutch trade was twofold, first and foremost it increased company profits, yet at the same time it decreased those of its competitors. In 1640 the Dutch began trading in Sierra Leone redwood, rendering it less profitable for the English, and in 1641 with the capture of Portuguese São Tomé, the Dutch entered into the sugar trade closing it to English shipping. In addition to the *inter-coastal* trade that brought African trade goods from the Slave, Ivory, and Pepper coasts to the Gold Coast an important year round *coasting* trade moved imported commodities around the Gold Coast. As company goods were delivered to the main forts the coasts factors would then distribute them via sloops, canoes and other small vessels to the various company outforts and factories along the coast (see Kea 1982:216-223).

Gold Coast trade policy. By 1636, Dutch officials and traders stationed on the Gold Coast had become integral participants in the transatlantic slave trade. Their role was to promote and direct the trade from their base at Mouri (later Elmina), dispatching slaving vessels further along the coast, as WIC policy prohibited the taking of slaves along the Gold Coast (Porter 1974:152). From 1643 onwards, Gold Coast officials actively participated in the slave trade, sending out locally stationed coastal yachts, which, up until this time, were primarily used for the acquisition of ivory, pepper, and local cloth, to secure slaves (Porter 1974:223). Though relatively small in scale, the Dutch dominated the West African slave trade until the 1650s when the Dutch market for slaves was almost completely eliminated as a result of the first Anglo-Dutch war (1652-1654). By 1654, the WIC, who had come to control almost half of Brazil, had ceded all of its Brazilian possessions to Portugal. Furthermore, the growing Caribbean market was closed to the Dutch as French and English laws, influenced by mercantilist ideology, closed their ports to foreign traders. However, the rapidly expanding plantations of the Americas and their dependence on slave labor would need to be met somehow. And the decrease in supply brought about by the prohibition against Dutch vessels served as a catalyst for the French and English slave trade (Fage 1969:68).

3.4 Challenges to Dutch Supremacy

The supremacy of the Gold Coast trade that was established by the Dutch after their capture of Elmina in 1637 began to be tested by an ever-increasing presence of ships from other European countries that began to appear along the coast from 1645 to1650. Particularly troubling to WIC officials was the fact that a large number of these voyages were propagated by private Dutch traders and former WIC employees who used foreign commissions and flags to protect their ventures in areas covered by the WIC monopoly. Many of these ventures relied on varying degrees of Dutch capital, merchandise, seamen, and even ships (Porter 1974:265).[33]

Between the years 1661 and 1664, after having suffered significant losses at the hands of a multitude of European interlopers, the WIC carried out a Gold Coast offensive the likes of which had not been seen since Portugal had tried to expel the French, English, and Dutch intruders during the sixteenth century (Porter1974:470). The results of the offensive would be far-reaching, leading to a great struggle between the English and Dutch for supremacy of the coastal trade, and ultimately, the second Anglo-Dutch war.

In 1661 the WIC enacted a new policy for the Gold Coast, calling for the seizure of foreign vessels suspected of being fronts for private Dutch ventures. The first vessel confiscated under this policy was the Danish vessel *Courier von Venetien*, which was seized in February of that year. Just three days later an even more significant engagement, one with further reaching ramifications occurred when the Swedish African Company (SAC) vessel *Christina* arrived on the coast, was seized, and her cargo confiscated on the grounds that she was a concealed Dutch enterprise. The capture of the *Christina*, the last of that company's ships to reach the Gold Coast, proved to be the final blow to an already besieged SAC and a spark in the growing powder keg that was Dutch-English relations on the coast. That same year even more vigorous actions were taken against English interlopers. Though these vessels lacked the auspices of Dutch traders,

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[33] For example, the Swedish ship *St. Jocob*, which arrived on the Gold Coast at the end of July 1646, was financed, captained, and crewed by Dutchmen, as well as having its outbound cargo laden in the United Provinces. Likewise, in 1647 the Swedish vessel, *Prins of Danmark*, was outfitted in the United Provinces, had a predominantly Dutch crew, and its captain and at least one leading officer had formerly served the WIC (Porter 1974:267-268).

therefore refuting the legality of the WIC's action, the Dutch seized nine English vessels, including several on the Gold Coast, over a ten-month period (Porter 1974:469, 471).

In many ways successful, the WIC offensive of 1661 did not come without its repercussions, many of which stemmed from the capture of the *Christina*. On the one hand, with the *Christina's* seizure the WIC eliminated one of its European rivals, yet on the other hand, they greatly angered the Central Regions' most powerful African and ally of the SAC, Akrosan, who desperately needed the trade goods the *Christina* carried. Akrosan retaliated in March of 1661, withdrawing all Akan merchants from Elmina and no longer permitting trade and provisions to reach the Dutch through his territory. A WIC response to Akrosan's embargo was inevitable; if Akrosan wished to deny trade to the WIC, the WIC would deny trade to Akrosan. Shortly thereafter, the Dutch initiated a naval blockade of Cape Coast, Akrosan's seat of power (Porter 1974:475). In April of 1661 one of the WIC's best vessels was stationed in the road and for the ensuing blockade two to three would remain on station, preventing any European trading vessels from trading there.

In June of 1662, the situation on the coast worsened when local Africans attacked and plundered the Dutch lodge at Komenda, slaying its inhabitants including the WIC factor and his European assistant. Following the attack the Dutch blockade was extended to Komenda and Ampeni and as a result tensions in Europe heightened. The situation escalated further when England learned of the WIC's reoccupation of Cape Coast Castle. Fear rapidly spread that the Dutch, now in possession of the coast's two strongest castles, would prevent the English from trading. Soon these fears came to fruition as vessels belonging to the English Company of Royal Adventurers were denied access to some forty miles of the coast. An English response would be inevitable.

In 1664, 11 English ships intent on asserting the interests of the English Company of Royal Adventurers arrived on the coast. The fleet, the strongest English force to appear on the coast up to that time, met great success. In just two and a half months, the English seized Cape Coast Castle, three lesser lodges, and either captured, sunk, or drove off all Dutch ships on the coast; in doing so, they established themselves as the coast's dominant European power for the first time. Success, however, was fleeting. Within a short period of time after the English fleet's departure, the Dutch Admiral Michiel de Ruyter arrived on the coast with a force even greater than his English counterpart. With the exception of Cape Coast, de Ruyter drove the English out of all their newly captured areas, seized the English headquarters at Fort Kormantin, and successfully restored Dutch supremacy to the coast (Porter 1974:567).

In the short term, the conflict ended with the Dutch retaining their supremacy but their competitors were to make gains that would have long lasting effects. England had gained the strategic position of Cape Coast Castle, where it would go on to establish its new headquarters and eventually dominate the Gold Coast trade. At the time of the English fleet's arrival, the Danish African Company (DAC) had two forts in progress, but were in serious jeopardy of losing Fort Fredericksberg through harassment by the Dutch. The English disturbance of WIC activities breathed new life into the DAC, allowing them to establish a permanent foothold on the coast.

Up until about 1650, the WIC's West African trade, especially its gold trade, yielded significant profits, yet the company was quickly enmeshed in financial difficulties when these were sunk into its Brazilian losing ventures. The Dutch West Indian Company was liquidated and replaced by the second West Indian Company following the third Anglo-Dutch War which ended in 1674.[34] The new company was much like the first though less ambitious and smaller in scale. The company's primary objective remained centered around the gold trade; however, a greater emphasis was given to the rapidly expanding slave trade (Boxer 1965:49; van Dantzig 1978:8). In the end, the intensification of trade by other European entities proved too much for the Dutch to stave off. While they would continue to be a major trader on the Gold Coast for another hundred years, by 1700 the primacy of trade they had held since the early seventeenth century was a thing of the past.

3.5 "And Then There Was Three," 1700-1800

The changes set in motion during the second half of the seventeenth century continued into and throughout the eighteenth century with an even more dramatic effect. As was the case in the previous century, the major driving force behind these changes was the intensification of the Atlantic slave trade, which peaked during the eighteenth century (for a quantitative analysis of the Atlantic slave trade, see Curtin 1969; Eltis 2001; Hernaes 1998:129-304; Inikori 1976; Lovejoy 1989; Postma 1975a, 1975b, 1990, 2003). Changes specific to European-African Gold Coast trade patterns included transformations in the demand for particular imports and exports, an increased volume of trade and commodities, and the opening of the Gold Coast market to independent traders. The eighteenth century also saw the dissolution of the protectionist ideas of seventeenth century mercantilism and the rise of open market capitalism. Largely due to their inability to deal with the increased demand for slaves, the once dominant monopolistic

[34] For a detailed discussion of the restructuring see den Heijer (2003a).

charter companies of the seventeenth century, no longer proving successful, gradually gave way to a free market on the coast (Hopkins 1973:94; Van Dantzig 1980:53). By 1700 the conversion of the Gold Coast's chief export from gold to slaves was complete and within a short period of time the slave trade was rapidly expanding.[35] Corollary to the escalation of the slave trade in the eighteenth century we see the increased importance of firearms, gunpowder, rum, and tobacco as imports (Rodney 1969:17).[36]

In 1698, England became the first nation to deregulate its Africa trade when the Royal African Company (RAC) opened its monopoly to all ship captains on the condition that they paid recognition of ten percent of their profits to the company. Individual English merchants, many of whom had gained firsthand knowledge of the coastal trade through illegal interloping, quickly began to capitalize on the now legal market; so much so that within a few short years "Ten Percenters" came to outnumber company ships along the coast (van Dantzig 1980:53). The Ten Percent Act did much to improve the opportunities available to free traders, but rather than creating a free market it really constructed a quasi-free market with a ten percent tax profiting the RAC. However, after repeated lobbying by English merchants, a true free market did prevail. In 1712 Parliament abolished the "Ten Percent Act", finally opening the Guinea trade to all

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[35] This reflects an overall trend for the Gold Coast trade. However on a national level, the actual conversion from gold to slaves occurred at various times for each nation, with some not changing over until later in the eighteenth century. For example, Postma (1973) has shown that the Dutch conversion did not come until the 1720's. For a more detailed discussion of the conversion specific to various European trading powers operating on the coast at the turn of the century see (Danish: Hernaes 1998:310-349; Dutch: Postma 1973; 1990:126-148; English: Davies 1957).

[36] Yet, it should be remembered that the transformations in commodity importance manifested themselves predominantly in the proportionality of commodities relative to each other. With only a few exceptions, the items included in the overall cargoes bound from West Africa changed very little over time (Eltis and Jennings 1988:948 also see Alpern 1995; Den Heijer 2003b:151 for Dutch example). The major exceptions were the introduction of a large-scale firearms trade in the middle of the seventeenth century, the introduction of rum and tobacco during the eighteenth century, and the predominance of English cloths in the early part of the nineteenth century. Still it should be noted that these commodities were added to the regularly traded commodities rather than displacing them.

English vessels. After 1740, profits from the RAC began to enter into a rapid state of decline. Within a decade, the deteriorating situation on the coast prompted the Crown to abandon its backing; and in 1750, the RAC was replaced by a loose confederation of free-traders known as the Committee of Merchants Trading to Africa. The transition was completed in 1752 when the crown relegated control of its Gold Coast forts to the Committee of Merchants who retained command of the British West African trade until 1821.

Following the War of the Spanish Succession (1702-1713), the WIC's Gold Coast trade began to suffer greatly due to a damaging influx of Zeeland interlopers operating on the Gold Coast. Zeelanders, who had been highly active in privateering during the war, were forced to find an alternative means of income when peace came. For many, a viable alternative was interloping in the West African trade, an area that was a frequent hunting ground during their privateering days. Although the exact numbers of illegal Dutch ships that descended upon the coast during this time may never be known, an indication of the volume of interlopers can be gleaned from the number of vessels seized by the WIC during this time. In the eleven years following the war (1714-1725), twenty-seven Zeeland ships were recorded as confiscated by the Dutch factor at Elmina, and these likely represented only a small fraction of the total trade.[37]

The WIC was more successful than its English counterpart in retaining its monopoly over the African trade into the eighteenth century; however by 1730, under mounting pressure from private traders, they too were forced to concede. With the exception of just a sixty mile stretch of the Gold Coast, the company's monopoly was

[37] As might be expected, the tremendous losses interlopers incurred at the hands of the WIC resulted in hostilities towards the company. When the WIC's charter came up for renewal in 1730, the majority of protest came from Zeeland (den Heijer 2003a:101).

now opened to Dutch free-traders in exchange for recognition dues. Four years later even this proved too much. The company's sole remaining monopoly was dissolved and the validity of African passes issued in exchange for recognition duties was extended from twelve to sixteen months for the direct trade and twenty months for the triangular trade. These actions finally made it profitable for free traders to participate in the African trade (den Heijer 2003a). The breaking of the WIC's monopoly greatly altered the company's role on the Gold Coast. Within the span of a few short years, the company ceased its direct participation in the slave trade leaving it in the hands of private trading companies like the Middelburgsche Commercie Compagnie (MCC) (Postma 1990:203-204). From 1735 until its dissolution in 1791, WIC activities on the Gold Coast were largely limited to administrative affairs, overseeing staffing, and the physical maintenance of Dutch possessions (Yarak 1990:100).

In 1791, the bankrupt WIC was finally dissolved and the Dutch Republic assumed administration of its Gold Coast possessions, including those at Elmina. Things did not fare much better under government control, as shortly after the transfer, it suffered a destabilization stemming from the French Revolution. From 1795-1813 a number of governing bodies charged with administrating the Dutch presence in West Africa were formed and subsequently dissolved. Continuity was finally achieved in 1813 with the creation of the new kingdom of Netherlands and the establishment of a ministry of colonial affairs. During this time, only a handful of Dutch ships are known to have visited the Gold Coast, bringing trade virtually to a standstill (Yarak 1990:101-102).

3.6 Abolition and the Nineteenth Century

It might be expected that since the slave trade of the seventeenth and eighteenth centuries led to major alterations in European-African trade patterns that the abolition of the trade in the nineteenth century would have an analogous effect for its time period. And indeed it did. The abolition of the slave trade led to the demise of Europeans incapable of adapting their trade and a rise for those that could while leading to significant shifts in the commodities exchanged on the coast and the reintroduction of a large-scale contraband trade. For the most part these changes were gradual, as a true abolition of the Atlantic slave trade, initiated in 1807 but not successfully accomplished until 1860s, was also gradual.[38] The difficulties of overseas enforcement and the market’s persistent demand prevented national bans on the trade—such as Britain's abolition act of 1807—from being effective.[39] For example, trade figures for the 1820s prove the trade's persistence as slaves still accounted for two-thirds of all African trade with the Atlantic World during this time. Twenty years later, British reports were still complaining that British Gold Coast forts were providing slave vessels with the goods needed for the procurement of slaves (Eltis and Jennings 1988:945; Reynolds 1974:95).

Much like the interlopers of the seventeenth century and the free traders of the eighteenth century, little is known concerning the specifics of the contraband slave trade. The clandestine nature of the illegal trade meant that virtually no paper trail was

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[38] Denmark was the first country to outlaw the trade of slaves by its people when in 1792 it passed a law abolishing the act as of 1803. Great Britain followed suit with similar legislation in 1807 and by 1825 so had the United States, Sweden, the Netherlands, France, and Brazil.

[39] Recounting his time on the Gold Coast (1847-1848) Gordon, a British merchant noted “that slave vessels often visited the coast and carried on a brisk business from some of the places beyond British jurisdiction we knew perfectly well. Many such vessels we have seen dropping down along the coast, and although a powerful squadron was retained for the suppression of the traffic, so perfectly had the owners and captains of the vessels in question kept within the law that although their destination and purpose were perfectly understood, it was absolutely impossible to find in them anything to justify their detention and suspicion.” (Gordon 1874: 24).

produced, leaving historians a diminutive amount of material to work with in attempting to piece together its history.

The Danish were the first Europeans to abandon the slave trade. The long string of failed Danish ventures in the eighteenth century took its toll on popular support and forced the Crown to examine its African trade altogether. In 1787 a state committee charged with examining the Danish slave trade concluded that the trade no longer was capable of supporting itself (Nørregård 1966:173). Just a few years later in March of 1792, a royal ordinance was passed decreeing the abolishment of the slave trade as of January 1, 1803.

The Danish abolition of the slave trade proved disastrous to the Guinea trade. After its decree, the crown all but abandoned its responsibilities to the coast; in 1792 it opened the trade with Danish holdings to all vessels, including those flying foreign flags. The complete opening of the market signified the crown's disinterest in the Guinea trade. After this, they no longer sent vessels to supply the forts, but instead relied on private enterprise which amounted to one or two ships per year (Nørregård 1966:178). The abolition, however, only marked the official end of the Danish slave trade.[40] The reduced trade suffered further setbacks when the Napoleonic wars once again prevented Danish ships from traveling to the coast for a period of 9 years. A complete cessation of the trade, however, did not come until the 1830s when slavery was abolished throughout the British Empire. In 1833, Denmark entered into a three-way agreement with France and Britain that allowed each nation to examine the other's vessels to assess their involvement in the slave trade. This signified the end of the Danish trade altogether. In

[40] Nørregård (1966:184) believes that "there is a great deal of evidence to support the fact that the slave trade at the Danish forts continued" after 1803, though on a much smaller scale.

1850 Denmark finally abandoned the Gold Coast trade, selling its possessions to Britain, whose merchants desired to expand the palm oil trade prevalent in the area (Reynolds 1974:99).

Like that of the Danes, the Dutch trade, already suffering at the end of the eighteenth century, was also brought to a virtual standstill during the Napoleonic wars. Following abolition, a successful attempt was made under the direction of Governor Daendels to reestablish some prominence of trade on the Gold Coast. Though somewhat successful these efforts were short lived and Dutch trade continued to drop off significantly during the nineteenth century. By 1858, a mere eleven out of one hundred and two vessels entering Elmina that year were Dutch (Coombs 1963:2). Commerce continued to decline in the 1860s and by 1864 only six of the fifteen Dutch forts along the coast were reported as manned (Brooks 1970:265).

3.6.1 Americans on the Coast: An "American" presence in West Africa dates back to the end of the seventeenth century when it became a vital part of the triangular trade, linking New England's rum commerce with African slaves and West Indies sugar plantations. However, because of America's limited market for African commodities other than slaves, American vessels focused on the Slave Coast where they could procure the largest number of slaves. This is not to say that the Gold Coast was void of American vessels. Slavers en route to the Slave Coast sailed along the Gold Coast and at times procured cargoes there, but to a lesser degree. An influx of American vessels trading specifically to the Gold Coast arose from post-revolution economic difficulties that forced New England ship owners to seek out new trading opportunities, mainly West Africa's "legitimate trade". Further impetus for this transition came in 1788 when Rhode

Island and Massachusetts declared the slave trade illegal, and again in 1793 when war broke out between France and England. The tumultuous times that followed in Europe provided American merchant marines an opportunity to fill the void left by European ships (Bennett and Brooks 1965:xxiv; Brooks 1970:23).

Initially, the principal markets for American legitimate traders were the French and English settlements on the Windward Coast with little commerce being carried out south of Sierra Leone (Brooks 1970:30). However, after 1809, American merchants began to capitalize on the lucrative market provided by the absence of competition on the Gold Coast at this time. Dutch and Danish vessels no longer frequented the coast, the British had abolished the slave trade, and clandestine American slavers, who previously were the chief suppliers of rum to the coast, were in disarray. To take advantage of the new market after 1809, American merchants fitted out their vessels to trade the length of the coast from Cape Verde to the Bight of Benin (Brooks 1970:70).

After a brief hiatus during the War of 1812, American vessels returned to trade with the Gold Coast. Only this time, American merchants found trading conditions less favorable, as European vessels, no longer constricted by the wars in Europe, appeared on the coast in great numbers (Bennett and Brooks 1965:xxviii). American merchants suffered further setbacks in 1821 with the dissolution of the British African Company. This caused British Gold Coast forts to fall under the colony of Sierra Leone's jurisdiction, making them subject to Britain’s Navigation Acts and closed to American vessels. The exact degree to which this hurt American trade is unclear, for in the following year, after making a personal inspection of the Gold Coast, the governor still complained of foreign vessels trading at the British forts. What is clear is that the British prohibitive acts, in conjunction with a "trifling" Dutch and Danish presence on the coast, resulted in a flood of American vessels to Dutch and Danish ports. British traders soon complained that Elmina had become nothing less than "a factory for the disposal of American and Portuguese produce" (Petition of British traders on the Gold Coast to MacCarthy, September 30, 1822 cited in Brooks 1970:246) and by 1823, MacCarthy himself had conceded that Elmina and the Danish fort at Christiansborg were "in a great measure like American factories" (MacCarthy to Bathhurts, February 11, 1823 cited in Brooks 1970:247).

Around 1820, American trade patterns for West Africa shifted away from trading the length of the African coast to a more regionally defined trade based on specific markets and types of trade (Brooks 1970:103). Three main trading regions emerged: the northern part of the Windward Coast where hides and peanuts were the principal return; the Leeward Coast including the Gold Coast where palm oil was the main return; and the Slave Coast, where specie obtained from slave traders was the main draw. American merchants trading with more than one of these areas typically organized independent operations outfitting separate vessels and masters for each trade. However, the three regions were never fully differentiated as vessels bound for the Leeward coast often traded along the Windward Coast on their outbound voyage and vessels en route to Angola sometimes traded the Gold Coast down.[41]

Beginning in the 1830s and lasting through to the Civil War, the American legitimate trade saw a period of great growth (Brooks 1970:103). The restoration of peaceful conditions along the coast in the 1830s led to a rapid-growth in the trade of palm

[41] American merchants trading to Africa typically employed schooners and small brigs and barks, as these were favored for their shallow draft, handling qualities, and cheaper outlay and maintenance for the long voyage (Bennett and Brooks 1965:xxxii).

oil. Within just a few years, palm oil became the principal export to the United States, exceeding in value the traditional exports of gold dust and ivory (Brooks 1970:252). By 1855, it accounted for four-fifths or more of the total value of recorded exports (Brooks 1970:259). The booming trade continued to lure an increasing number of American vessels to the coast.[42]

3.6.2 British Abolition and the Rise of the Legitimate Trade: At the turn of the century no country was in a better position than Great Britain to adapt to the economic changes and new markets brought about by the abolition of the slave trade. By the nineteenth century Great Britain had positioned itself as Europe's economic nexus and its manufacturing centers and wares—Birmingham brass, Manchester cotton, Staffordshire pottery—dominated the market place. It was this economic clout that enabled Great Britain to maintain its Gold Coast trade and led to its eventual domination of the West African trade as a whole. Even so the transition from a slave-based to a legitimate trade was a difficult and slow progression and British traders like their various European counterparts faced their greatest challenges in the years immediately following abolition.

The low level of trade development on the Gold Coast in the decades following abolition can at least partially be attributed to the fact that a successful substitute for the slave trade had not yet been found.[43] Obviously, a new basis of exchange for European products was needed. This led to the development of plantations and the encouragement of indigenous agricultural production for export through legitimate trade (Reynolds

[42] It is estimated that American vessels accounted for almost a quarter of the value of imports and slightly less than a quarter of total exports at British forts during the 1850s (Brooks1970:259).
[43] The fact that abolition made illegal about 90% of the trade of the English Company of Merchants' Trading to Africa, markedly demonstrates the extent to which trade was affected by abolition (Metcalf 1964:3).

1974:63).[44] Initial efforts, however, were largely unsuccessful as the market was slow to change. By 1821, profits had declined to a point that the merchants could no longer afford to manage British forts on the coast, forcing the government to resume control. The government control from 1821 until 1828 placed British Gold Coast forts under the jurisdiction of the Sierra Leone governor, who imposed British Navigation acts closing them to trade with foreign vessels and taxing British vessels carrying foreign goods. The ramifications were two-fold as a 1822 Petition of Thirteen explains: "The plain fact now is, that Ships, not only of all foreign Nations resort to Elmina, but British Vessels make a practice of doing their trade at that Port in preference to Cape Coast, by which means they avoid paying any Duties." After continued protest, the Crown yet again relinquished control of the Gold Coast forts; this time, leaving them in control of the coastal merchants.[45] Merchant rule lasted from 1828 until 1843, when the Crown again resumed control over all of its Gold Coast settlements.

Until the end of the nineteenth century, plantation efforts on the Gold Coast had produced meager profits except for some coffee exports in the 1830s, some cotton exports during the 1860s, and palm oil in the 1820s (Reynolds 1974:69). Of these commodities, palm oil was the most important. From its early expansion in the 1820s

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[44] Though non-slaving voyages were occasionally undertaken prior, British sources suggest that legitimate trade did not become differentiated from the slave trade until after the Treaty of Paris in 1783. The principal attraction for merchants to disassociate themselves from the slave trade originated in the profits provided by the ivory trade. Merchants seeking the greatest profit margins understood that the differences involved in the prosecution of the two trades made it more profitable to undertake one or the other, rather than both. The greatest profits in the slave and ivory trades came from varying parts of the Coast. The manner in which these items were procured also differed, as around this time ivory merchants began to rely on a commerce based on goods advanced to African middlemen. As may be expected, this new system of trade was highly speculative and initially few merchants were willing to abandon the tried and true practice of slaving, risking their stakes in the legitimate trade. For example, in 1789 only twelve to fourteen British vessels are believed to have been involved in the legitimate trade, compared to an estimated one hundred and fifty British vessels involved in the slave trade (Brooks 1970:15).

[45] An unsuccessful war against the Ashanti and the terrible effects of the climate were two other factors leading to the withdrawal of the British government from direct control of the Gold Coast forts (Davies 2000: xxvii).

and 1830s through its highest profit margins in the 1850s to its greatest volume in the 1890s palm oil remained Great Britain's largest and most important West African trade. And although the Gold Coast's production of palm oil paled in comparison to that of the oil rivers of the Niger Delta it nevertheless became a staple export of the region and figured prominently in its economic development. By 1850 palm oil had become the Gold Coast's leading export (Davies 2000:xxvii).[46]

Even greater numbers were seen in the second half of the century as the palm oil trade continued to dominate the economic landscape of the British West African trade. Closely linked to its rise in the latter half of the nineteenth century was the development of steamship transport between Great Britain and West Africa.[47] The first regular use of steamship transport for the West African market began in 1852 when The African Steam Ship Company began operating monthly voyages between Great Britain and West Africa[48]. The company maintained a virtual monopoly on steam transport until the formation of The British and African Steam Navigation Company in 1869. By the following year, however, an agreement had been struck between the rival factions fixing freight rates and sailing dates which in effect divided the trade amongst the two parties evenly. In 1891 the two competing lines were essentially merged when Alfred Jones of the Elder Dempster & Co shipping line obtained a majority stake in each. Though the

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[46] Closely linked to the rising palm oil market was the importation of cowrie shells. Though widely imported to West Africa prior to the 1830's, it has been suggested that the spike in palm oil production would not have been possible without the adoption of the cowrie as a new medium of exchange (Johnson 1970; Reynolds 1974:85). By 1850 150 tons of cowries were being imported to the Gold Coast annually (Cruickshank 1853:43).

[47] The first known use of steamships in West Africa was in 1832 when Macgregor Laird attempted to navigate up the Niger using two paddle steamers, the *Quorra* and *Alburkah*. Though somewhat unsuccessful in his initial attempts to utilize steam Laird would go on to found the African Steam Ship Company in 1852 (Lynn 1989: 228). For a detailed history of Macgregor Laird and his founding of the African Steam Ship Company see Davies (2000).

[48] Initially the African Steam Ship Company operated out of London but by 1856 the center of operations had been moved to Liverpool.

lines continued operating separately they were now under the direction of a single owner. Jones, who began his career as a junior clerk with The African Steam Ship Company, had by then become one of the most powerful shipping agents associated with the West African trade. His control of an overwhelming majority of the market and his long understanding of the trade allowed him to expand his shipping lines and stave off all but one of his rivals by the century's end (Lynn 1989:229; also see Davies 2000, 1976:180-201).[49]

Steamers provided two major advantages over traditional sailing ships that would have profound effects upon the coastal trade. First and foremost, steam powered vessels were vastly faster than their wind powered counterparts. Steamships leaving Britain could reach the West African coast in about a month while a typical return voyage for a sailing vessel could be expected to last somewhere between six to twelve months. Furthermore, under the power of steam, vessels had an easier time running against the coast's prevailing winds, a technological innovation that allowed them to facilitate multiple ports of call on a single voyage. This task was much more difficult for sailing ships and so they often only called at a single port before heading back out into the Atlantic to voyage home.

Such advantages naturally resulted in the transition from sail to steam in the British coastal trade. This transition is most evident in the proportion of the oil trade' gross tonnage carried by each during the last quarter of the century. By 1870, less than twenty years after their introduction, steamers already accounted for over 50 percent (55.4 percent) of the registered tonnage of the British oil trade; by the decade's end it was

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[49] Unsuccessful rival companies included the West African Steam Navigation Co (1881), Prince Line (1890), and General Steam Navigation Company (1894).

89.7 percent. And by 1890 the transition from sail to steam was all but completed. In that year 76 out of the 80 ships involved in the trade were steam driven, their cargo accounting for 98.8 percent of the annual registered tonnage (Lynn 1989:233).

The effects of such a transition upon the oil trade were numerous but perhaps the most sweeping of these and the one with the most profound effect was the increased competition made possible by the introduction of steam transport. Prior to the 1850's the high costs of owning or chartering a ship prevented all but only the largest-scale companies from entering the coastal trade. The introduction of regular service between Great Britain and West Africa provided by the steam lines changed all of this by providing cargo space to all levels of the trade. What used to be the domain of a few select large-scale companies operating their own ships was now open to anyone. With only a small amount of start-up capital, new traders could now purchase cargo space rather than the entire vessel. Such a transformation on the structure of the market had profound effects on the trade. In 1850, two years prior to the introduction of steam service, English trading vessels registered 21,560 tons of oil imported into Great Britain. Twenty years later that figure had more than doubled and by 1890 it had reached 89,841 tons or about four times that of just forty years earlier (Lynn 1989:233).[50]

The overall trend evident in the oil trade then is both a transition of markets—from slaves to oil—as well as a transition of market structure. In its infancy, the legitimate trade was a continuum of the economic structure developed for the slave trade, its first traders being ex-slavers seeking out new commodities in a familiar market. By the 1870s the structure of this trade had changed dramatically. "In place of a few relatively large-scale family-based firms or partnerships, operating their own shipping on

[50] 58,775 tons were imported in 1870.

single voyages to the coast, trading from on deck and reliant on the capital costs of starting up to keep competitors out, the trade was now a land-based commerce, reliant on the steamship service for transport and having been through a period of fierce restructuring" (Lynn 1995:70).

Unfortunately figures like those cited above, but specific to the trade on the Gold Coast only, are not available. However, trends visible in the West African oil trade, as over generalized as they may be, were likely played out on the Gold Coast as well. From the 1820s to the close of the century palm oil reigned as Great Britain's largest West African import. The trade's prominence meant that most West African traders, regardless of their geographical specialty, were somehow involved in the trade and would have felt its influences. As such, structural transformations in the oil trade were precipitous of structural transformations in coastal trade overall.[51] Secondly the Gold Coast, especially in the nineteenth century, can no longer be viewed separate from the greater West African trade. Once a dominant seat of trade, in the nineteenth century the Gold Coast was relegated to a minor trading destination, provisioning station, and diminished administrative center. Nevertheless the Gold Coast continued exporting goods and remained a stopover point for many vessels as they made their way down the coast to the more prominent trading ports. By examining the oil trade, even in a generalized context, we are provided insight into a prominent Gold Coast export and an overall trade structure that would have had profound consequences to the maritime traffic of the Gold Coast during this time.

[51] For example Reynolds (1974:119) points out structural changes on the Gold Coast similar to the overall structural changes seen in the oil trade. In particular, he notes a similar role of the steamship.

3.6.3 Destruction of Elmina: The drastic economic, social, and geopolitical transformations of the nineteenth century that were entangled within the abolition of the slave trade and the transition toward legitimate trade had a profound and lasting effect on Elmina. Continual decline in profits in the nineteenth century led the Dutch to consider selling their Gold Coast possessions to the British, first in 1824 and again during the 1850s. Each time, however, some hope of an economic return must have remained as neither deal was ever finalized. In the 1860s Britain and the Netherlands continued to claim jurisdiction over adjacent settlements and territories, the boundaries of which and their extent of jurisdiction, continued to be points of contention. The issue was finally resolved in 1867 with an exchange of possession between the two sides. The line of demarcation became the mouth of the Sweet or Kakum River lying between Elmina and Cape Coast. The English ceded all forts west to the Dutch while Dutch forts to the east became British (see Coombs 1963). The consolidation of territory seems to have had little to no positive affect for the Dutch as it was not long after the exchange that the Dutch finally abandoned all hope of positive economic returns from its Gold Coast holdings. The final decision to give up their coastal possessions came in 1871, and a year later the transfer to Britain was complete.

Although formally recognized amongst European parties, much of the population of Elmina refused to accept its new British authority. Already mounting tensions came to a head in 1873 when the Asante, a long standing ally and trade partner of the Dutch and hence Elminans, moved to the coast and defeated the Fante (for Dutch/Asante relations see Baesjou 1979:17-28; Brukum 1985:34-39; Coombs 1963:1-13; Yarak 1986; 1990). In response the British, who had actively encouraged Fante independence from the

Asante (Baesjou 1979:8-17; Fynn 1971:142-147; Sanders 1979), imposed martial law, including the surrender of all arms, at Elmina. On June 13, 1873 members of the British army's West Indian Regiment, supported by marines and sailors from the H.M.S. *Decoy*, *Barracouta*, *Druid*, *Seagull*, and *Argus* surrounded the "disaffected" portion of the town and opened fire. Within minutes the town was ablaze. The attack, which lasted less than thirty minutes and resulted in no casualties, nevertheless had a permanent and significant effect on the town. The bombardment and subsequent razing largely destroyed Elmina's economic importance and dispersed much of its population (DeCorse 2001a:43). After 1873, rebuilding was not permitted on the peninsula and the settlement was relocated to its present position (DeCorse 2001a:45).

3.7 Conclusion

The maritime commerce of the fifteenth and sixteenth century that centered on the gold trade was transformed in the middle of the seventeenth century by the introduction of a large-scale trade in African slaves. This trade was fueled by the expansion of the plantation economy of the Americas and its unsustainable demand for labor (see Rodney 1969; Bean 1974; Van Den Boogaart 1992; for an in-depth quantitative analysis of the gold trade, see also Feinberg 1989:53-58; Garrard 1980:127-170). In the fifteenth century Elmina, with a population numbering in the hundreds, was likely subservient to the neighboring interior Fante states of Eguafo and Fetu (DeCorse 2001a:9). It was said that when European ships arrived at Elmina, it would take upwards of four to five days for the news to travel and merchants from the interior to gather on the coast (Hair 1994b:129). However, as European trade increasingly flowed into the coast the small, scattered subsistence based villages once peripheral to interior trade networks transformed into major trading entrepôts fully enmeshed in an expanding European economy. Elmina, the once small coastal village, came to regard itself as politically distinct from its surrounding African populations. By the eighteenth century Elmina's estimated population had exploded to between 12,000 and 16,000 and the town consisted of over 1,200 dwellings (Barbot 1992:373; Feinberg 1989:85). These changes have been noted, archaeologically, through affiliated demographic and sociopolitical changes visible in the form of shifting settlement sizes and artifact inventories (DeCorse 2001a); however, much more work is needed to fully understand this phenomenon.

The driving force behind these transformations was the reorientation away from the long-established trans-Saharan routes towards new opportunities for prosperity provided by an emergent European coastal trade. Clues vital to our understanding of African transformations can be found in recognizable corollary transformations in European trade patterns, as the two phenomena drove each other. One such link can be seen in the sheer volume of trade; Elmina's growth was directly proportional to European trade interests. During the fifteenth and sixteenth centuries, the number of European vessels trading along the Gold Coast averaged close to thirty a year; but, by the end of the seventeenth century, the average had risen to over one-hundred and fifty annually (Kea 1982:211).[52] Unlike the Portuguese dominated late fifteenth and sixteenth centuries, the second half of the seventeenth century was a period of intense rivalries on the Gold Coast, as a multitude of European nations vied for a piece of the lucrative Gold Coast

[52] Kea's figure of 150 vessels annually in 1700 may be an underestimate. In 1700, the Dutch factor at Elmina writing to the Assembly of Ten reported that "no less than 35 sails have been counted at the Brandenburgher fort, and the English say themselves that in a relatively short time not less than 80 recognition ships, from England as well as from Jamaica and Barbados, have arrived here. All of them fitted out to trade gold as well as slaves" (van Dantzig1978:71). This total of 105 vessels does not include Dutch, Danish, or interloping ships.

trade. Brandenburger, Dutch, Danish, Swedish, English, French, and Portuguese traders, representing an array of nationally backed monopolistic companies, competed with each other along the Coast as they vied to secure their share of the African trade. The transition of the region's chief export commodity, resulted in significant social, political, and economic ramifications for both the indigenous populace and the Europeans who traded with them (see Fage 1969:81-95; Rodney 1969; Daaku 1970:28-29; Reynolds 1974:9-13; Inikori and Engerman 1992; DeCorse 2001a:26-27). At the close of the century, over 30 European forts, castles, and plantations were located along the Gold Coast's 500 km shoreline (Lawrence 1963; van Dantzig 1980).

Shifting political power, reorientation of trade networks, and changes in settlement patterns continued into the eighteenth century with an even more dramatic effect. Like the previous century, the major driving force behind these changes was the intensification of the Atlantic slave trade carried out in the hulls of European ships (for a quantitative analysis of the Atlantic slave trade see Curtin 1969; Postma 1975a, 1975b, 1990, 2003; Inikori 1976; Lovejoy 1983, 1989, Hernaes 1998:129-304; Eltis 2001). Changes specific to African-European Gold Coast trade patterns included transformations in the demand for particular imports and exports, an increase in both trade volume and commodity types, and the opening of the Gold Coast market to independent European traders. The eighteenth century saw a relational escalation in the role of slave exports and an increased importance of firearms, gunpowder, rum, and tobacco as imports (Rodney 1969:17). Some historians have argued for a cyclical link connecting African socio-political transformations, an influx of the slave trade on the Gold Coast, and the proliferation of firearm importation, though not all are in agreement (Daaku 1970; Kea 1971; Richards 1980; Inikori 1977).[53]

As European-African trade relations continued to grow in scale, European traders eager to meet the demands of their African counterparts provided them with an ever increasing array of goods. For example, in 1645 the Dutch inventoried no less than ninety-two different trade items at Elmina Castle (Ratelband 1953:385-387). By the end of the century, the number of different items being imported to the coast had increased to nearly one hundred and fifty, and in 1728 two hundred and eighteen types of merchandise were being stored in Elmina (Bosman 1967:91, Postma 1990:103).[54] The eighteenth century also saw the dissolution of the protectionist ideas of seventeenth century mercantilism and the rise of open market capitalism. Largely due to their inability to deal with the increased demand for slaves, the once dominant monopolistic charter companies of the seventeenth century, no longer proving successful, gradually gave way to a free market on the coast (Hopkins 1973:94; van Dantzig 1980:53).

Manifestations of African socio-political changes are apparent in the concomitant shifting economic trade patterns between Africans and Europeans and are readily accessible to archaeologists through the examination of shipwreck sites. Transformations regarding demand, desire, and volume for particular imports and exports are visible archaeologically through the detailed examination of European wrecks and their associated cargos. While individual sites provide tight chronological control regarding these changes, regional studies of shipwrecks provide a diachronic view of fluctuations in trade volume (Parker 1992). For a detailed understanding of the persistent illegal trade

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[53] For counter arguments to the gun-slave circle theory, see Curtin (1975); Hernaes (1998:369-384).
[54] Feinberg (1989) calculated 138 types for 1725.

carried out by interlopers and the eventual opening of the Gold Coast market to private European traders, shipwreck sites are in fact, the only reliable data base for this phenomenon, as they largely went unrecorded in the documentary record (Lenihan 1983:58; Murphy 1983; Schmidt and Mrozowsky 1983)

Lastly, the fact that the Atlantic slave trade reached its height during the eighteenth century acts as a double-edged sword for researchers interested in small-scale regional shifts in African-European trade patterns. On the one hand, an increased interest in the subject has resulted in a vast amount of literature addressing a wide array of the trade's economic repercussions on the African market. However, in regards to the study of eighteenth century English imports specific to the Gold Coast, one of the unfortunate ramifications has been that historians addressing alterations of consumption patterns associated with the slave trade have predominantly opted for a large-scale interregional perspective rather than regionally specific studies (e.g. Richardson 1979; Eltis and Jennings 1988). The multi-regional scope of this research stems from the fact that these historians are first and foremost examining the slave trade, which happened to result in commodity shifts. These, of course were not confined to a single region of West Africa. Yet, when the orientation of the research is instead focused on regional commodity shifts that have a cause and effect relationship with the slave trade, the relevance of this data must be questioned, as it has been shown that regional demands differed (Davies 1957; Richardson 1979, van den Boogaart 1992; Alpern 1995). Furthermore, in terms of volume other than inferred proportionalities, a data point for "ships trading to West Africa" tells us very little concerning volumes specific to the Gold Coast. In this manner, historical data has provided us with only minimal information concerning regionally-specific commodity shifts that are frequent indicators of localized transformations in African socio-political structures. While ships' manifests and trade records specific to the Gold Coast have survived, these sources are incomplete and thus, studies relying on them tend to be temporally narrow in scope (e.g. Metcalf 1987a, 1987b). Also, clandestine and privatized trade, which inherently avoided the bureaucratic quagmire that produced the few existing records available, have left little to no evidence in the form of written sources. In contrast, the archaeological examination of shipwrecks and their associated cargoes can provide researchers with refined dates associated with specific commodities, information concerning items not recorded in manifests, and insight into the structure of both illegal and privatized trade.

A correlation exists between the political and economic transformations occurring along the Gold Coast during the Atlantic Age and transitions in the commodities that drove the African-European exchange. Furthermore, the transitions in commodification and therefore the transformations in society are most recognizable archaeologically through the study of submerged cultural sites in the form of European shipwrecks and their associated cargoes. The remains of European vessels and their associated cargoes are not only the purveyors of a European history, but also have the potential to speak profoundly of the societies for which the trade goods that filled their hulls were bound. As archaeological sites, these vessels can broaden our understanding of indigenous transformations resulting from cultural contact and the incorporation of non-western societies into the developing world economy.

CHAPTER FOUR: MULTISCALAR ARCHAEOLOGY AND SITE INTERPRETATION: THE CASE OF THE ELMINA WRECK SITE

Discovered in 2003, the Elmina Wreck site has become a primary focus of the Central Region Project's maritime research. Additional field seasons include Cook's work in 2005, my own excavations in 2007, and Horlings research in 2007 and 2009 (Cook n.d.; DeCorse et al. 2009; Horlings 2011). A large collection of artifacts has been recovered as a result of this work. This material, as well as radiocarbon AMS dates of five wood fragments recovered in cores taken from the site, place the ship's age in the middle of the seventeenth century. The identity of the ship has not definitively been determined; however, it is possible that the ship is the *Groeningen*, a WIC vessel that sank off of Elmina Castle upon its arrival on the coast in 1647.

The Elmina Wreck site provides a clear example of how multiple vantages of scale, when applied to the archaeological investigation of specific sites, can at the same time aid in the interpretation of that site and the extrapolation from that site. Events do not happen in isolation, and like a forest without trees, the *long durée* is inconceivable without individual actions. At the same time we are confronted with the fact that events and processes are clearly very different things and exhibit different properties. As much as events and actions are products of the cultural milieu in which they are entrenched, they are equally susceptible to agency and free will and potentially anomalistic. Caution must therefore be taken to differentiate the anomaly from the norm. Processes, on the other hand, are void of individual actors and ignorant of anomalies. This dialectic of scale is a mechanism in that it provides a research design strategy by which we may achieve a desired result, in this case interpretation and extrapolation.

The focus of this chapter is interpretation. In it I outline the archaeological work conducted on site up to this point, provide a detailed description of my analysis for significant finds, and provide my interpretation of the site based on this analysis. I describe the methodology used to draw forth an unknown historical event from the archaeological record and show how understanding large-scale socio-cultural processes can yield information concerning small-scale events. Specifically, this is accomplished by analyzing individual artifacts, or artifact types with regards to trade, manufacture, and consumption. It is well known that European manufacture goods are readily datable and valuable information concerning their trade and consumption can be gleaned from the historical and archaeological records. In turn, this information is then used to interpret any site containing such items.

4.1 Discovery

The Elmina shipwreck site was discovered by Greg Cook in 2003 during a remote sensing survey conducted in the waters directly off the modern town of Elmina, Ghana and further investigated by Cook in 2005 (Cook n.d.; Cook and Spier 2004).[55] As the focus of the 2003 season was on the acquisition of data and the completion of this survey, very little time was spent exploring the newly discovered wreck site (Cook personal communication). The work conducted was limited to only two dives on the site. Cook's initial reconnaissance of the site noted the presence of two large cannon, large rolls of sheet lead, stacks of brass basins, and large clusters of brass manilas. The combination of cannon and large quantities of European trade materials typical of the African trade suggested the sonar anomaly likely represented the remains of a European trade vessel. A rough sketch map (Figure 4.1) was made of the site and a stack of three small brass

[55] Both the initial 2003 survey and 2005 project are discussed in detail by Cook in his doctoral dissertation.

bowls and a manila were collected for further analysis. Unlike in subsequent field seasons, several feet of visibility were possible on site allowing Cook to take several photographs of cargo exposed on the seafloor.

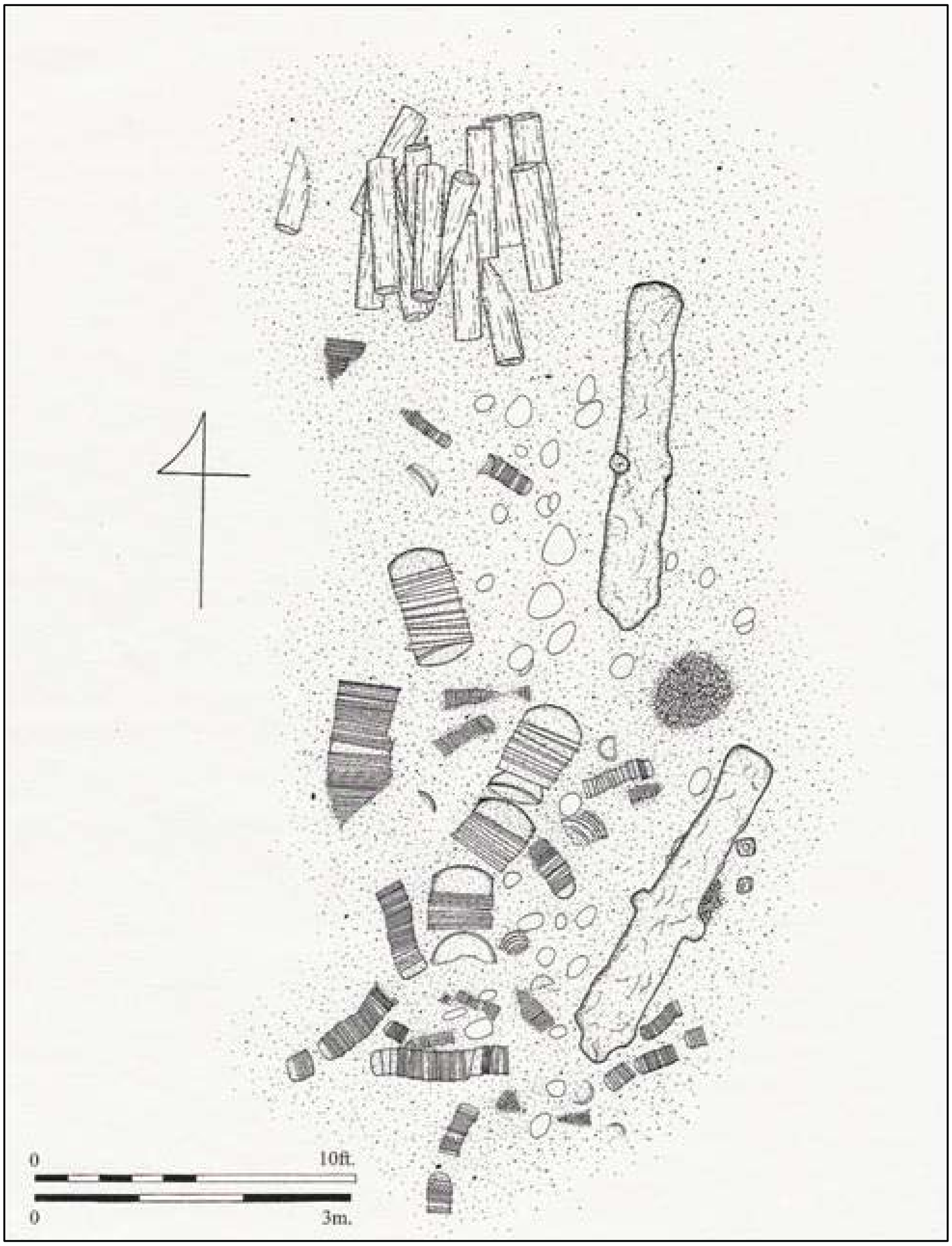

Figure 4.1 Sketch map of Elmina Wreck Site made during the 2003 reconnaissance dive (Drawing by G. Cook).

The first full field season devoted to documenting the Elmina Wreck site was carried out in 2005 (DeCorse et al. 2009). The goals for the 2005 field season were to determine the site's extent, record all visible or tactile features, produce a detailed, measured site plan, and recover diagnostic artifacts present on the site's surface. Although hampered by zero-visibility and challenging diving conditions, each was met. Reconnaissance dives revealed that exposed elements of the site were composed of several large clusters of material culture protruding (some as much as two feet) from an otherwise flat and featureless seafloor. The site was mapped in reference to nine temporary datum points interconnected by a series of baselines that encircled the approximated site boundary. [56] Features recorded during the 2005 season included five large cannon (including the two discovered in 2003), several masses of entangled brass manilas, large nested stacks of brass and pewter basins, and the rolls of sheet lead (Figure 4.2). In addition, glass beads, cowrie shells, glass bottles, ceramics, manilas, bricks, brasswares, pewterwares, and brass pins were recovered through surface collection and kept for conservation and analysis.

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[56] Several lines were also laid between these datums that crisscrossed the site allowing for accurate positioning throughout the interior of the site. The decision to map the site in reference to these nine somewhat random datums as opposed to a more conventional grid system or bisecting baseline was largely symptomatic of the zero-visibility diving conditions. The archaeologists' inability to see the site meant that the only way to determine the extent of its features was to physically encounter them.

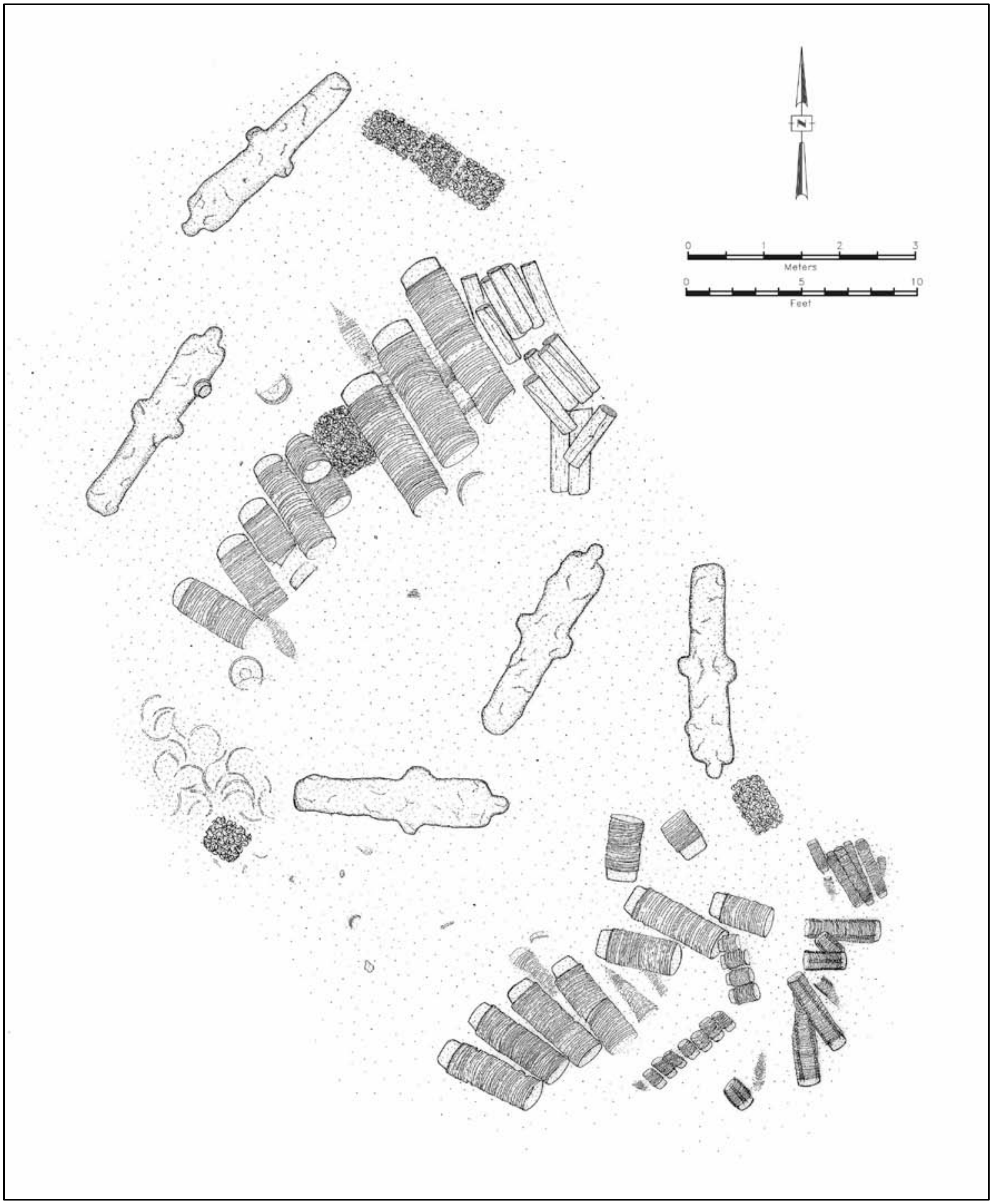

Figure 4.2 2005 site plan of the Elmina Wreck Site (Map by G. Cook)

4.2 The 2007 Project

A second field season focusing on the investigation of the Elmina Wreck was directed by Rachel Horlings and myself in 2007 (DeCorse et al. 2009; Horlings 2009; 2010). As noted earlier, this research grew out of NSF proposals aimed at the examination of socio-cultural transformations in African societies, with particular emphasis on trade, social organization, and technological change during the Atlantic World.[57] The 2007 field program began with the investigation of 50 high-priority sonar targets located by Cook in 2003, with the intention of carrying out more extensive sampling on selected new discoveries (see Cook and Spiers 2004).[58] Each target was investigated by divers using a circle search method. A diver descended to the bottom, attached a guide line to the anchor, and swam in concentric circles radiating outward in fixed intervals from the central reference point. This method provided the most complete coverage of the seafloor bottom and was repeated for all targets. Unfortunately no further shipwreck sites were discovered during the investigation of the 50 designated targets (see DeCorse et al. 2009).

With no new sites located our focus shifted to the Elmina Wreck site. Our goals were to relocate the wreck site, assess and record any changes to the site that had

[57] The survey of maritime sites has always been envisioned in conjunction with the large-scale, regional archaeological survey of terrestrial sites made possible by a NSF Senior Research Grant awarded to Christopher DeCorse. Equipment for the evaluation of maritime sites, including our research vessel, trailer, and tow vehicle, were purchased with funds provided by a NSF Major Research Instrumentation Program Grant. Additional funds were provided by the Maxwell School of Citizenship and Public Affairs, Syracuse University.

[58] Prior to the 2007 field season Cook, Horlings and Pietruszka independently analyzed this sonar data, designating targets and assessing their potential for representing submerged shipwreck sites. Interestingly, there was wide variance amongst the evaluators as to the interpretation of the data and the likelihood of targets representing archaeological remains. In an effort to counter these discrepancies evaluators ranked their individual targets based on the probability of representing a shipwreck. In the end it was decided that all targets falling in the top two tiers of probability would be explored by divers. This method ensured that no evaluation outweighed another, a system believed to provide the best chances for locating additional wreck sites. This method resulted in (50) targets in which at least one of the evaluators had designated it a high probability target.

occurred since 2005, conduct a systematic surface collection of the site, and undertake substantial excavations. The site was easily relocated using GPS, requiring no more than a single circle search at the known coordinates. From the beginning, it was apparent that significant changes had occurred at the site. The most obvious of these were the buildup of sedimentation on the site's southern end and scouring at its northern boundary. Large stacks of basins observed in 2005 at the site's southern portion were no longer exposed while new materials (specifically a cannon and anchor) could now be observed in the north.[59] The surface collection and excavations yielded a large number of artifacts, the analysis of which has contributed greatly to the current site interpretation.

4.2.1 Surface Collection: In order to ensure comprehensive coverage and accurate provenience during surface collection and in the placement of excavation units, the site was gridded using one meter squares. Two linear, perpendicular baselines bisected the site to form the grid's X and Y axis.[60] The baselines were anchored to temporary datum points placed 5 meters beyond the visible boundaries of the exposed site. The height of each baseline ranged from a few centimeters to as much as a half meter depending upon variations in the contour of the seafloor and archaeological features. A metal grid made up of five consecutive one meter squares was constructed from iron rebar and placed on site.[61]

Prior to excavation, surface collection was carried out over the entirety of the site using the metal grid to ensure accurate provenience. Starting at datum 1 (the northern

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[59] See Horlings and Cook's work for more in-depth discussion and comparisons between 2005 and 2007.
[60] The use of the term perpendicular is meant only a descriptive approximation. Due to diving conditions it was not possible to ensure that the two baselines were truly perpendicular. For this reason only a single baseline (baseline 1) was used as a basis of the grid. The baseline provided the Y axis while the one by five meter metal grid frame provided the X-axis.
[61] The entire metal grid measured one meter in width and five meters in length rebar crosspieces subdivided it into five adjacent one meter by one meter units. Six adjustable aluminum legs allowed vertical positioning in relation to the seafloor and protruding cultural features.

terminus of baseline 1) the grid was placed widthwise adjacent to the eastern side of the baseline thus providing five one meter by one meter units beginning at the baseline and extending five meters perpendicular. Divers would then proceed through each of the five units and collect any objects that they encountered on the surface and record its provenience.[62] After all five units had been searched, the grid was picked up and shifted one meter down (south) the baseline, establishing the next five units to be surveyed. The process was repeated along the eastern side of the wreck until the divers reached datum 2 (the southern terminus of baseline 1). The grid was then repositioned on the western side of baseline 1. The same process repeated as the divers progressed up along the western half of the site following baseline 1 from datum 2 to datum 1.

4.2.2 Excavation: Excavation of the site was carried out with a three-fold purpose. The first was methodological. Looking ahead to future work on maritime sites in both Ghana and the broader West African region, I wanted to evaluate the effectiveness of multiple sampling strategies, in this case surface collection and the more intrusive controlled excavation. By comparing the two artifact assemblages and their respective data sets, I hoped to learn about how they differ, identify inherent biases in each strategy, and explore how these biases effect archeological interpretation of sites. As the focus of the 2005 field season centered solely on the then-exposed portions of the site, the second purpose of excavation was to ascertain the site's true extent in the horizontal and vertical planes. The third was to recover an extensive artifact assemblage that would enable us to discern the temporal and cultural parameters of the shipwreck.

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[62] Provenience was recorded as the unit, not the exact position of the object within each unit. Due to the frequency of high energy wave action present on the site is can be presumed that surface materials frequently shift on the site. Therefore a provenience accurate to one meter at the time of collection was considered sufficient.

The initial research design was to excavate a series of adjacent one meter by one meter units running the length of each baseline and forming two perpendicular trenches; each approximately bisected the site along their respective axis. However, time and financial constraints coupled with adverse site conditions required an altered course of action. Rather than completely bisecting the site in two directions, a single trench was laid along the entire length of baseline 1 with a second trench beginning approximately midway through baseline 1 and extending perpendicular to the first trench, thus cutting through the eastern side of the site (Figure 4.3).[63] The same metal grid used during the surface collection was also employed during excavation to ensure accurate placement of every excavation unit. To begin, the grid was positioned adjacent to the eastern side of baseline 1 running lengthwise from datum 1 towards datum 2 a distance of five meters and extended east 1 meter. The rigid metal grid provided divers with clearly defined boundaries for five consecutive one meter by one meter units even in a zero-visibility environment. Excavations were carried out a single unit at a time. Using a variety of tools including spades, cooking pots, metal cups, and their hands a diver carefully removed the matrix, including all artifacts encountered, and place it in a modified 30 gallon (113.56 liters) PVC barrel securely anchored next to the unit.[64] At the completion of each dive, the bucket's harness was secured by a carabiner to a line running from the boat anchored above to the site. Next, the diver signaled topside that the bucket was

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[63] The eastern side was chosen because the prevailing currents as we understood them at the time flowed in an easterly direction. It was therefore assumed that a greater deposit of cultural material would be found on the site's eastern edge where it would have been deposited by the prevailing current. Using baseline 1 as a guide allowed us to tie the excavation units into the same grid system utilized for the surface collection.

[64] The barrel's top had been cut off so that the matrix could be put into it and lead dive weights held in place by zip ties ballasted the bottom. The ballast anchored the unfilled or lightly filled bucket on the seafloor preventing tipping or spillage with heavy surge. In addition, a four point harness made from ½ inch polypropylene line was attached to the top of the bucket, allowing workers on the surface to raise the bucket in an upright position as it was lifted through the water column.

secured and ready to be raised by inflating and releasing a safety sausage. Upon receiving the signal, those remaining on the boat would haul up the bucket using the attached line. Because the current caused the boat to drift off site while attached to its mooring, the bucket had to travel across the seafloor before being located directly below the vessel where it could be raised in a controlled vertical assent. To ensure no material was lost the diver remained with the bucket keeping it upright until it was lifted into the water column where the four point harness guaranteed upright orientation.

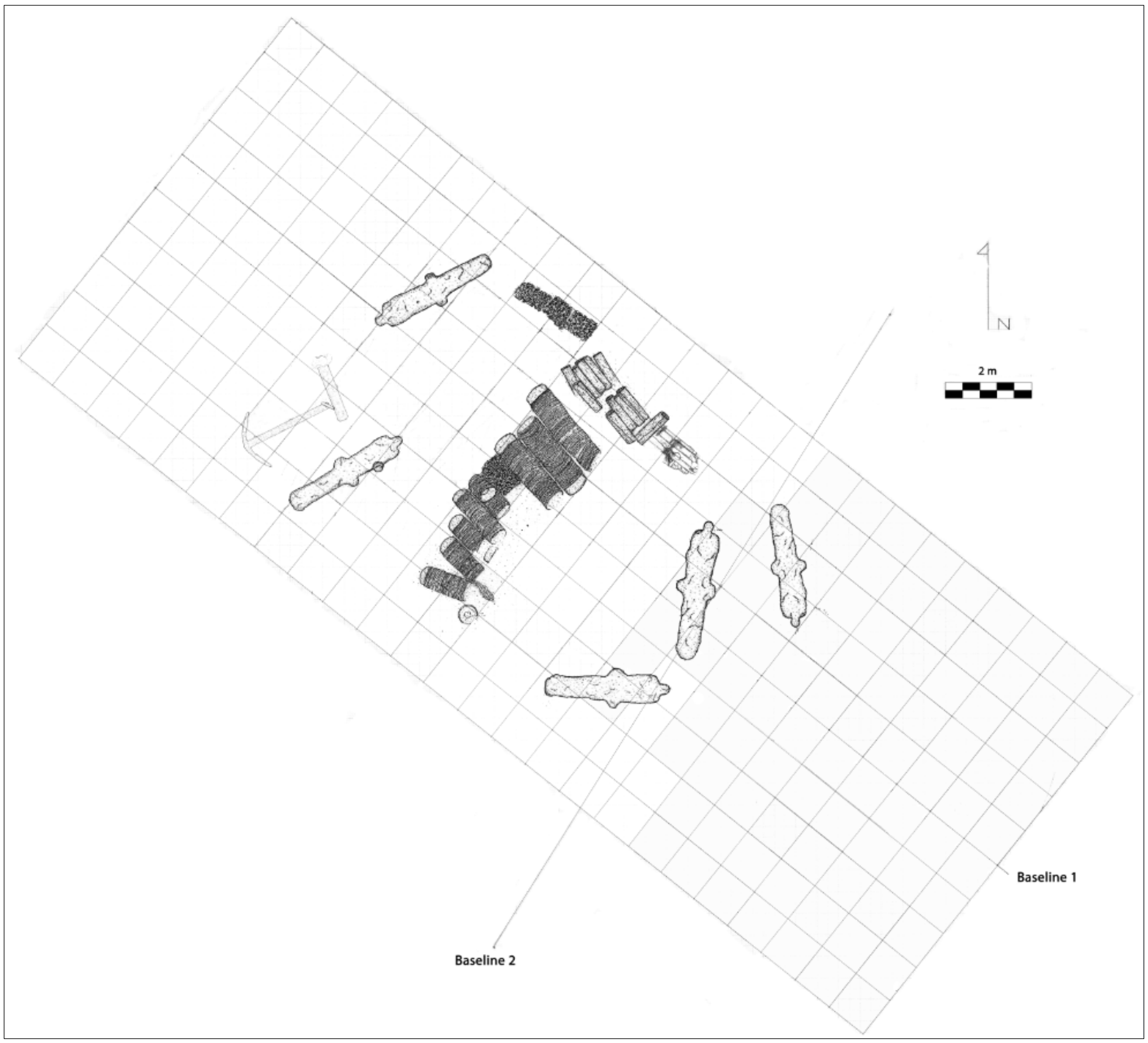

Figure 4.3 Site plan of the Elmina Shipwreck site, 2007 (Map by A. Pietruszka and G. Cook)

Units were excavated following arbitrary stratigraphic levels defined as the contents of the bucket when arriving at the surface at the end of a dive.[65] At its maximum, a level was defined by the amount of sediment the 30 gallon barrel could hold; however, variation in the matrix (i.e. silt, sand, compact shell), encountering features, and a diver's rate of air consumption sometimes prevented them from filling the bucket completely. When this occurred, the diver would send what had been excavated and collected in the bucket to the surface at the end of his or her dive and this would be assigned a level. Consequently, the depth of levels excavated varied both within a single unit and across the site.

Excavation was undertaken evenly across the unit unless the excavator encountered an immovable feature partially obstructing progress. Artifacts encountered during excavation were not removed individually but instead left intermixed in the matrix. After being lifted to the surface, the matrix was screened using 1/8 inch mesh. Any artifacts recovered during the screening process were placed in plastic containers or Ziploc bags filled with seawater to prevent decay and each bag or container labeled with the date, excavator, unit, and level (Figure 4.4). Provenience was recorded with regards to unit and level only. No more exact positioning was recorded regarding an artifact's either vertical or horizontal placement in the unit or level. In all, a total of 28 one meter by one meter units were excavated yielding over 1000 artifacts.[66]

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[65] Excavators noted any changes in the matrix and recorded approximate depth of the unit at the close of each level, but these were not factors used in determining levels.

[66] While every effort was made to collect and record each and every artifact recovered during excavation, in the end, this task proved impossible. In order to excavate even the limited extent of the site we did accomplish, divers had to be kept in the water at all times. This meant that the contents of a level had to be sorted in the time it took the next diver to excavate the next level. Confined to a small local dugout canoe, researchers were only able to operate a single screen. Separating the artifacts from the matrix was a lengthy process in which buckets of water were poured over the material to form a slurry of sand, mud, and water. The slurry flowed through the screen leaving only shell and artifacts behind to be sorted. While this

Figure 4.4 Photographs showing crew members retrieving the matrix excavated from the site below and screening (Photos by A. Pietruszka)

4.3 Analysis and Interpretation

My initial analysis of the material recovered from the Elmina Wreck site focused on delineating age and origin of manufacture for as many artifacts as possible as the age and origin of the vessel now resting at the Elmina Wreck site was unknown. Although thousands of European ships visited the Gold Coast between 1471 and 1900, we currently know of only one vessel said to have been wrecked specifically in front of Elmina Castle, the *Groeningen*, a WIC vessel that sunk upon its arrival in 1647. While this ship remained a possibility the paucity of surviving historical documents combined with sheer

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process was effectual in separating the material it also meant that the crew had to constantly bail the slurry out of the bottom of the canoe further limiting the time they could dedicate to sorting. Seeking the most diverse data set possible under these conditions, several artifact types were selected for limited sampling. Cowries and beads were selected because of their prolific numbers, difficulty in separating from the shell left after screening, near universal similarity among individual examples, and their inability to provide much diagnostic information about the site. Modern debris and some flora were excluded as they were clearly intrusive to the site.

probability suggested that we consider all possibilities covering the entire spectrum of European maritime activity on the coast.

Artifacts were sorted by class (i.e. glass, ceramics, metalwares, tobacco pipes, etc.), classes subdivided by types, and types by individual pieces. Analysis was conducted largely at the individual and type level and temporal ranges were developed for as many artifacts as possible. Unlike most terrestrial occupation sites that are the diachronic accumulation of human activity, shipwrecks are synchronic; they represent an individual event, a moment of time. The artifacts associated with them should represent this. While the timeframe of technologies, forms, and styles of individual artifacts vary in duration often extending in either direction from the synchronic point of the event, they should overlap at the time of the wrecking. Conventional wisdom says that if you find this synchronic point then you can use this to interpret the wreck site, and this supposition was the basis of my analysis. Unfortunately, at the Elmina Wreck site, the analysis of the artifacts did not reveal such a point. Instead, what we saw was an assemblage spanning nearly 500 years ripe with multiple examples of anachronistic technologies and types (see Appendix C). The majority of strata excavated included modern material as well as a mix of materials dating from the seventeenth through twentieth centuries (see Appendix B).

Based on the lack of overlap of artifacts it was determined that a significant portion of the artifact assemblage must be intrusive to the site having been deposited after the wreck was initially introduced into the archaeological record. The next step was to determine what was intrusive and what was not. In terrestrial archaeology this can often be concluded by determining site formation processes often revealed through stratigraphy. In underwater work this is difficult as few methods have been developed to record stratigraphy during underwater excavation accurately (Goggin 1960:351; Gould 2000:53). Initially it was thought that oldest materials would represent the original site and all the later was post depositional debris. However, the wreck site lies just 1.5 miles (2.41 km) off the town of Elmina, a major seat of European trade since the Portuguese arrival. Plausibly the earlier deposits may have washed into the sea from shoreline middens, or may have originally been deposited into the sea, and over time, through wave action, these earlier materials could find their way onto a later wreck protruding from the surface and acting as a trap. To circumvent this, a method of analysis was developed that ranked the artifacts in terms of their probability.

Kleij (1997) proposed a method of connecting the material remains of an unknown wreck site to that vessel's economic place of origin. Key to this method is an intentional ranking of artifact types based on a positive correlation between rate of circulation and a vessel's economic place of origin. Items that readily wear, break, and fall into disuse are replaced frequently and therefore are a much greater indicator of the last economic home port than larger less circulated items which may remain on a vessel for years. I surmised similar correlations between artifacts and site formation processes, particularly the probability of intrusion. Large, unmovable objects would be most impervious to wave action, the most likely culprit for post-depositional intrusion. These items resting on the seafloor could get there by no other way than through the original wrecking event. They, therefore, must be associated with the wreck and provide us with our starting point for site interpretation. From the Elmina Wreck site assemblage cannon, manillas, brasswares, pewterwares, and lead rolls fit this description. Two other items—

beads and cowries—were also included due to their prolific numbers and likely primary association with the wreck. The analysis of these items formed the basis of the overall interpretation of the site. Although I emphasize the data I collected in 2007, my interpretation also draws upon the findings from Cook's 2003 and 2005 field seasons.

4.3.1 Cannon: In total six cannon have so far been discovered at the Elmina Wreck site. Five large guns, all roughly the same dimensions, were measured and plotted during the 2005 field season. They measured 2.74 m (9 ft.) from muzzle to basal ring but when measured from muzzle to cascabel they ranged between 2.9 m to 3.05 m (9.5-10 ft.).[67] Based on these dimensions it is possible that the guns are cast iron 12 pounders. A sixth cannon was discovered in the northwest corner of the site in 2007. Although partially buried, it appeared somewhat smaller than the other guns and had a bore of 34 cm (13.39 in).

Cannon recovered from wreck sites can provide archaeologists with valuable clues regarding a vessel's origin, date, or identity. Historical records documenting the production and distribution patterns of Europe's cannon foundries, naval records, and those of joint-venture companies like the Dutch East India Company have provided valuable insight concerning ships' armaments and procurement over the past five hundred years (e.g. Barker 1983; Brown 1988, 1989, 1990; de Vries and Hall 1997; Elvin 1983; Frantzen 2001; Kennard 1986; Kist 1988). Often, guns are readily datable according to design or markings, some even were stamped with a date of casting or proof. Proof of a vessel's identity can be obtained by matching its armaments recorded in historical documents if available with those recovered from an archaeological site.

[67] Due to the large amount of concretion encasing each gun all measurements must be considered approximate.

Conversely, cannon can also be quite problematic regarding site interpretation. While historical records clearly indicate trends linking foundries with nations, cannon were extremely valuable and easily transferable. In times of war, it was common practice for a captured ship's guns to be removed and placed in another nation's armory.[68] Moreover, because of their value, cannon were kept in service for as long as possible meaning that a gun's casting date could be off by as much as 100 years from the actual wrecking event (e.g. Karklins 1991; Smith and Maxwell 2002).[69] Matching a vessel's identity requires a basic understanding of the vessel the site represents and the survival of appropriate historical records documenting its armament. Often, archaeologists are provided with neither.

The use of cannon to interpret sites like the Elmina Wreck in West Africa is particularly problematic. While the Dutch East India Company began standardizing the armaments of its vessels by 1669 (Kist 1988), no evidence has been found documenting a similar standardization undertaken by the WIC. The WIC relied upon a much greater variety of vessels to carry out and maintain its African trade. Different types of vessels were employed for different functions and these varied in both size and armament. Frigates, employed as cruisers for guarding the coast, carried as many as twenty-five guns; those transporting commodities between Europe and West Africa, fifteen to twenty. Slavers ranged between twenty and less than ten depending upon their size, and vessels used for the coastal trade were often only lightly armed with one or two cannon and a few muskets (den Heijer 2003b:143-151). Interpretation of any site is further confounded by

[68] During the Scanian War (1675-1679) the Danish navy captured nearly 1000 guns from Swedish ships (Frantzen 2001:10)

[69] The earliest gun recovered by archaeologists from the wreck of the *Kronan* that sunk in 1676 was a German 30-pounder cast in 1514 (Einarsson 1994:46)

the dearth of information concerning the armament of interlopers and vessels sailing under foreign flags.

Unless the guns already discovered on the Elmina Wreck are to be raised and properly conserved, they unfortunately reveal little at present in regards to the site's date and origin.[70] The small number of cannon may suggest a smaller coasting vessel or slaver but at this time the records remain far too incomplete to draw any meaningful conclusions. As only a small fraction of the site has been excavated, the total number of guns carried by the vessel may be much higher than the six so far discovered, and the measurements taken of the guns already discovered do not contribute in dating the wreck.

4.3.2 Pewterware: Although no pewter pieces were raised during the 2007 excavation, 19 pewter bowls recovered in 2005 provide invaluable information concerning the wreck's date and possible origin. In her analysis of the metalwares recovered during the 2005 field season, Hamann (2007) has separated the pewterware into two types. The first (Type 5 by Hamann's designation), represented by 18 pieces recovered in a single concreted nested stack, is described as medium-sized dishes 28.16 cm (11.26 in) in diameter with plain beaded rims 2.80 cm (1.10 in) wide and a bossed well. The well is 23.17 cm (9.33 in) in diameter, and has a depth of 4.95 cm (1.95 in). Each dish weighed approximately 1,014.10 g (35.77 oz.) (Figure 4.5). Only a single example of the second type (type 6 by Hamann's designation) was found. Like the first type, it is a round dish with a plain below-beaded rim. It measured 33 cm (12.99 in) in diameter, the rim being 2.84 cm (1.12 in) wide. The well is 27.05 cm (10.65 in) in diameter with a depth of 8 cm

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[70] None of the cannon were raised from the wreck site due to constraints of both time and money. Although they could potentially one day provide valuable comparative data, especially with regards to the dating of the vessel, the excavation and preservation of large iron guns from a marine environment can easily cost thousands of dollars and take several years to complete. In Ghana these factors are compounded by the lack of any proper facilities for the conservation of marine artifacts.

(3.15 in). The dish weighed 1,275.80 g (45 oz.). All nineteen pieces of pewter recovered in 2005 have an identical mark stamped on the topside of its rim, a crowned rose with the letters “B” and “H” contained in the circlets of the crown (Figure 4.6) (Hamann 2007).

Figure 4.5 Pewter plate recovered from the Elmina Wreck Site in 2005 (Photo by N. Hamann)

Figure 4.6 Close-up of the touchmark found on pewterwares recovered from the Elmina Wreck site, 2005. The stylized Tudor rose and maker's initials within the crown above suggest that the pewter was made in the Netherlands (Photo by N. Hamann).

The style of pewter dishes and the touchmark suggest manufacture in continental Europe between the mid seventeenth and early eighteenth centuries. Although attempts to match the touchmark with known pewterers have proven fruitless, its style suggests that it belonged to a Dutch maker. Taken from the English Tudor rose, the rose and crown mark was first used in England in the sixteenth century to mark goods for export. On continental wares it was initially employed to demarcate items made of English tin, but over time it was adopted on a much broader scale to denote goods of high quality, regardless of their origin (Brett 1981:235; also see Dubbe 1978:454). While the crown and rose became virtually ubiquitous to Western Europe, several key idiosyncrasies can be used to determine a particular mark's origin. For example, the marks of Low Country pewterers usually bear the maker's initials within the crown, either in the arch or circle, and the rose is often more stylized then English marks (Brett 1981:235; Cotterell 1929:48). As these are both characteristics of the marks found on the Elmina Wreck pieces, we may conclude that they were indeed manufactured in Holland.

Whereas the touchmark indicates the likely origin of the pewter vessels, dating was based on their overall shape and form. Stylistically, the raised boss found on the 18 dishes which comprise type one is characteristic of continental dishes made before 1720 (Brett 1981:37). A similar pewter plate with a raised boss and crowned rose maker's mark was recovered from the Dutch EIC ship, *Batavia* (1629) (Green 1989:155).[71]

The dishes remained stacked in a concreted mass weighing over 40 lbs. (18.14 kg) indicating they are part of the original wreck. The likelihood of such a mass being deposited on site, even by extremely turbulent or violent wave action, is negligible, especially intact in the stack form. Long-term stability is furthermore suggested by the level of concretion found on the stack. The pewter's clear association with the wreck and readily datable form provide an excellent *terminus post quem* for the site of around 1720. Adjusting for continued use gives a date range between 1600 and 1730 for the Elmina Shipwreck Site.

4.3.3 Manillas: From the time of discovery, it has been apparent that manillas comprised a significant part of the cargo carried by the vessel that sunk off of Elmina. A large tangled concretion of the brass bracelets was observed by Cook on his initial dive. Numbering in the hundreds, the intertwined mass of manillas still retained the cylindrical

[71] Touch marks on some pieces of pewter recovered from the *Batavia* (1629) also contain the letter B and H in circlet above crowned rose (Green 1989:154, 156). These marks are similar but not identical to those observed on the Elmina Wreck site pieces.

shape of the barrels in which they were packed for shipping (Cook and Spiers 2004: 20). Further reconnaissance in 2005 revealed two more large masses of manillas, one between two stacks of brass basins in the center of the site and another on the site's western fringe. A large number of unconcreted, individual manillas were also recovered across the entire site.

No more large masses of manillas were discovered in 2007, but a large number of individual manillas (636) were recovered during excavation. Three units in the center of the wreck (K, M, and N) accounted for 448 of these. The large concentration of manillas in a relatively small area likely represents the remains of another large mass like those observed in other areas of the wreck. Because of their similarity, cost of conservation, and the large number collected in 2005, only a small representative sample were kept for analysis in 2007. Though identical in form, these eight manillas demonstrated variability in casting. This is evident across four measures—widths ranged from 82.5 mm (3.25 in) to 96.5 mm (3.8 in), with an average of 91.625 cm (3.61 in); gauge at center from 7.5 mm (.3 in) to 8.5 mm (.33 in), with an average of 7.875 mm (.31 in); diameter of foot from 14.5 mm (.57 in) to 20.5 mm (.81 in), with an average of 17.25 mm (.68 in); and their weights varied from 83 g (2.93 oz.) to 145 g (5-11 oz.), with an average of 113.73 g (4.01 oz.) (Figure 4.7).

Figure 4.7 Manilla recovered from Elmina Wreck site (photo by G. Cook)

Unfortunately the analysis of the manillas recovered is hampered by a dearth of general information about manillas. As one scholar has lamented “manillas were the most common form of copper-ring currency along the west coast from the period of the Discoveries into the twentieth century, but it is remarkable how little is actually known about them” (Herbert 1984:201). Few scholars have examined how their shape and form changed over time and from region to region (both in terms of African regional preference and European manufacture). Archaeologically, very few examples have survived. They are not commonly found in assemblages from terrestrial sites (e.g.

DeCorse 2001a:147; Stahl 2001; Kelly 2001), and those recovered from shipwrecks are limited to only a few examples from a small number of sites.[72]

Much of the information about manillas that we have comes not from archaeologists or historians but has been pieced together by collectors from examples either recovered by treasure hunters and salvers from would-be archaeological sites or obtained from the West African coast (e.g. Semans 2008). The accuracy of this data is suspect due to poor provenience and an inherent bias towards the more modern (late nineteenth century) forms, many of which can still be found on the continent today.[73] Two ethnographic sources often cited, Johansson's (1967) *Nigerian Currencies* and the writings of Percy Talbot (1967, 1969), are problematic in their own right. In his ethnographic description of Nigerian ethnic groups Talbot listed nine different types of manillas but provides little or no description of each. Furthermore, while he differentiated between types still used at the time of his writing and previous types used among the tribes of Nigeria, he failed to contextualize how long ago these former types were used. Johansson's study, which is more comprehensive, lists a greater number of manillas and provides illustrations; however, for reasons unclear, he chose to only illustrate nine of his types. Further confusion is added by the fact that though he recognizes Talbot's types, none of Talbot's names match those provided by Johansson. Lastly, both authors' sole emphasis was on Nigerian currency of the late nineteenth and

[72] Examples include the *Batavia* (Green 1989:191); Saint-Quay-Portrieux Wreck (Herry 2004); and Manilla Wreck (Smith and Maxwell 2002).

[73] The importation of manillas lasted until 1894 and in some areas they were still used as an official currency as late as 1948 (Johansson 1967:19). According to Alpern (1995:13), the British Colonial government stopped the importation of manillas into Nigeria in 1902 and withdrew them from circulation in 1949.

early twentieth centuries and therefore they are of little use for distinguishing earlier manilla types and regional variation.

The analysis of the manillas from the Elmina Wreck affirms how little is understood concerning the development of the manilla trade and highlights the need for more comprehensive scholarly study. The shape of manillas recovered from the Elmina Wreck is known as the Popo, also sometimes referred to as French Popo, type. Thought to have been made in Nantes, France and possibly Birmingham, England, Johansson (1967) and Semans (2008) attributed Popos to the late-period trade of the nineteenth century. However, a single manilla, similar in shape and size to those recovered from the Elmina Wreck was recently discovered among the remains of the eighteenth century Saint-Quay-Portrieux wreck (Herry 2004).[74] This suggests that the manufacture of Popos, or at least a variation of them, dates at least to the beginning of the eighteenth century; and now with the discovery of the Elmina Wreck, perhaps even earlier. Variations in size and weight—115 g (4.06 oz.) for the Saint-Quay-Portrieux wreck versus the 131 g (4.62 oz.) given by Seaman for nineteenth century Popos—suggests that while Popo's retained their basic shape, over time their weight increased. At 113 g (3.99 oz.), the average weight of the manillas recovered from the Elmina Wreck are closer to the Saint-Quay-Portrieux type than the nineteenth century type. While a definitive date for the introduction of the Popo manilla remains unknown, its presence on the Saint-Quay-Portrieux site demonstrates a much greater time depth than previously

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[74]Along with the manillas, divers also recovered a number of glass beads, and nearly 100 African elephant tusks suggesting that the site represents the remains of a homeward bound African trader. Based on their analysis of the European ceramics, glass, pewter, bricks, and navigational equipment, archaeologists believe the that the Saint-Quay-Portrieux wreck is the remains of a Dutch vessel dating to the first half of the eighteenth century (Herry 2004)

acknowledged, giving credence to the evaluation of the Elmina Wreck dating sometime between the seventeenth and early eighteenth centuries.

4.3.4 Brassware: Beginning with Cook's discovery in 2003, brassware has been prominent in the identification and interpretation of the Elmina Shipwreck site (Cook and Spiers 2004). The large numbers of nested brass basins littering the seafloor, which Cook observed on his initial dive, were a key feature suggesting that what he had discovered were the remains of a European shipwreck. Recognizing their significance, Cook collected a stack of five small brass bowls, the first artifacts to be recovered from the Elmina Wreck site.

Large in number and prominent among exposed artifacts, brassware was a major focus of the 2005 field season. The position of all exposed stacks was recorded, measurements were taken in-situ, and a representative sample of the smaller types was collected for further analysis. Seven stacks ranging in number from three to thirteen pieces each (a total of 49 pieces) were collected in 2005 and were analyzed by Nicole Hamann (2007) as part of her master's thesis at the University of West Florida. Based upon the characteristics of each artifact set (grouping consistently occurring traits together), morphological distinctions, chemical composition, and historical descriptions, Hamann subdivided the brassware into four distinct types.[75] Though thorough, her analysis regarding the temporal and geographic origins of the brassware was inconclusive.

Due to the large representative sample of hollow brassware collected in 2005, only a single stack of nested small brass basins were kept for analysis during the 2007

[75] Hamann's typology does not represent the full range of metalwares comprising the Elmina Shipwreck site as it excludes those pieces left in-situ.

field season. These round basins measured 13.1 cm (5.16 in) in diameter, 4.3 cm (1.69 in) deep, and had a flared flat rim extending 2 cm (.79 in). Though miniscule relative to the overall artifact count, these basins represent one of the largest and most significant artifact groups present at the site.

All pieces of hollow brassware recovered so far from the site share two universal characteristics: the presence of concentric annular grooves on both the interior and exterior of each vessel and a small indentation rising interiorly in the center of the base, a feature commonly referred to as a "pip" (Figure 4.8). These features are characteristic of a manufacturing technique known as spinning, which involves the use of a lathe to manipulate sheet metal into a desired shape. Hollowwares are formed by wedging a disc of sheet metal against a rotating chuck (a wooden former or pattern of the desired profile); then the metal is literally pushed into shape using a blunt-nosed tool leveraged against movable pegs positioned along the side of the lathe. The pressure applied by the clamp used to wedge the disc against the chuck often deforms softer metals such as brass and copper resulting in a small indentation or "pip". Similarly, tools comprised of a substance harder than the vessel's base metal can leave annular grooves as the piece is leveraged into shape while rotating against the chuck (Hull and Murrell 1984:94; Ward et al. 1995:237).[76]

[76] This would be particularly true for pieces made by craftsmen of lesser skill and likely more prominent on early pieces, as the technology and technique did become more and more refined over time.

Figure 4.8 Top: Close-up photographs of the touchmarks discovered on two of the brass basins recovered in 2005. Below: Three basins recovered in 2005 after having undergone conservation. Notice the concentric rings and distinctive "pip" in the center of each (Photos by N. Hamann).

Though more commonly associated with the nineteenth century and later (Day 1991:177), the use of spinning in the manufacture of metal hollowware dates at least to Roman times while the lathe, the principal technology required for spinning, could date as far back as 1200 BC (Cave 1977:85; Woodbury 1961:23; also see Strong 1966;

Tylecote 1962).[77] Unfortunately few clues exist regarding the technique's development from its classical invention to its industrialization in the nineteenth century, but it is probable that spinning has been practiced continuously for at least the last 2000 years. In his history of the lathe, Woodbury (1961:38) reminds us that "whatever the Dark Ages may have been politically, intellectually, or artistically, there is no reason to assume a corresponding decline from the high level of Roman technology." "The lathe" for example, "persisted as an important tool throughout the medieval period" (Woodbury 1961:38).[78]

The first clue that post-Roman metal spinning, or at least the technological advances required for it, pre-dates the nineteenth century by a significant margin comes from a manuscript by Theophilus Presbyter written about 1130 AD, in which he describes a metal cutting lathe used in finishing cast pewter vessels (Presbyter, cited in Woodbury 1961:40). This is the first known description of a metal turning lathe since Roman times. Some 400 years later a decree of the Nuremberg Council written in 1559 refers to the "Red-metal turners," a guild of craftsmen who produced turned objects made of copper and brass (Klemm 1964:153-159). Subsequent decrees by the Council, between 1559 and 1591, suggest a proliferation in metal turning technology, as no fewer than five different lathe drives—wheel, hand, treadle (pole), horse, and water—are mentioned (Klemm 1964:153-159). An example of at least one type of these lathes can be seen in Jost Amman's 1568 woodcut of a German Pewter, in which he clearly depicts a craftsman turning a pitcher while his apprentice cranks a large flywheel in the

[77] Much of the nineteenth century bias can be attributed to two factors: a focus on the Birmingham Brass industry in sources available in English and a dearth of pre-nineteenth century archaeological examples.
[78] For the purpose of interpreting the Elmina Wreck, however, proving direct continuity is not imperative.

background (Figure 4.9) (Amman and Sachs 1973:83).[79] It is clear then that by the beginning of the sixteenth century artisans had developed all the important elements of the modern metal turning lathe: continuous drive, heavily constructed bed and stocks, a mechanical tool holder and carriage, and a spindle drive. Innovations continued. A pewterer producing spun

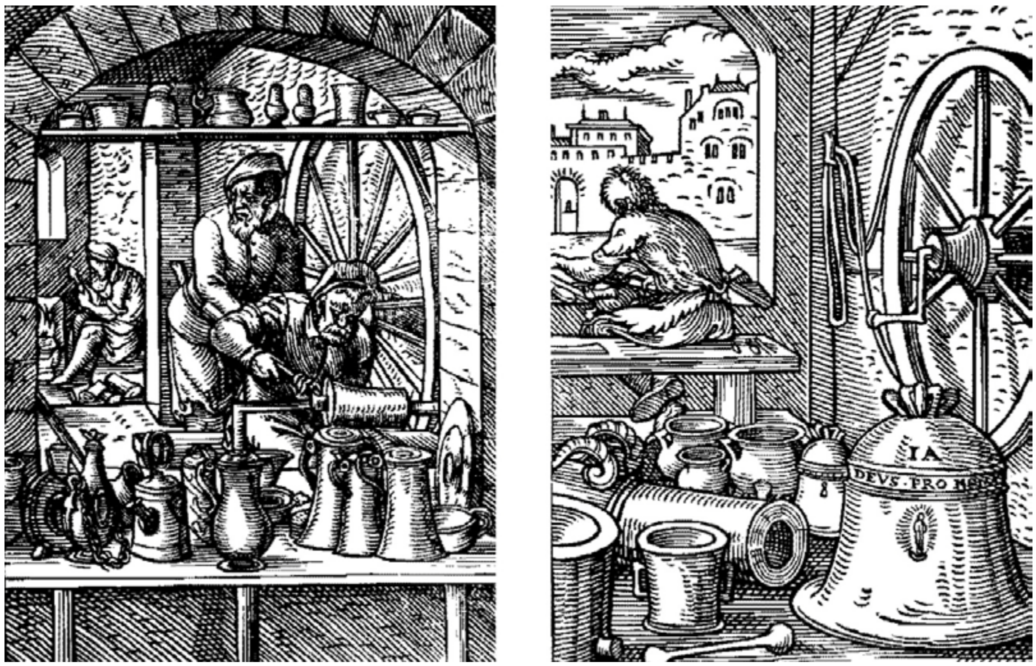

Figure 4.9 ***The Pewterer*** **and** ***The Bell Founder*** **woodcuts by Jost Amman, 1568. The pewterer is turning a pitcher on a lathe driven by the flywheel in the background (Amman and Sachs 1973:83).**

hollowares by way of a flywheel-powered lathe can be clearly seen in German copper engraving from 1699 (Figure 4.10) (Barkin 1988:8). Iron cutting lathes were in use by at least the first decade of the eighteenth century, and a lathe is clearly depicted in the background of a 1763 engraving of a French coppersmith's shop (Diderot 1763; Plumier

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[79] Though no lathe is depicted, a large flywheel very similar to the one used to power the pewterer's lathe is seen in the background of Amman's woodcut "The Bell Founder," a trade responsible for the production of bells, cauldrons, and mortars (Figure 4.9). Taken in conjunction with contemporary references in the Nuremberg Council decrees that large guns were among the many items produced by members of the Red-metal turners, it would appear that lathe technology of the mid to late sixteenth century had advanced to a point where even extremely large pieces of metal were capable of being turned on a lathe (Amman and Sachs 1973:62; Klemm 1964:153-159).

1701; Woodbury 1961:82). Seventeenth century Dutch and Flemish still lifes may provide further evidence of the early production of spun brass hollowares, as several paintings depict brasswares with clear concentric marks (Figure 4.11).[80] As these masters sought to portray lifelike and accurate depictions, these marks are likely not happenstance.

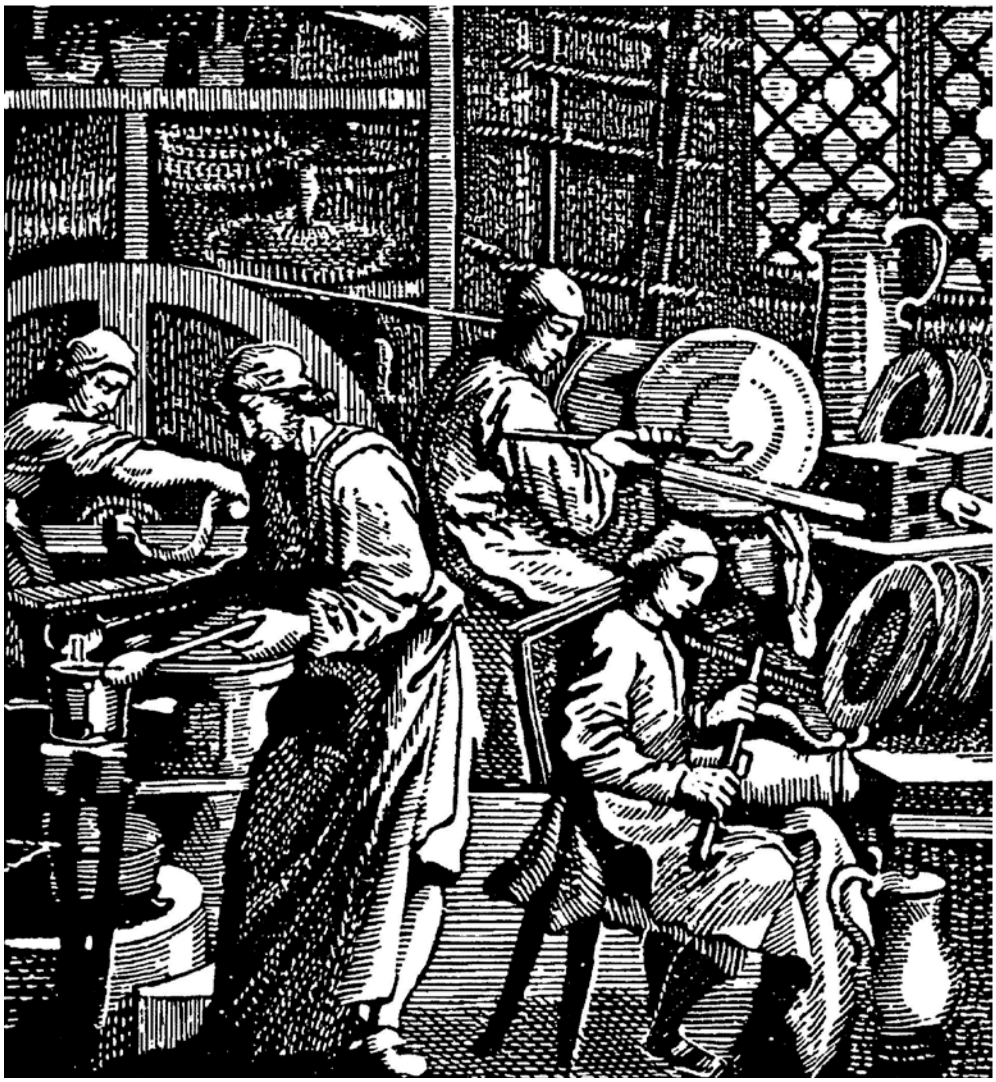

Figure 4.10 *Der Kandelgiesser* (The Pewterer), a copper engraving by P.Abraham and S. Clara, Würzburg, Germany, 1699. The craftsman in the background is producing spun hollowares on a flywheel driven lathe (Barkin 1988:8).

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[80] For example see Peter Boel *Still Life of Fish on a Quay* (c. 1660-1665)(Helmus and Jongh 2004: 234); Jacob Gillig *Still Life of Fish with a Cauldron* (c. 1678) (Helmus and Jongh. 2004: 284); Abraham Vosmaer *Fish on a Kitchen Counter* (c. 1650) (Helmus and Jongh 2004: 306).

Figure 4.11 Top: ***Kitchen Scene*****, Floris Gerritsz van Schooten, 1620s (Wheelock Jr. 1989:80). Below:** ***Still Life of Fish with a Cauldron*****, Jacob Gillig, 1678 (Helmus and Jongh. 2004:284)**

This evidence clearly indicates the technological elements necessary to produce spun metalwares predates the more conventional date of the nineteenth century. It is highly likely that spun metalwares have been produced continuously since Roman times, though witnessing an expansion of growth during the industrial revolution. Although the technique's popularity appears to have waned, it reemerged in Germany beginning in the sixteenth century. As evidenced by Council decrees, German guilds (then Europe's most technologically advances and skilled coppersmiths) guarded such advancements with zeal, likely retarding the technology's spread to competing European powers.[81] Though contemporary sources indicate a prevalence of battery techniques, spinning would have been advantageous for the African market as it provided a faster mode of production to keep up with the ever increasing demand for large amounts of plain brass hollowware needed to supply the West African market.

Two brass basins recovered in 2005 bear marks. The marks, appearing the same on both pieces, are indistinguishable but may represent a fleur-de-lis or a stylized cross with the letters "M" and/or "W" legible on each side (Figure 4.8) (Hamann 2007). Though untraceable as the design is not fully legible, the presence of such marks on early brass pieces implies continental manufacture. While English coppersmiths rarely stamped their wares prior to the nineteenth century, the highly skilled guilds of Germany required stamping by at least the beginning of the sixteenth century (Garrard 1980:60; Pohl 1977:234; Strauss 1976:137).

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[81] English adoption of spinning metal hollowware does not appear to have taken place until the late eighteenth century when it was employed in the production of goods made from Britannia metal, an alloy of tin, antimony, and copper. It was later adapted to steam and widely employed in the Birmingham brass industry to produced large quantities of copper and brass hollowares (Day 1991:177).

Lastly, Atomic Absorption Spectroscopy (AAS) revealed the composition of the brassware to be between 70-76 % copper and 23-29% zinc (Hamann 2007:151-154). Zinc concentrations higher than 33% indicate brass made in the nineteenth century (Craddock and Hook 1995:186). Zinc concentrations lower than 33% do not preclude manufacture post 1800 as the cementation process of brass making was used up to the 1860s; however, these metallurgic findings are in line with what would be expected for seventeenth or eighteenth century pieces.

4.3.5 Cowries: The number of cowries encountered during excavation numbered into the thousands. Because of their abundance and apparent uniformity, coupled with time and financial constraints, only a small representative sample was recorded. Five cowries were collected and analyzed from each unit and level in which they were present. The small representative collection confirmed field observations of a predominance of a single species. 138 of the 145 shells collected, or 95.17 %, were classified as *Cypraea moneta*. Four *Cypraea annulus*, two *Trona stercoraria*, and one *Zonaria zonaria* were also represented in the collection (Figure 4.12).[82] *C. moneta* and *C. annulus*, neither of which are indigenous to West Africa, are found exclusively in the Indian Ocean and likely are associated with the wreck's cargo (Lorenz and Hubert 2000). *T. stercoraria* and *Z. zonaria* are indigenous to Ghanaian waters and the shells are not likely associated with the wreck (Edmunds 1978; Lorenz and Hubert 2000).

[82] Classification was carried out using the plates and dichotomous key in *A Guide to Worldwide Cowries* (Lorenz and Hubert 2000)

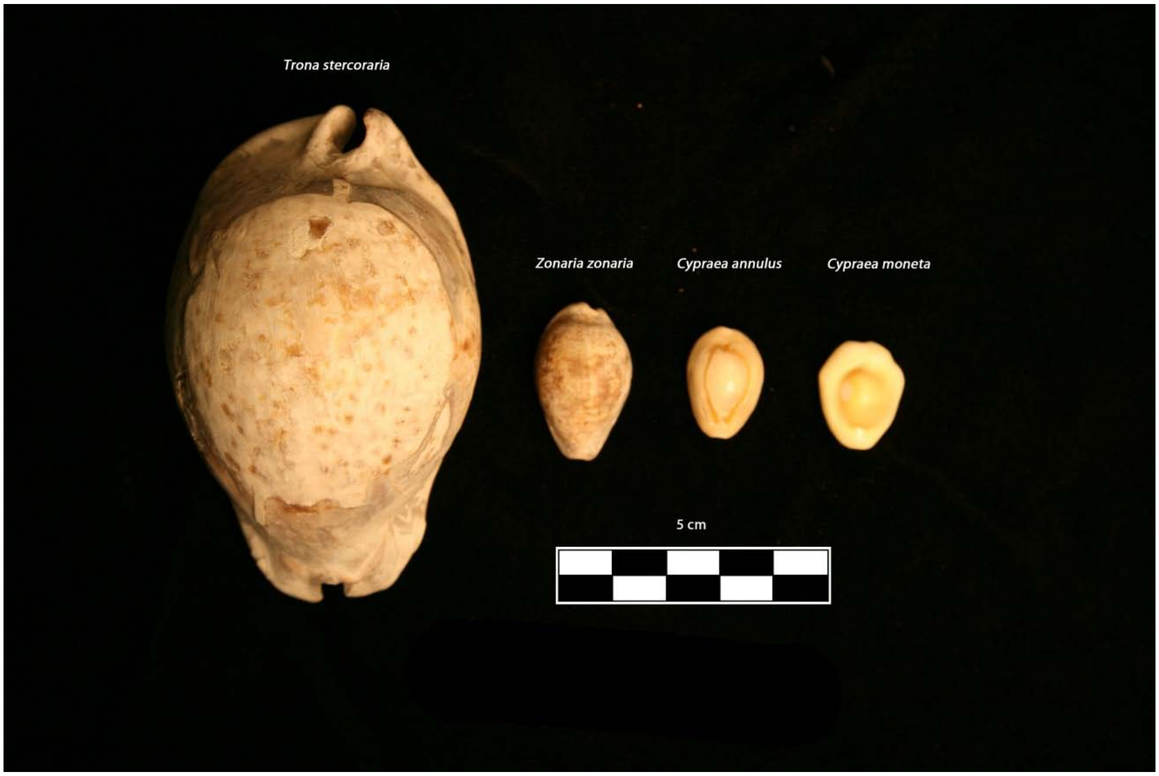

Figure 4.12 Four species of cowries collected from the Elmina Wreck site. Left to Right: *Trona stercoraria, Zonaria zonaria, Cypraea annulus, Cypraea moneta* (Photo by A. Pietruszka).

C. moneta remained the exclusive cowry accepted by West African traders until the introduction and acceptance of *C. annulus*. Closely related and similar in appearance, the first known shipment of *C. annulus* was received in Whydah in 1845 (Johnson 1970:23). Though never superseding *C. moneta*, the trade in *C. annulus*, a cheaper substitute that could be procured along the East African coast, grew rapidly, accounting for a significant share of the cowry trade in the second half of the nineteenth century. However, while the shells of *C. annulus* were readily accepted in Benin, Togo, and most of Nigeria, it was never accepted west of the lower Volta (Krause 1895:371).

While the appearance of four *C. annulus* shells in the collection is suggestive of a wreck dating somewhere in the second half of the nineteenth century, their small proportion to the overall sample calls such a conclusion into question. Historical sources suggest that European traders collected the two types of cowries from two different geographic locations; traditionally, *C. moneta* were acquired from the Maldives and *C. annulus* from the East African coast. The ecological ranges of each species, however, are not limited to these two areas as both are found throughout the entire Indian Ocean, though with varying frequencies (Lorenz and Hubert 2000: 204-205). With overlapping ranges it is reasonable to assume that a few of one species would be collected with the other, especially with two species so similar in appearance.

4.4.6 Beads: A large numbers of glass trade beads were encountered during both the 2005 and 2007 field seasons. Numbering well into the thousands, beads were frequently found inside other artifacts such as bottles or stacks of brass basins, and intermixed within concretions. Large numbers of glass beads were also encountered in every unit excavated in 2007. The overwhelming majority of beads were found individually, intermixed throughout the site’s matrix; however, several large masses of type two beads were discovered in 2007 still concreted in long linear rows indicating that some of the beads were ship pre-strung (Figure 4.13).

Figure 4.13 Mass of trade beads concreted in long linear lines indicating that at least some of the beads on board were shipped strung (Photo by S. Pickett)

The beads recovered in 2005 were analyzed by Lisa Hopwood (2009), the results of which are contained within her master's thesis. Using Kidd and Kidd's 1983 typology and Karklin's 1985 asterisk system, Hopwood identified 16 types, designated Elmina types 1-16, based on form, manufacture, and color variation (Figure 4.14). The overwhelming majority (99 percent) of beads so far discovered fall within Hopwood's types 1-7, equivalent to Kidd's Type IIa or Karklins IIa*. These are small monochrome drawn seed beads that averaged 2-3 mm in diameter and 1.5-2.5 mm in length. Colors include translucent orange, translucent yellow, opaque yellow, translucent dark green, opaque light green, transparent blue, and opaque light blue. Elmina types 8-10 are small (2-4 mm) to medium (4-6 mm) opaque white drawn beads either round, ellipsoidal, or barrel shaped. Elmina types 11 and 12 are small striped drawn seed beads of the Kidd Type IIbb. Four types of compound (or multilayered) beads make up Elmina types 13-16.

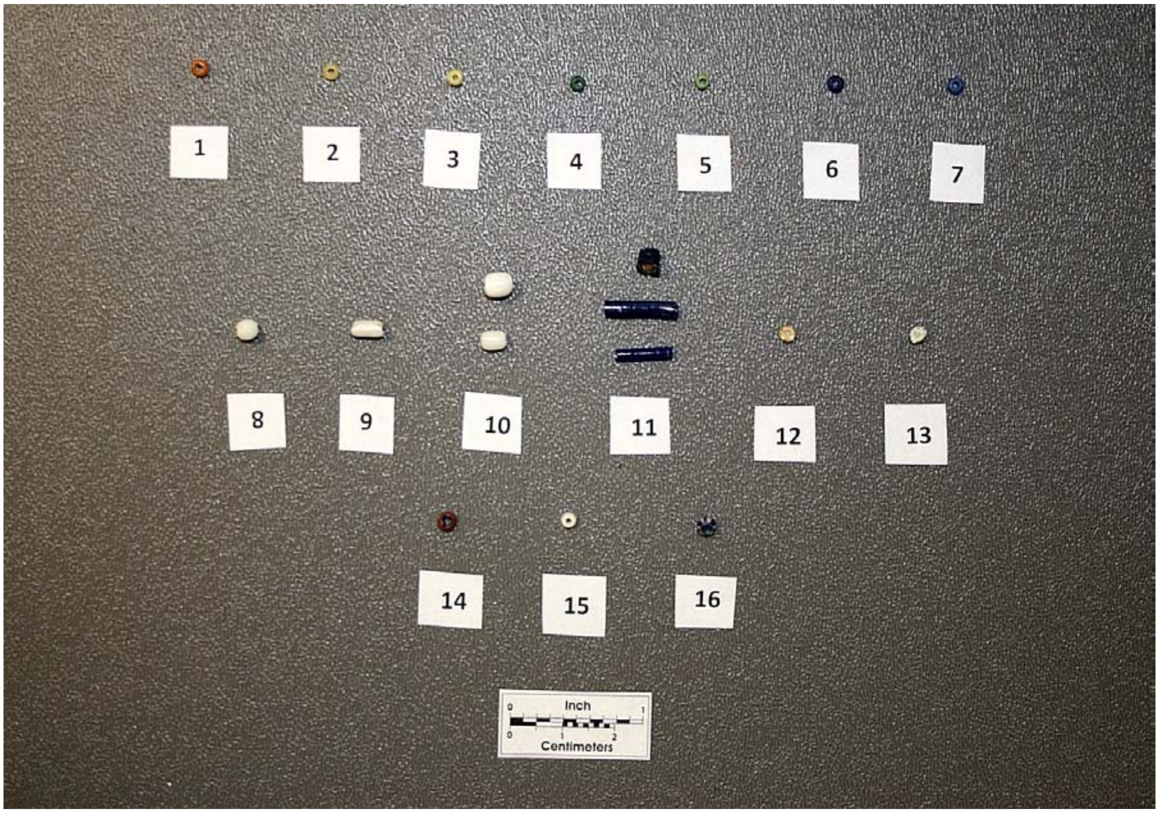

Figure 4.14 Bead Assemblage from the Elmina Wreck site, 2005 (Photo by L. Hopwood).

The production range for small glass beads of these types spans the entirety of European-African contact in West Africa and has been one of the chief European imports since Portuguese times (Alpern 1995; DeCorse 1989). Unfortunately, the types of beads discovered on the Elmina Wreck site are not particularly diagnostic in terms of the date and origin of the vessel; however, they are consistent with those that would have been carried by a Dutch vessel from the mid seventeenth to early eighteenth centuries.

4.3.7 Lead Rolls: A large number of lead rolls rest exposed on the eastern boundary of the wreck site (Figure 4.15). When taken together the number of rolls resting in a single pile, their large size (1 m by 30 cm), and weight make it highly likely that they were carried as part of the vessel's cargo and are not intrusive to the site. Lead rolls have been found associated with several seventeenth century Dutch vessels including the *Batavia*, *Oosterland*, and *Zuytdrop* (Green 1989:194; McCarthy 1998; Werz 2004:77).

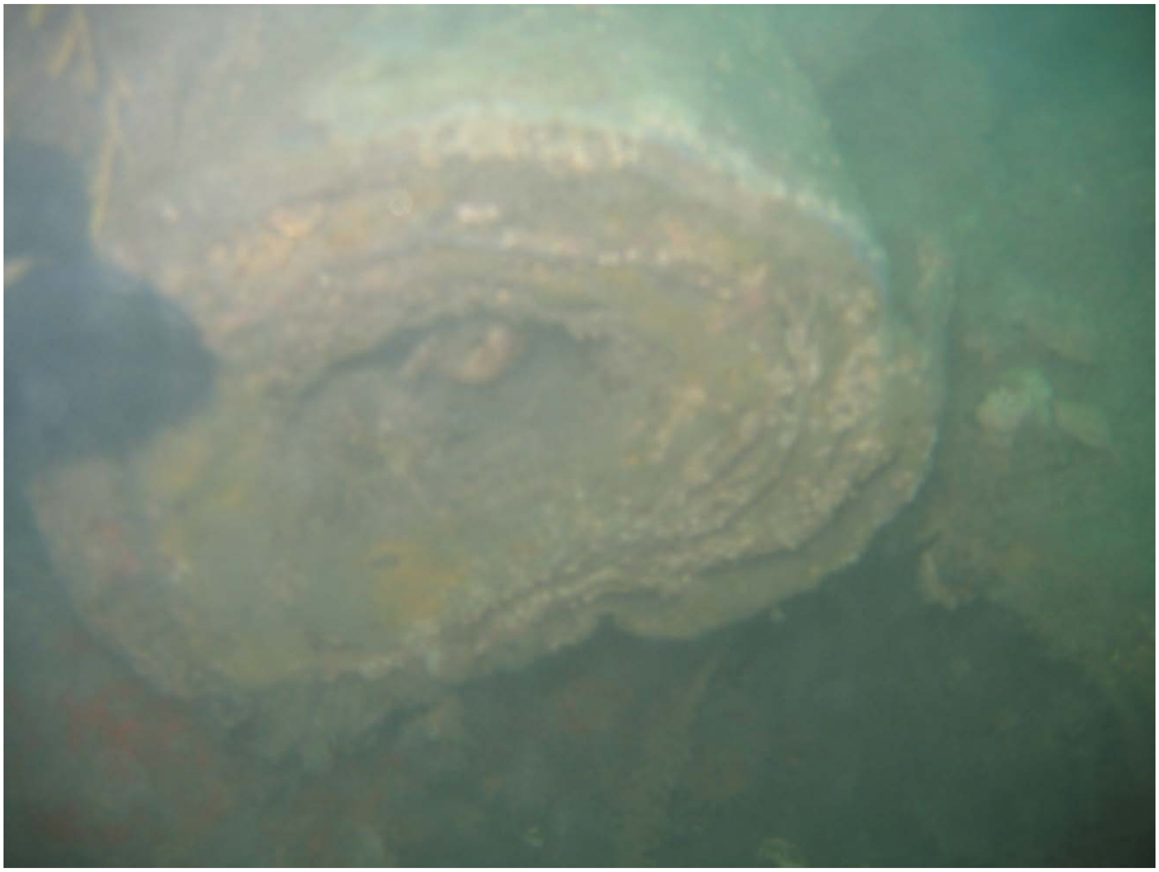

Figure 4.15 Rolled lead sheet from the Elmina Wreck site (Photo by R. Horlings)

4.3.8 Historical Context of the Definitive Remains: In the end, seven artifact classes—pewter, cannon, brassware, manillas, beads, cowries, and lead rolls—were identified as the definitive archaeological remains of an unknown vessel that is the Elmina Wreck site. The analysis of these materials has provided key evidence as to the age and origin of this ship. The pewter plates, with their distinctive raise boss and crowned rose touch mark, date the wreck sometime between 1600 and 1730 and suggest a Dutch origin for the vessel.

Pewter wares came rather late in the West African trade as they are absent from discussions concerning the Portuguese period of trade and do not appear in Dutch trade accounts until the second half of the seventeenth century (for Portuguese context see, Vogt 1979:68-69). The only mention of pewter in de Marees' 1602 account is in reference to decorative adornments, in particular pewter bracelets, and of these he notes that they are not accepted in great quantities (de Marees 1987:53). Although the exact origin of the trade is unknown, it appears that pewter dishes and porringers had become commonplace by the middle of the seventeenth century. They are found among the list of items General Ruÿchaver proposed as cargo in 1653 (Jones 1995:175-177) as well as those detailed by Dapper (1676), Barbot (1992:561), and Tilleman (1994:41). And in 1693, according to Thomas Phillips, master of the English slaver *Hannibal* "the goods they most covet are pewter basons, the larger the better" (Phillips 1746:213 in Moore and Malcom 2008).

While all European nations trading on the Gold Coast acquired some goods for the West African market from their rivals, the preferred trade was in domestic products. According to Barbot (1992:560) "every nation of Europe carries to this coast [Gold Coast] as many things suitable for the trade as it can from its own country." Since by the seventeenth century pewter smiths were well established in all of the major European nations vying for the Gold Coast trade there would have been little need to acquire these goods from their rivals (Barkin 1988:9, 22-23). The archaeological record appears to support this in that several seventeenth century and early eighteenth century wreck sites contain only domestic pewter (e.g. Barkin 1988; Green 1989; Moore and Malcom 2008).

Unfortunately, the other artifacts identified as coming from the vessel were less diagnostic in regards to site identification; however, the analysis of these materials still yielded pertinent information. Taken together, these artifacts reveal that the vessel was inbound to the coast at the time of its wrecking and can provide a wealth of information regarding the trade goods carried in its still-laden hold. Although no further definitive date ranges could be established for these items, none of these artifacts are incongruent or out of context with the age and origin prescribed by the pewter basins. Rather, the historical record demonstrates that all of these items have a long-standing tradition on the Coast consistent with what you would expect to find aboard a seventeenth century Dutch merchant vessel.

Although little is known about the development of manillas, surviving examples indicate an evolution in form. Possible drivers of this change include temporal modifications, regional indigenous preference, and European manufacture, but more research is needed to understand each one's typological effect. The form discovered at the Elmina Wreck site is commonly referred to as a "Popo" manilla. Previously thought to be a nineteenth century form, archaeological finds from the Saint-Quay-Portrieux wreck now date it to the first quarter of the eighteenth century. Their presence on the Elmina Wreck site may indicate an even earlier date of use.

Barring Dapper's (1676) description of manillas as "oblong with a rounded curve," few details have survived documenting their appearance in seventeenth and eighteenth centuries. However, the historical record indicates a prolific trade, and their abundance on the Elmina Shipwreck site fits a seventeenth or early eighteenth century context. Starting with the arrival of the Portuguese at the end of the fifteenth century, manillas were one of the most copious items traded by Europeans on the West Coast of Africa up until the early twentieth century. Although inadequate records make it impossible to know the exact number imported during the 400 year time span, surviving figures suggest a staggering rate of importation. In a three year period (1504-1507), the Portuguese agent at Elmina received 287,813 brass and copper manilas or roughly 100,000 per year (Garrard 1980:73; Alpern 1995:13; DeCorse 2001a:147). Six years later, the inventory numbered 302,920 or roughly 94.5 tons of brass bracelets (Herbert 1984:126). By the 1520s annual sales on the Gold Coast had reached 150,000; and in 1548, the Portuguese ordered the casting of an astonishing 1,400,000 manillas for the Gold Coast trade (Alpern 1995:13; Blake 1967:107).

Though figures like those available for the Portuguese in the sixteenth century have not survived for the Dutch in the seventeenth century, it is clear manillas continued to play a significant role in European-African trade at the hypothesized time of the Elmina Shipwreck. Included among de Marees (1987:52) account of European goods traded on the coast are “red and yellow copper Bangles” which the native tribes wore “around their arms and ankles, as a great ornament.” Forty years later, the Dutch factor at Elmina wrote of their requirement for trade along the Grain Coast, Arbo, and the Bay of Cameroon (Ratelband 1953:xcviii), while another mid-seventeenth century Dutch manuscript states their necessity in trade between Allada and the Rio Real (Jones 1995:5). In 1646, the Dutch factor at Arbo (Benin), lamenting of their short supply, noted how “they are necessary here for trade and sustenance” (Ryder 1969:97 (cites WIC doc)).[83] In 1670, manillas are included amongst the list of items brought by Europeans

[83] Drawing upon surviving documents of the W.IC., Daaku (1970:38) notes their demand on the Gold Coast in 1647.

for trade along the Coast compiled by Dapper (1676). Likewise, although not published until after his death in 1712, they were included by Barbot (1992:561) in his discussion of trade conducted in the last quarter of the seventeenth century and as well as in Tilleman's (1994:41) list published in 1697.

Like manillas, brass hollowares were abundant at the site, yet remain circumstantial due to a dearth of knowledge regarding typological developments. Investigation into the touch marks discernable on two basins revealed no matches or clues as to their origins. Metalurgical tests confirmed that the brass was smelted using the calamine process; however, this process, which dates back to the first millennium B.C., was widely used in Europe from the fifteenth century through the middle of the nineteenth century and thus provides little help in analysis. The concentric rings incised on the vessel's interior and exterior are indicative of a manufacture by spinning. Although no direct evidence for this poorly understood technique is known prior to the nineteenth century, a large amount of indirect evidence suggests a much older origin dating as far back as Roman times. The evidence therefore does not preclude the proposed context, and written sources confirm the likelihood of a large compliment of brass hollowares being a major component of a seventeenth or early eighteenth century Dutch Gold Coast cargo.

Brasswares of all kinds were one of the most important and abundant items imported by Europeans for trade along the west coast of Africa. It is estimated that manillas and basins alone accounted for 37% of the Portuguese trade from 1480-1540 (Vogt 1979:76), and the volume of brass and copper imports continued to increase over time. This is how, at the beginning of the seventeenth century, the Dutch, given their close proximity to Germany, Europe's center of copper production, and their burgeoning role as Europe's leading distributor of manufactured goods, found themselves in a position to dominate the West African market by responding to this ever growing demand.[84] Within fifteen years of their first expedition to the coast, it is estimated that the Dutch were importing some twenty tons of copper/brass basins, kettles, and hardware (Daaku 1970:1; 33-39; de Marees 1987:51-55). Included among these items were "all sorts of basins…such as small and large Neptunes, Barbers' Basins, cooking Basins, *fater*-basins, chased basins, big Scottish Pans,…, and small rimless Cups" (de Marees 1987:52). These were brought in such great quantities, it was said that they were "so common in the Country that people often sell brass-ware as cheaply as it is bought in Amsterdam" (de Marees 1987:52); the founding of the WIC in 1621 only served to increase the trade even more (Herbert 1984:133). By 1635, Samuel Blommaert, director of the WIC, estimated that the Dutch, English, French, and other Europeans were shipping a combined 1 to 1.4 million pounds of copperwares to West Africa annually (Ratelband 1953:xcix).[85]

Regrettably, there is little evidence from which to discern similar figures for the second half of the seventeenth century; however, what has survived continues to highlight the importance of brasswares throughout the remainder of the century and into the next. Writing from Elmina in 1653, General Jacob Ruÿchaver dispatched a letter to his commanders back in Holland detailing the compliments of what he believed to be a successful and profitable Gold Coast cargo. Among the merchandise to be included were some 43,000 pounds of brass basins (Jones 1995:175). In other words, the annual

[84] See Vogt 1979:146

[85] Based on the Dutch pound of 1.09 pounds avoirdupois, this amounts to 545 to 763 tons per year (Herbert 1984:133)

tonnage of brass tallied for the entire Dutch West African trade just fifty years earlier was now required of a single ship in order to maximize profit. Though no other figures are given regarding quantity, in the last half of the century a variety of brasswares are included among the items suitable for trade recorded in contemporary historical accounts (e.g. Barbot 1992; Dapper 1676; Tilleman 1994).

Due to sheer numbers encountered on site, cowries were included among the items definitively identified as part of the ship. Two non-indigenous species of cowries were discovered among the wreck. However, representative sampling revealed that the overwhelming majority of cowries, belonged to a single species, *C. moneta*, that accounted for 95.17% of the sampled population.

C. moneta, commonly referred to as the money cowry, and *C. annulus* were the only cowries used as currency in West African commerce (Johnson 1970:17). While highly likely that for parts of West Africa a cowry currency preexisted European contact, it was the Europeans, capable of importing large volumes of the shells from the Indian Ocean, who were responsible for its eventual expansion and proliferation.[86] The first Europeans to utilize cowries (*C. moneta*) in the West African trade were the Portuguese. By 1515, they were trading large quantities of the shells in Benin where they were readily accepted and from here the practice rapidly expanded. The trade stretched eastward to the Niger Delta, and westwards from the Benin and Forcados areas in the sixteenth century to Whydah and Ardra in the seventeenth century; Christiansborg by the end of the seventeenth century; Winneba by the early nineteenth century; until reaching its western terminus, Anomabu, by the middle of the nineteenth century (Johnson 1970:35).

[86] For a discussion on pre-European cowry currencies in West Africa see (Johnson 1970:18, 32-34; Johansson 1967:28)

The appearance of cowries in Dutch markets coincided with their takeover of the island of Ceylon and they were shipped in larger quantities starting in the middle of the seventeenth century (Glammann 1958:22; Hogendorn and Johnson 1986:37-40). According to Barbot (1732:338), they were “commonly brought over from the East Indies…and put into small barrels in England or Holland for the better conveniency of the Guinea trade.” Mid seventeenth century Dutch manuscripts tell how cowries were in demand from Allada to Cameroun Bay where they served as a medium of exchange (Jones 1995:15) and they are included among many of the trade lists from the end of the century (e.g. Barbot 1992:561; Dapper 1676:305; Tilleman 1994).

Like cowries, several types of small glass trade beads were found in such great quantities that they were deemed part of the vessel’s assemblage. Analysis of the beads revealed 16 types, but unfortunately all types proved indiscriminate. Small wound round beads and drawn beads like the ones discovered on the Elmina Wreck site were common trade items and manufactured by the millions throughout the entirety of the Atlantic trade. Their simplicity also makes their source of manufacture nearly impossible to determine.

Historical records describe a long and prolific trade. Alpern (1995:22) has referred to glass beads as “among the all-time bestsellers” due to the sheer number (estimated to be in the billions) imported throughout the course of the Atlantic trade. Although only two varieties of beads were discovered at the Elmina Shipwreck site, a wide range of varieties were known to have been imported to meet the specific desires of the many West African markets, each market demanding its own specific size, color and layout.[87] For example 14 different types alone were included among a single Dutch cargo from 1646 (Ryder 1969:98). Historically, the most common type was small colored glass beads manufactured in Venice and Netherlands similar to those found on the wreck (Alpern 1995:22).[88] These are likely the same type de Marees was referring to in the early seventeenth century describing how “they [West Africans] take great quantity of Venetian Beads of all sorts of colours” (de Marees 1987:53). By mid-century it appears that the most requested colors were yellow (lemon), orange, light purple, violet, striped in various colors, black, and green; however, these preferences, like all preferences, likely fluctuated over time (Ratelband 1953:cii).

Last are the lead rolls lying in a pile on the sites eastern boundary. Seemingly not a major commodity traded along the coast, lead, however, does appear on trade manifests as early as 1540 and is included in subsequent lists (Barbot 1992:561; Bennet and Brooks 1965:41; Meredith 1967:69; van Dantzig 1978:77). Although not mentioned in his account of European goods traded on the coast, de Marees (1987:106) did recount how natives stole the lead sheathing from ships suggesting an indigenous demand for it by the early seventeenth century. Apparently, the inferred demand at the beginning of the century was confirmed by its end. In 1653, General Ruÿchaver proposed that 2000 lbs. of lead be included among the cargo of a Gold Coast trader (Jones 1995: 79), while “lead in sheets and in the shape of organ pipes” are described by Barbot (1992:106) in his list of trade items. Lead may also have been shipped to the coast as building supplies as we know that in at least one instance from the eighteenth century, the hall in Elmina Castle was roofed with lead sheeting (DeCorse 2001a:212).

[87] For lists and descriptions of specific types of beads traded by Europeans in the West African market, see Ratelband (1953:cii), Alpern (1995:22-23), Jones (1995:313-325)
[88] For a history of these two centers see Dubin (1987:101-117).

4.4 Artifacts of Equivocation

Using the temporal and geographical parameters (1600-1730, Dutch origin) established from the analysis of definitive items, I was able to divide the remainder of the artifact assemblage into possible inclusive or definite intrusive materials. The first order of analysis was typological and all artifacts with a range of manufacture overlapping the date of the site were identified as possible inclusive. Artifacts anachronistic to this date were considered intrusive. A second order analysis examined all artifacts labeled as possibly inclusive with regards to the historical contexts and documentary evidence of their use by the Dutch on the West African coast in the seventeenth and early eighteenth centuries. Surprisingly, all of these items can be contextualized in regards to a seventeenth or early eighteenth century Dutch trader; however, they remain categorized as possible inclusive due to an inadequate understanding of site formation processes. Because of the small size of these items, the close proximity of European cultural deposits on the coast, and violent wave action, a later deposition of early context materials cannot be ruled out at this time.

4.4.1 Ceramics: The date range of several ceramic pieces recovered in 2007 fall within our estimates concerning the wreck's date and therefore may be part of the ship's assemblage. The six pieces recovered were plainly decorated utilitarian, objects including a strainer, storage jar, a small crock or cup, bowls, and lid. Five of the vessels are European in origin, one Asian. The five vessels identified as European were the small crock or cup, bowls, lid, and strainer. A complete base of a small crock was discovered lying on the surface in unit S12 (Figure 4.16).

Figure 4.16 Earthenware crock recovered from the Elmina Wreck site, 2007 (Photo by A. Pietruszka).

It measures 6.5 cm (2.56 in) in diameter, 5.5 cm (2.17) in height, and its wall 4 mm (.16 in) thick. The body is comprised of red-paste earthenware with a small amount of tiny quartz flecks added as temper. A red lead glaze is present on the vessel's interior. No glaze is present on the exterior; however, rather than the vessel's original finish, the bare paste exterior is believed to be the result of abrasion and the whole piece likely was originally covered with lead glaze. The vessel was made using a coil technique. Its small dimensions and interior glazing may signify a drinking vessel rather than a crock. Lead glazed red-paste earthenwares of this type were common throughout Western Europe from the fifteenth through nineteenth centuries and beyond and therefore any conclusions drawn from such a piece are relegated to speculation. However, comparisons to the ceramic assemblage excavated by DeCorse (personal communication 2010) at the Elmina site suggest this type was more common during the Portuguese and early Dutch occupations (1482-1700) than later times.

A small rim sherd of a pot or bowl was found in level 3 of Unit G11 (Figure 4.17). Using the curvature of the rim remnant, the pot's diameter at its opening is estimated to be 15 cm (5.91 in). Its wall measured 4.5 mm (.18 in) thick. The paste is grey earthenware with small amounts of quartz tempering. A yellow-brown lead glaze covers both the interior and exterior, although much of the exterior glaze has been abraded away. A small rolled lip decorated the vessel's rim. A darkening of the outer-most millimeter of the paste extends from the top third of the lip through the body portion of the fragment, suggesting that the vessel was repeatedly exposed to fire after its initial firing. The most likely explanation is that the sherd is a fragment of a lead glazed earthenware cooking pot. At this time, no more positive identification can be made; however, this type of pot could fall in a seventeenth or early eighteenth century context.

Figure 4.17 Earthenware rim sherd recovered from the Elmina Wreck site, 2007 (Photo by A. Pietruszka)

Figure 4.18 Salt-glazed stoneware sherd recovered from the Elmina Wreck site, 2007 (Photo by A. Pietruszka).

A small body fragment of a brown salt-glazed stoneware jug was recovered from Unit U13 level 2 (Figure 4.18). Approximately 90% of a small horizontal handle or ear is still attached to the sherd. The exterior of the piece is covered with a light brown salt lead glaze but the interior is plain. Its buff paste body is 3 mm (.12 in) thick; no temper is visible, and markings on the interior walls indicate that the piece was thrown on a wheel. European potters favored almost exclusively vertical handles on their pitchers or jugs, therefore the horizontal handle on this sherd is quite distinctive, although a vessel comparable in size, shape, and form does exist in the Dutch National Cultural Heritage Department's maritime archaeology collection (http://www.geheugenvannederland.nl). This piece, which appears identical to the sherd from the Elmina Wreck, was discovered within the remains of a small Dutch fishing vessel excavated from the *Zuiderzee*. The wreck has been dated to the early sixteenth century. While the only other example of this type predates our wreck site by some 150-200 years, the actual range of manufacture for this type remains unknown.[89] Its presence on an early sixteenth century wreck does not preclude a continuation of manufacture into and beyond the seventeenth century.

A complete coarse earthenware lid was recovered from unit M11 level 2 (Figure 4.19). The dome-shaped lid is 12 cm (4.72 in) in diameter and 4.2 cm (1.65 in) tall. Decoration is simple. A mustard yellow lead glaze covered the whole exterior and extends interior to the lip that would have held the lid in place. Four simple green dots arranged opposite one another along the rim decorate the exterior. A simple flat cylindrical knob is centered at the top of the dome. At its rim, the vessel's dome shape transitions to a beveled plateau. It has a buff paste with quartz temper and was made using a coil method. No comparable examples have been found to identify the lid's origin and age, but lead-glazed coarse earthenware is not uncommon on seventeenth century European wrecks. Therefore this piece must be at least considered as a possible part of the original assemblage.

A single rim fragment of an earthenware strainer was discovered in level 1 of unit R11 (Figure 4.20). It is a red-paste earthenware with yellowish-brown lead glaze on both the interior and exterior. Several round holes perforate the fragment. The only form of decoration present is a hanging collared rim with three ribbels where the rim edges are rounded to form the top and bottom ribbel. Based on the rim fragment, the vessel's overall diameter is approximately 36 cm (14.17 in).[90] The form, size, and decoration is similar to seventeenth century Dutch colanders (*vergieten*) discussed by Schaefer (1998:39, 124) and commonly depicted in Dutch still-lifes from that period (Figure

[89] This remains one of the major pitfalls of using shipwrecks to establish dates for material typologies. While shipwrecks can often provide a very precise date for any given artifact, by themselves they do little to inform us about an artifact's range of manufacture, some of which can span hundreds of years.
[90] The fragment contains approximately 10% of the rim's total circumference.

4.21).[91] Several archaeological examples dating to the second half of the seventeenth century have also been recovered from a Dutch fishing vessel found in the *Zuiderzee* (http://www.geheugenvannederland.nl).

Figure 4.19 Coarse earthenware lid recovered from the Elmina Wreck site, 2007 (Photo by A. Pietruszka).

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[91] The *vergieten* from the Elmina Wreck differs from those in Schaefer's typology in that Schaefer observed that the holes in the colander were punched from the inside out while the *vergieten* from the Elmina Wreck appear to be punched from the outside in; For example see Pieter de Putter *A Fisherwoman with Freshwater Fish on a Table* (c. 1640) and *A Fisherman's Interior* (c. 1650) (Helmus and Jongh 2004:246, 248); Wallerant Vaillant *Still Life of Fish With Cat* (c. 1650) (Helmus and Jongh 2004:304).

Figure 4.20 Red earthenware strainer fragment recovered from the Elmina Wreck site, 2007 (Photo by A. Pietruszka).

Figure 4.21 Top: ***Breakfast of Mussels, Cheese, Bread, and Porridge,*** **c. 1620, Floris Gerritsz van Schooten (Wheelock Jr. 1989:79). Below:** ***A Fisherman's Interior,*** **c. 1650, Pieter de Putter (Helmus and Jongh 2004:246, 248).**

A Martavan jar recovered from unit H 11 level 3 is the only ceramic vessel believed to be part of the ship's assemblage not made in Europe (Figure 4.22).[92] The jar recovered from the Elmina Wreck measures 13.4 cm (5.28 in) in height and 13.4 cm (5.28 in) at its widest point. The mouth of the jar is 6.85 cm (2.7 in) in diameter, its base 8.9 cm (3.5 in). It has a barrel-shaped, thick body, and a short straight neck with four small ears placed high on the shoulder. The paste is yellow buff colored with a brown lead glaze covering the top half of the vessel's exterior including the ears and lip. It is very similar to examples found on the *Witte Leeuw* (van der Pijil-Ketel 1982:242) and *Risdam* (Green 1986:100).

Martavans, or martabans as they are sometimes called, is the name given by westerners for large brown or black glazed stoneware storage jars from China and Southeast Asia. The name comes from Martaban, a port of transshipment on the west coast of Burma where early Portuguese and Dutch sailors first encountered such vessels in the fifteenth century.[93] Today, the origin of these vessels is much more varied with scholars attributing them to China, Indonesia, Japan, Laos, Korea, Thailand, Vietnam, Cambodia and Burma (Adhyatman and Ridho 1984; Brown 2000; Maedema 1964; Moore 1970; Ottema 1953, 1970; Spinks 1956, 1959; Volker 1954, Woodward 1974; van der Pijil-Ketel 1982). Produced from the seventh to eighteenth century, they have been used as containers for shipping a variety of goods including sugar, salt, teas, salted fish, butter, oil, and wine and as storage jars for food and water (Adhyatman and Ridho 1984; Gutman 2002).

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[92] A single rim sherd recovered in 2005 has been identified as a locally made earthenware bowl; however its form and decoration suggest that it post-dates the Elmina Wreck by some time and thus intrusive (Cook n.d.).

[93] The use of Martaban as a generic term for large storage jars transshipped through the port of Martaban throughout South Asia appears to pre-date the arrival of Europeans (Adhyatman and Ridho 1984: 49)

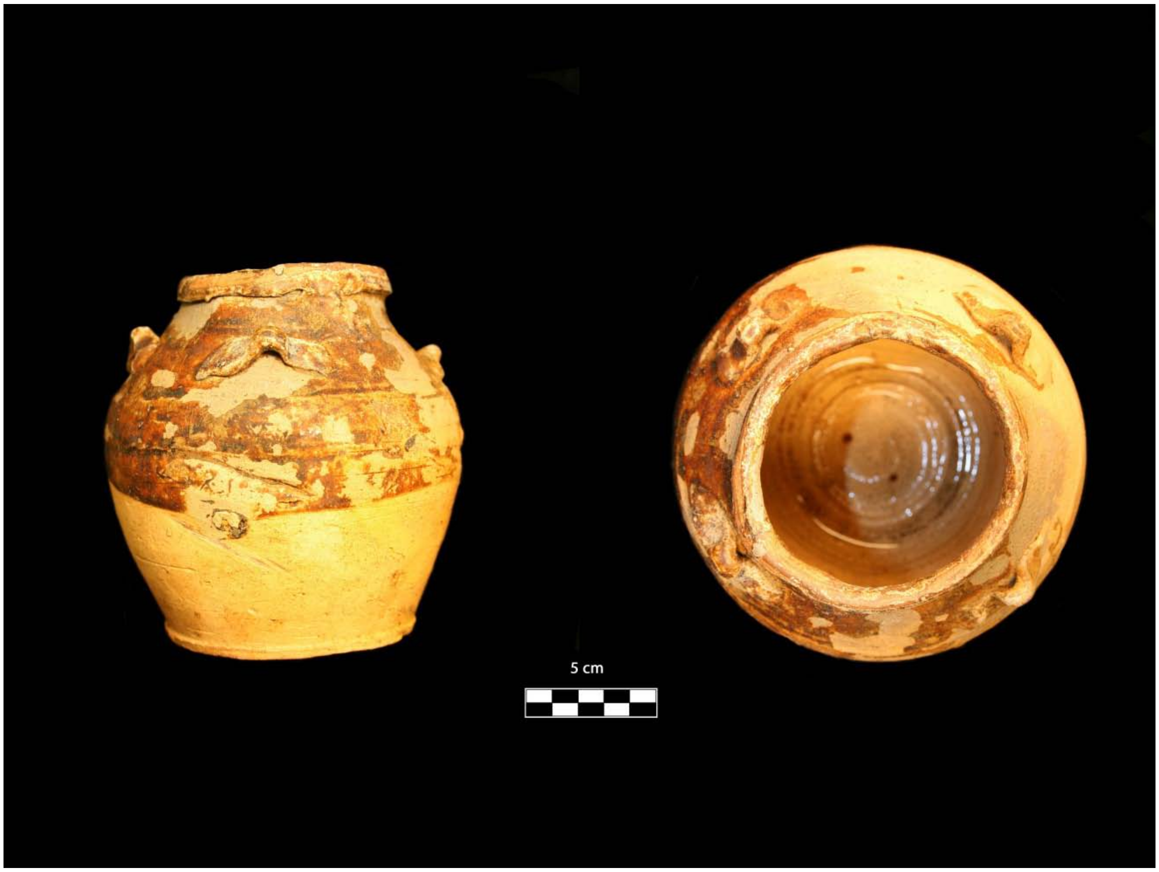

Figure 4.22 Martavan jar recovered from the Elmina Wreck site, 2007 (Photo by A. Pietruszka).

Martabans are ovoid or barrel-like in shape with heights ranging from 20-100 cm (Woodward 1974). Often, a small number of ears are present just below a vessel's rim, functioning as anchor points for attaching lids. The wooden, leather, or ceramic lid is held in place by a cord drawn through the ears. Utilitarian in nature, decoration is minimal, often limited to simple incised lines or a monochromatic glaze. Exteriors are frequently covered with a thick lead glaze black, brown, green or yellow in color. The glaze typically only covers part of the vessel, usually the top half or two-thirds. The interior is often left unglazed though examples with glazed interiors have been discovered. Martabans were most commonly produced using a coil method.[94]

In the west they are mostly associated with the cargo found on European shipwrecks from the seventeenth century (e.g. *Witte Leeuw* (1613) van der Pijil-Ketel 1982; *Batavia* (1629) Green 1989; *Vergulde Draeck* (1656) Green 1977; *San António da Tanná* (1697) Kirkman 1979)

Few references exist singling out ceramics as an important trade item, particularly prior to the nineteenth century. At the beginning of the seventeenth century, earthenware was included amongst a list of merchandise brought to the Coast by the Dutch (Kea 1982:207-208). Earthenware basins, with and without lids, were requested for trade by Ruÿchaver in 1653 (Jones 1995:175-177) and are included in Tilleman's (1994:41) list of merchandise at the century's end. DeCorse's (2001a:151-158) excavations at Elmina, however, demonstrate a "dramatic contrast" between the archaeological remains of European ceramics and the dearth of documentary evidence for their import. At Elmina, imported ceramics accounted for almost one fifth of the ceramic vessel sherds recovered and included over four dozen types (DeCorse 2001a:151).[95] As the majority of these pieces came from an African context, clearly there is still much to be learned about the importation of ceramics for trade.

Besides cargo, the few ceramics discovered at the Elmina Wreck site may represent personal items of the crew or the utilitarian wares typical of a ship's galley in the seventeenth or early eighteenth century.

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[94] The wide variation seen in Martaban jars is likely due to the fact that there is still much to understand about their exact origins as well as regional and temporal variations.

[95] Over 6,000 sherds of imported ceramics were recovered at Elmina making them one of the most common trade items found in the archaeological record (DeCorse 2001a:14).

4.4.2 Glass: Although a relatively large amount of glass has been recovered from the site, only a small amount has a range of production that overlaps with the prescribed date for the Elmina Shipwreck. These forms include onion bottles and case bottles.

A total of nine onion bottles have been recorded or recovered from the site thus far; two were collected in 2005, six in 2007, and a single bottle was recorded in situ in 2009. The remains include four complete bases, a partial base, a complete base and body, one neck complete with finish, and a few small body fragments. Unfortunately, the lack of body fragments limits the amount of information garnered from these bottles, as body shape is a primary delineator when dating onion bottles.

It is often difficult to distinguish English onion bottles from continental ones, the task being exacerbated when working with fragmentary remains (Abrahams 1987:13; Dumbrell 1983:128). The confusion regarding origin stems from the fact that English styles were widely copied by continental glassworks in the seventeenth and eighteenth centuries, there is a lack of well provenienced archeological examples, as well as an imprecise understanding of bottle export, import, and reuse. Challenging as it may be, answering the question of origin is vital, for the dates of manufacture vary depending on location. In England, globular-shaped onion bottles are often attributed to the 1680s to the 1720s, after which they were replaced by mallet shaped bottles. Continental forms often lagged behind the English forms they mimicked; similarly shaped onion bottles of Dutch origin are dated from 1700 to at least 1750 (Dumbrell 1983:128; Noël Hume 1969:63-68, 70).[96]

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[96] While these dates are still widely accepted some more recent finds may suggest a much earlier origin for the onion bottle, particularly within continental contexts. For example the Dutch National Cultural Heritage Department's maritime archaeology collection has an onion bottle recovered from a mid-

Proposed general attribute demarcating the two types are as follows. Dutch bottles are often described as lighter in weight and color with a conical shaped basal kick, small pontil scar, and less irregular shape in comparison to their English counterparts. For Dutch bottles, colors typically include amber and various shades of green ranging from olive to more unusual shades of sea-green and emerald. The term "blackglass" has often been used to describe the color of English bottles which are typically darkened to the point where the glass is no longer transparent. The basal kick of Dutch bottles was narrow and cone-shaped as compared to the more generous and hummock-shaped kick of English design. English bottles were often finished using an iron glass-dipped pontil while Dutch bottles typically exhibit an open pontil left by the blowpipe itself.

While useful, caution must be taken when applying these trends to the analysis of archaeological materials and site interpretation, for large gaps still exist in our understanding of the development and use of onion bottles. British and American scholars largely focus on the evolution of English bottles as these account for the overwhelming majority of early bottles excavated. U.S. archaeologists working on non-Anglo sites are therefore faced with a dearth of knowledge concerning the production of continental forms. Little is understood about the cross pollination of manufacturing techniques and styles that occurred throughout Europe; artisans were frequently imported from other countries to begin domestic production. In his examination of the bottles recovered from the Dutch ship *Hollandia* that sank in 1743, Dumbrell (1983:129) noted that many of the bottles looked English. Definitively tying the cargo to Holland would mean that bottles once believed to be English in origin may in fact be Dutch. The bottles

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seventeenth century wreck (http://www.geheugenvannederland.nl). An illustration in Dapper (1676) shows a Dutchman pouring what looks like an onion bottle on African coast.

date from 1690 to 1740, indicating long-term reuse. Dumbrell suggests this would have led to mixing throughout Europe and the colonies and possible misclassification by archaeologists.

The date range observed in the *Hollandia's* assemblage calls into question the validity of some typological dating.[97] Often referred to as time capsules, shipwrecks have long been recognized for their tight chronological control. For this reason, archaeologists and collectors alike have relied upon materials collected from identified, datable wrecks as the temporal cornerstones of their typologies.[98] However, the synchronic nature of a wreck provides little to no information concerning the diachronic nature of manufacture. In and of itself, a bottle recovered from the *Hollandia* indicates that particular style was in use in 1743. Only through further comparative and contextual information are we able to recognize that style to be over fifty years old. Therefore typologies, like Noël Hume's, that rely on synchronic dates should be used cautiously.

The fragmentary and incomplete nature of all but two of the bottles from the Elmina Wreck make their comparison difficult. Nonetheless, several characteristics are worth noting. A definitive body shape is difficult to determine as the fragmentary remains are almost exclusively composed of bases and finishes; however, the curvature of surviving heels and the few body fragments suggest a generalized globular shape characteristic of onion bottles (Figure 4.23). Two bottles with large portions of their bodies intact confirm this (Figure 4.24). For English bottles this shape was common

[97] The Saint-Quay-Portrieux Wreck that dates to the early eighteenth century also exhibited a wide range of dates in onion bottles (Herry 2004).

[98] Noël Hume in his typology, one of the most cited works in terms of classifying English bottles, includes numerous examples recovered from shipwreck sites.

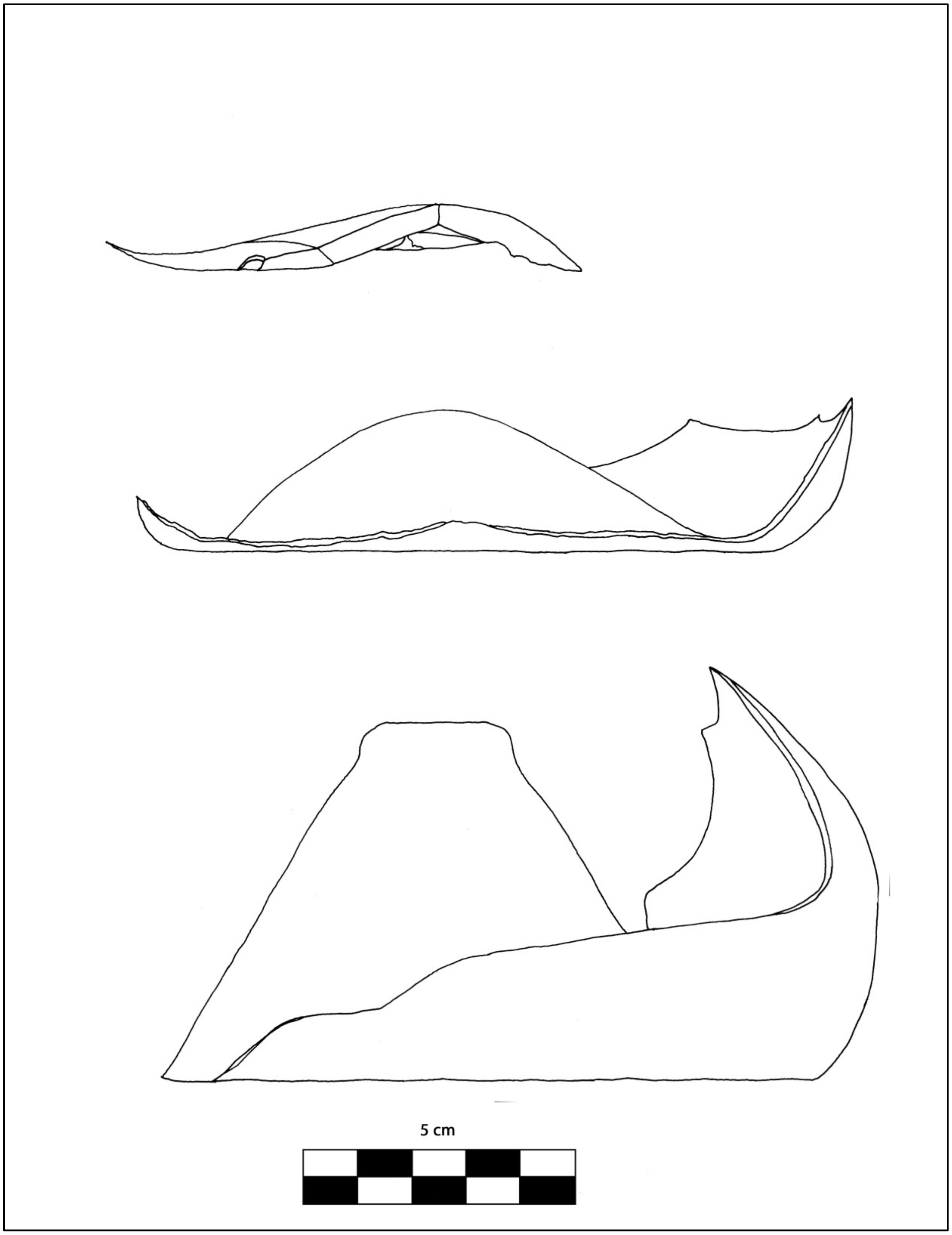

Figure 4.23 Three partial bases of onion bottles recovered from the Elmina Wreck site, 2007. Notice the wide variation among the kickups of each bottle (Drawing by S. Turner).

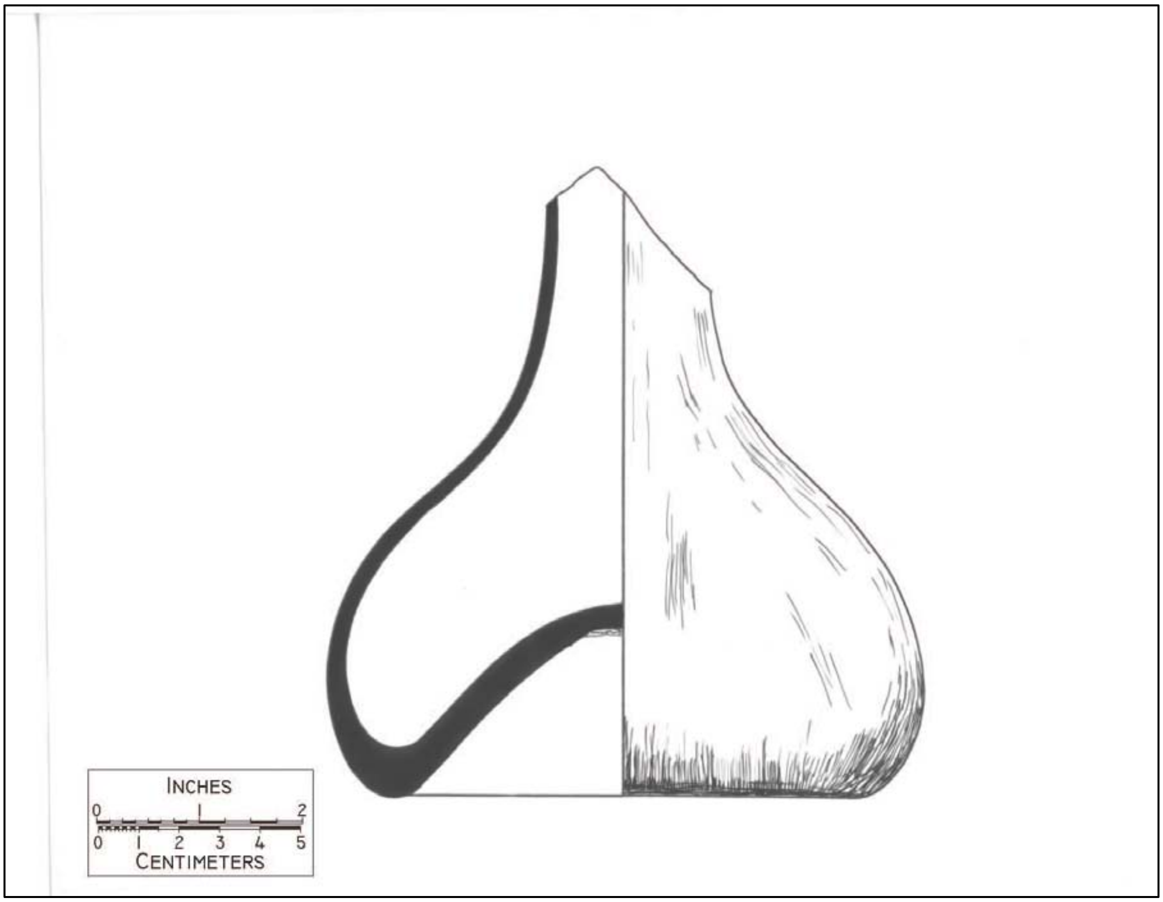

Figure 4.24 Near complete onion bottle recovered from the Elmina Wreck site, 2005 (Drawing by G. Cook).

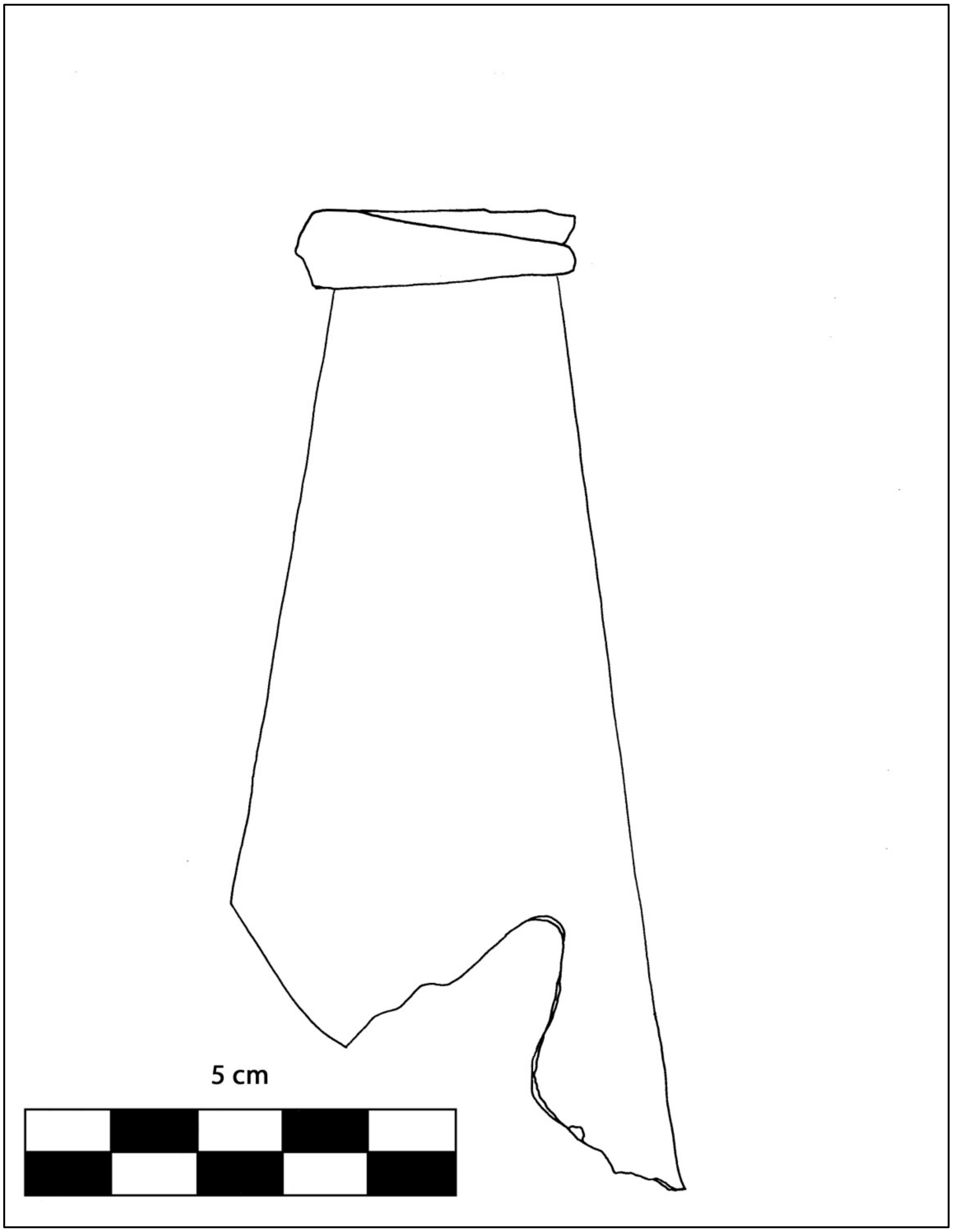

Figure 4.25 The neck and finish of an onion bottle recovered from the Elmina Wreck site, 2007. The Applied string rim is similar to those found on eighteenth century bottles made in continental Europe (Drawing by S. Turner).

from 1688 to the 1720s (Dumbrell 1983; Noël Hume 1969: 63-68). Likewise, Dutch onion bottles appear in the 1680s, but in Holland the form lasted through the 1750s

(McNulty 1971; 2004).[99] The single finish recovered was an applied string rim (Figure 4.25). Based on the finish's lack of tooling, unevenness, proximity to the lip, and overlap, the bottle's date of manufacture appears to be eighteenth century (1720-1750)—likely from continental Europe (Abrahams 1987:15; Noël Hume 1969:71; McNulty 1971:112, 117, 2004:30-48; also see van den Bossche 2001:120-121). Kick-ups varied in depth from one to five centimeters. Generally it is understood that kicks increased steadily from the seventeenth to the eighteenth centuries for both English and Continental bottles; however, researchers still lack enough understanding to move beyond broad generalizations (Abrahams 1987:15; McNulty 1971:113-119).[100] A single base was marked with a quatrefoil, a mark made when an iron rod whose working end was split into quadrants was used to form the kick. Scholars are divided as to the origin and use of the quatrefoil. Jones (2000:153) suggests it appears almost exclusively on dark green English wine bottles. Its earliest evidence of use is from the 1720s but it continued into the nineteenth century. Abrahams (1987:15) notes that French wine bottles from between 1720 and 1760 frequently bear a quatrefoil mark.

The second most encountered form was the case bottle. Case bottles, also sometimes referred to as Dutch gin bottles, are characterized by a square body typically tapering from shoulder to base, a horizontal or near horizontal shoulder, and a short neck (Jones and Smith 1985:15).[101] The bottle's distinct square shape allowed them to be

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[99] See examples from *Hollandia* (1743) (Gawronski et al. 1992) and *Amsterdam* (1747) (Marsden 1975).

[100] According to Abrahams (1987:15) by 1670-1680 the kick-up on continental bottles had reached a height of 2-2.2 cm, by 1705 3.8 cm, and between 1755 to 1780, following the French design of much deeper kick-ups, approximately 5 cm; however, an example of a 3.78 cm kick-up from 1670-1680 can be seen in McNulty (2004:47).

[101] The term Dutch gin bottles can be associated with the high volume of gin that was transported by the Dutch in such bottles. It should be noted, however, that the form predates the popularity of gin in Holland and other liquids including brandy, aquavitae, and even mercury were carried in such containers well into the late nineteenth century (McNulty 1971:107).

securely packed in subdivided wooden cases for ease of shipping and to minimize breakage. Though often associated with the Dutch, case bottles were a common form manufactured throughout Western Europe and the United States making an individual bottle's origin often difficult to trace.

Dating case bottles has proven problematic. Overall, the bottle's shape changed very little from the seventeenth through nineteenth centuries, with the exception of a narrowing of the base. Earlier bottles were mostly straight sided, but beginning in the late seventeenth century a taper from shoulder to base was introduced. Gradually, this taper increased into the late eighteenth and early nineteenth centuries by which time bases had been reduced to the extent that bottles were nearly unstable (McNulty 1971:107; Munsey 1970:84-85). However, this tapering trend is a generalization. It provides only relative dates as no absolute dates have been correlated to a specific degree of taper and many exceptions to the rule have been noted. A similar trend occurs in finishes. Earlier bottles tend to have flared lips formed from the bottle's glass while in later versions glass was applied to form the lip. Another popular finish, a sloping collar, is mostly found on nineteenth century case bottles. Earlier bottles were hand blown; the square shape produced using flat paddles. Dip molds were introduced in the eighteenth century and remained the primary mode of production into the twentieth century. Moreover, bottles produced prior to 1850 usually have pontil scars (Munsey 1970:84-85). Thus, while exact dating is challenging, documented changes in shape, finish, and manufacture aid in placing bottles at least in a general timeframe.

The fragmentary remains of eight case bottles were recovered from the wreck site. Most evidence was comprised of body fragments from which little could be discerned;

however, two complete bases and one associated finish were recovered. The first was a four point base with a high kick-up and pontil mark. Pontil marks are usually associated with pre 1850 manufacture but later manufacture cannot be ruled out as pontil rods were used, albeit less frequently, until the last quarter of the eighteenth century. The second base was also a four point base, but had a shallower kick-up and no pontil mark. This bottle's complete finish and partial shoulder were also recovered. It had an applied flared lip finish and the bottle's width at its shoulder and base indicates a heavy taper. Taken together, these characteristics suggest a post 1850 manufacture.[102]

Overall, the few comparable characteristics exhibit a wide variation and illustrate many of the problems archaeologists face when trying to use bottles for site interpretation. While nine pieces exhibited the shape characteristic of onion bottles the fragmentary nature of the finds proved to generalized to provide a date based on form. At best then they can be ascribed a date range between 1680 and 1750. It is possible that all nine bottles may be associated with the vessel. The examination of the case bottles proved only slightly less ambiguous. One specimen for which the base, shoulder, and finish were all recovered can be definitively dated to the nineteenth century. Thus it can be ruled out as belonging to the vessel and should be considered intrusive to the site. As precise of a date could not be determined for the other base; however, a four point base is generally believed to postdate 1725 (McNulty 2004:22). This specimen is also believed to be intrusive. The other six specimens, however, cannot be ruled out at this time.

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[102] Case bottles with a flared finish were common from the late eighteenth century through the third quarter of the nineteenth century. By the late nineteenth century, however, case bottles tended to be finished in other styles including oil, mineral, and blob. (http://www.sha.org/bottle/finishstyles.htm#Wide Prescription)

Strong liqueurs such as Dutch gin and French Brandy were a favorite in the African trade, with millions of liters imported and sold along the West African Coast (e.g. DeCorse 2001a:159; Bosman 1967:107; de Marees 1987:41; Müller in Jones 1983:213; van Dantzig 1978:265; den Heijer 2003b:155). According to one estimate, spirits accounted for 4.3 percent of WIC goods imported to the coast from 1700-1723, making them the 5th largest import in terms of value (den Heijer 2003b:155). Throughout much of seventeenth century, brandy, particularly French brandy, was the preferred spirit on Gold Coast (Alpern 1995:24).[103] Dutch gin, sought by Africans for consumption and ritual use, first became available in seventeenth century but was not imported on a grand scale until the eighteenth and nineteenth centuries.[104] [105] Wine was imported throughout the entirety of the Atlantic trade period although it was generally intended for European consumption (Alpern 1995:25; Jones 1995:180).

Early records give little indication of the containers used for shipping alcohol, but it is assumed some arrived in casks, jugs, and barrels. This is especially true for the fifteenth, sixteenth, and seventeenth centuries, for even in Europe, the wide-spread use of bottles for storing wine did not occur until the late seventeenth century (McNulty 1971:99; Noël Hume 1969:62-69). It is clear, however, that once adopted, the use of bottles rapidly spread from Europe to Africa. As early as the 1660s, it was noted that a prostitute on the Coast could be acquired for "as little as a bottle of brandy" (Müller in Jones 1983:157). In 1685, the accounts of Gross-Friedrichsburg include a case holding

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[103] The amount of brandy imported is demonstrated in the sinking of the WIC ship *Groenigen*, said to have sunk when its shipment of brandy caught fire as it lay at anchor off Elmina (Ratelband 1953:340-341); Ruÿchaver suggested 20 half-cases of French brandy in his 1653 proposal for a Gold Coast cargo (Jones 1995:177).

[104] The earliest explicit record of gin associated with the Gold Coast dates to 1767, although earlier references to "geneva", "spirits" and "liquor" may refer to gin (Alpern 1995:25).

[105] One account places the discovery of gin in Holland sometime in the middle of the seventeenth century (Munsey 1970:84; McNulty 1971:99-100).

nine *stoup*-bottles of brandy (Jones 1985:129).[106] In that same year, four bottles of brandy were recorded given as drinks to the traders and caboceers at the Barndenburg fort at Akwida (Jones 1985:135). And Tilleman's (1994: 41, 64) 1697 list of European wares traded in Guinea merchandise includes brandy both in ankers and "*flaske-fodere*", *flaske-fodere* being cases provided with divisions for the transport of bottles. Archaeologically, onion shaped wine bottles characteristic of late seventeenth and early eighteenth centuries have been recovered at Elmina (DeCorse 2001a:160).

Bottles on the other hand were frequently carried on board vessels for purposes other than trade. In addition to carrying spirits, case bottles were utilized by a ship's surgeon to carry medicines while higher ranking crew members, whose positions in life elevated them above the grog and beer of the common sailor, may have enjoyed wine and brandy from onion bottles.[107] Both onion bottles and case bottles are found on not only merchant vessels but all types of vessels from the seventeenth and eighteenth century.

4.4.3 Brick: A total of 27 yellow clay brick fragments ranging in size from a few centimeters to near-complete specimens were recovered (Figure 4.26). Average dimensions are a height of 3.13 cm (1.23 in) with a range of 2.5-3.7 cm; width of 8.13 cm (3.2 in) with a range of 7.5-10 cm; and a length of 16.4 cm (6.46 in) with a range of 14-18 cm.[108] Twelve of the 27 have small amounts of red clay aggregate intermixed throughout the yellow clay matrix.

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[106] A *stoup* is a liquid measure equal to just under 2.5 liters (Jones 1985:319)

[107] Since the pewter screw tops recovered from the site likely sealed case bottles, they should be considered just as variable.

[108] The average dimensions were calculated using only those samples for which a complete dimension was present.

Figure 4.26 Yellow Dutch brick recovered from the Elmina Wreck site, 2007 (Photo by A. Pietruszka).

Large caches of Dutch bricks have been recovered from a number of VOC vessels, including the *Batavia*, and the *Vergulde Draeck*, that sank off the Western Australian coast in the seventeenth century (Green 1977:169-172, 1989:190, also see Forster and Higgs 1973:296; Green 1986:103). Wrecked on the outward bound leg of their journey, these vessels contained a wide array of materials destined for the Dutch holdings in Java. Archaeologists have interpreted the unusually large number of bricks recovered from these vessels as paying ballast, for their intent was to supply the materials necessary for building projects in the East (Forster and Higgs 1973:296; Green 1977:169-172, 1986:103, 1989:190; Stenuit 1974:235). Their inclusion as part of a particular vessel's cargo does not appear to be happenstance. Instead, local governors submitted specific requests that were filled by the VOC in Holland and thus only a limited number of vessels traveled east carrying bricks in their holds (see Green 1977:169-170).

The finds from these ships demonstrate Dutch companies' willingness to sacrifice cargo room, a finite and precious commodity, for the transportation of construction materials to their various global holdings. However, when drawing comparisons the economic impact of this practice was not universal and local economics likely drove alternative solutions. One example of this is seen when the Java trade of the aforementioned vessels is compared with that of the Gold Coast. While company vessels destined for Java carried a wide array of goods, gold and silver specie were the primary driver of commerce. In West Africa a different commercial exchange took place; here native peoples most desired manufactured goods from their European counterparts, a pivotal difference in commodities with wide implications concerning a vessel's profit margin. A vessel carrying a large load of bricks to the East lost little with regards to its trade advantage as it could still carry a standard shipment of gold and silver required for trade. Conversely, vessels traveling to the Gold Coast, every inch of cargo space relegated to building supplies decreased the quantity of manufactured goods for trade and thus detracted from the voyage's profitability.

To increase their profit margins, Europeans in West Africa often relied upon local rocks and clays for a source of building materials, and many of the lodges and forts built by the Europeans were constructed using some local materials including locally produced bricks (see Lawrence 1964:90-95). Nonetheless, locally made bricks were considered inferior to those produced in Europe and, even at a loss of profit, bricks from Europe were imported especially for the construction and maintenance of the prominent coastal forts such as those at Elmina, Cape Coast and Anomobu. The frequency with which European bricks were imported to the coast, however, remains unclear. But, given the economic disadvantage imposed by carrying bricks as cargo, it is more likely that the European bricks found along the Gold Coast were shipped in irregularly dispatched vessels whose primary purpose was to deliver materials for a specific building project rather than consuming a portion of a commercial vessel's paying cargo. At least one account from the early seventeenth century refers to the importation of lime and bricks from Holland for the construction of Fort Nassau, Mori, the first non-Portuguese trade post on the coast (DeCorse 2001a:92).[109]

Rather than as paying ballast, bricks were also used to line the firebox in a ship's galley as well as the powder magazine. Given the small amount of bricks recovered from the site these are a far more likely explanation and small caches of bricks found on sites are often interpreted this way (e.g. Cowan et al. 1975:285; Herry 2004:98; Svalesen 2000:177).[110] Furthermore, it is also possible that the small number of bricks recovered are intrusive. The castle at Elmina, as well as several other nearby structures, were either expanded or constructed by the Dutch using similar bricks (see DeCorse 2001a:44-70; Lawrence 1964, van Dantzig 1980). It is of some interest that the average dimensions of those recovered from the site closely match those given by Lawrence (1964:141) for St. George Castle.[111] While groundtruthing targets from the 2003 survey a single yellow Dutch brick similar to those recovered from the wreck was discovered lying within a rock formation east of Elmina. As no other cultural material was present it is assumed that it was carried there by strong currents.

[109] From Brun's account of his voyage in 1617 (in Jones 1983:79).
[110] By way of comparison about 8000 bricks were recovered from each the *Batavia* and *Vergulde Draeck* (Green 1977:169-172, 1989:190)
[111] Bricks from the *Batavia* averaged 18.2 cm in length by 8.4 cm wide by 3.7 cm thick; those from the *Vergulde Draeck* 17.6 cm by 7.6 cm by 3.4 cm Green 1977:169-172, 1989:190). It should be noted, however, that although these averages are greater, the bricks from the Elmina wreck still fall within the range observed at both sites.

4.4.4 Pewter Bottle Tops: Five threaded pewter caps complete with their accompanying neck rings were found (Figure 4.27). Although varying in detail and design, three caps are of the same basic size and shape. These caps are cylindrical and have a diameter of approximately 4.7 cm (1.85 in). Their neck rings, which are greater in diameter than the caps, flare outwards and down to form a socket by which they could be attached to a bottle's finish. A single example of a second type is similar to the first type except is has a flanged cap and is smaller in diameter. A third type, also represented by only a single example, is much smaller than the first two; its cylindrical cap measures only 4 cm (1.57 in) in diameter. A small flat arch extending from the top of the cylinder allowed for a metal ring to be attached to the cap. Its flat, wide neck ring was designed to rest on the broad, flat shoulders characteristic of early square sided bottles. Pewter caps screwed onto pewter collared necks are a type of closure most often associated with case bottles up to about 1750 (Wills 1977:68). Although not exclusive to Dutch or German designers, they are frequently found among the remains of seventeenth and eighteenth century Dutch vessels including: *Campen* 1627 (Larn 1985:26); *Batavia* 1629 (Green 1989:173); *Lastdrager* 1653 (Sténuit 1974:241); *Vergulde Draeck* 1656 (Green 1973; 1977:215); *Kennemerland* 1664 (Price and Muckelroy 1977:205); *Meresteyn* 1702 (Marsden 1976:210); *Zudroyp* 1712 (Green 1998); *De Liefde* 1711 (Bax and Martin 1974:90); and *Hollandia* 1743 (Cowan et al. 1975:291).[112]

[112] Several small threaded pewter caps most similar to the Elmina type three caps have been recovered from early seventeenth century Spanish wrecks in the Caribbean and square or octagonal shaped glass bottles with pewter rims remained popular in the Andalusian glass industry through the latter half of the eighteenth century (see Deagan 1987:132; Frothingham 1963:59).

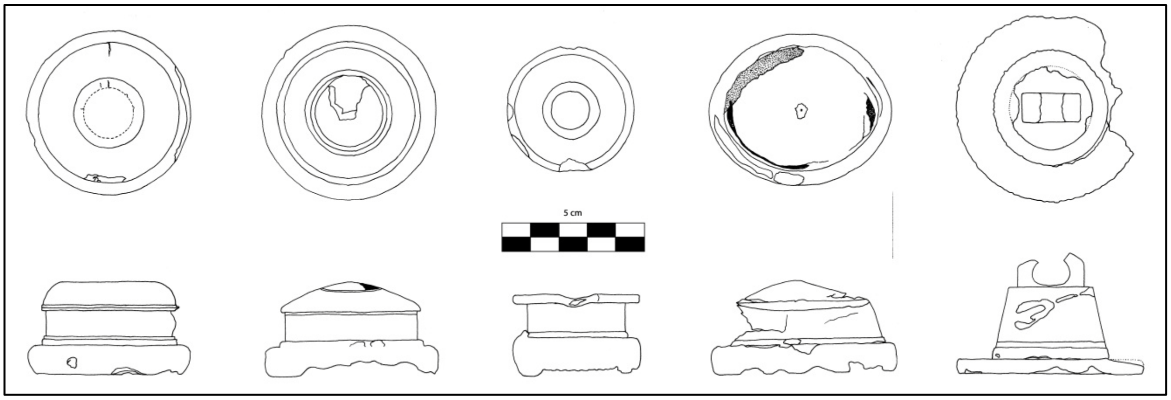

Figure 4.27 Pewter screw caps recovered from the Elmina Wreck site, 2007 (Drawing by S. Turner).

4.4.5 Lead Seals: Two small round lead seals with markings were recovered from the site in 2007. Lead seals of this type are a common artifact class found throughout Western Europe, colonial and post-colonial North American sites, and numerous European shipwrecks throughout the world. Generally they can be described as circular cast lead objects less than 30 millimeters in diameter with names, numbers, symbols, or some combination of the three cast, stamped, or scratched into them (Adams 1989:1). Their form is dependent upon the method of attachment: two disks connected by a flange; a single disk with a flange; or one disk perforated to allow wire or cord to be drawn through. They are frequently referred to as "bale seals" in archaeological literature (e.g. Stone 1974:281; Steer 1977:122); however, for the most part, this is erroneous, the more appropriate term being a "cloth seal" (See Adams 1989; Egan 1990:87). Cloth seals were attached to an individual, newly woven textile as part of the regulation or labeling required of the textile industry and served as indicators of quality, ownership, and taxation.

The two seals from the Elmina Wreck were recovered in the same general area of the site. The first, found in unit U12 level 6, has a diameter of 20 mm (.79 in). The letters ANN and the numbers 64 are visible on one side (Figure 4.28). The second, found in unit V11 level 1, is 22 mm (.87 in) in diameter and is marked with two identical as yet unidentified symbols. The symbols, perhaps best described as diamonds with curled tails, may represent some form of a stylized "b" or "q" (Figure 4.28). Both seals are of the two disc flange form, though one is a single flange while the other is a double flange.

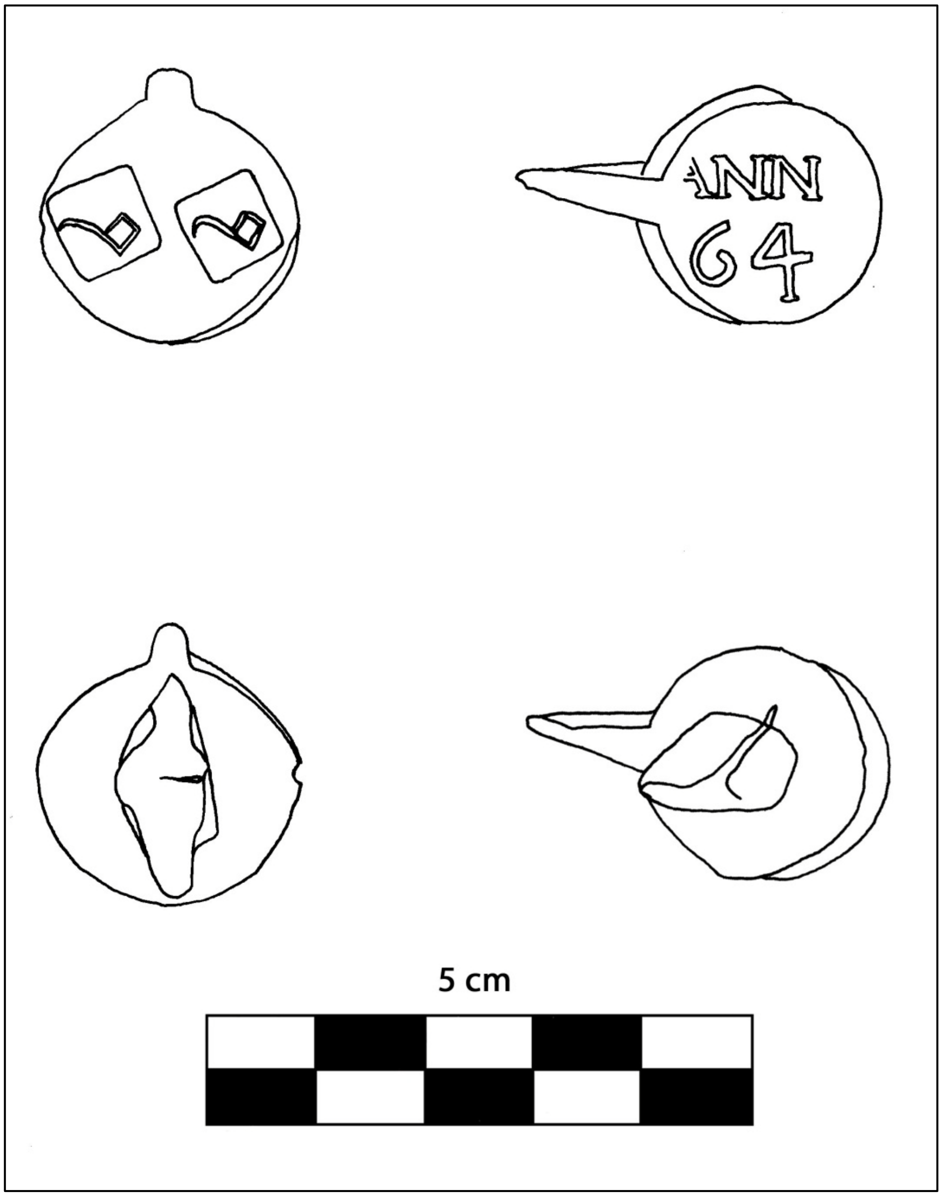

Figure 4.28 Lead cloth seals recovered from the Elmina Wreck site, 2007 (Drawing by S. Turner)

Unfortunately, no parallels of either stamp can be found at this time and without this information no definitive conclusions can be drawn about the age and origin of the seals, although according to Geoff Egan, a lead seal expert with the British Museum, neither look English (Geoff Egan personal communication). It is possible that ANN along with the number 64 is a year reference or it may be part of a name like Lannoy (a cloth producing family), or something else altogether, leaving the 64 possibly as a specification like the length or weight of the individual textile.

The attachment of lead seals to bolts of cloth to indicate quality, ownership, or taxation was a common practice of European merchants from the fifteenth through the nineteenth century, a timeframe that coincides with the entirety of pre-colonial European-West African trade. Although terrestrial archaeological sites have yielded few examples of these seals, it can be assumed that large amounts made their way to the coast as cloth was one of the chief trade items throughout this time.[113] Beginning with the Portuguese in the fifteenth century Europeans supplied Africans along the coast with a wide variety of imported cloths. To illustrate, in his study of European trade goods supplied to the coast, Alpern (1995:8-10) lists no fewer than 37 different types of Indian cloth alone, and to these another 19 types of European origin can be added.[114]

Textiles continued to dominate European imports in the seventeenth and eighteenth centuries, especially the Dutch. The Dutch textile industry, centered in

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[113] For example, over his twenty years of excavations at Elmina and surrounding sites in the Central Region DeCorse (2001a:14; personal communication 2010) has only found a single cloth seal. One reason for the absence of lead seals in the terrestrial record is the likelihood that the lead was melted and reused to make functional items such as bullets or fishing weights. A proposal for cargo to be sent to the Gold coast written by General Ruÿchaver in 1653 specifies certain cloths with their “leads” (Jones 1995:180).
[114] In his analysis, Alpern (1992), only included items which he could find included on five or more lists. By his own admission, more than three dozen Indian cloths were omitted from his list as they were mentioned fewer than five times. In addition, European ships also carried a large number of African cloths to the Gold Coast, although it is highly unlikely that these would have been marked with lead seals (see Alpern 1992:10; Blake 1977: 93;Daaku 1970:24; Vogt 1979: 67-68 find others)

Leiden, came to dominate European production in the seventeenth century while their overseas expansion into Asia provided the greatest means to meet West Africa's growing demand for Eastern textiles, particularly those from India. Although little has survived that allows a true quantifiable image of the trade, it is clear that textiles were the dominant trade item during the years of the WIC monopoly. Textiles account for 56% of the total value of the Gold Coast cargo proposed by General Ruÿchaver in 1653. Examining the cargo list of 138 ships sailing between the years 1700-1723, den Heijer (2003b:152-153) estimates that in terms of value (guilders), textiles accounted for 50.6% of all cargo shipped, a proportion over twice the amount of the next closest category. Similarly, in a two year period (1714-1715) half of all slaves acquired by the WIC on the Slave Coast were purchased in exchange for textiles (Postma 1990:103).

Cloth being the number one European import into West Africa, the fact that lead seals were used to mark such cloth from the fifteenth through the nineteenth centuries, and that they have been recovered from other Dutch vessels collude, suggesting a high probability that the two lead cloth seals are part of the original wreck and are not intrusive.

4.4.6 Pins: Several brass wire pins with wound heads have been recovered from the site. Conservators found a number of brass pins with wrapped heads in the concretion surrounding and between the basins recovered in 2005 (Hamann 2007:113). On average, they measure 5.28 cm (2.08 in) in length and .11 cm (.04 in) in diameter. Heads are .32 cm (.13 in) in diameter, .22 cm (.09 in) wide, and each wrap .1 cm (.04 in) wide in gauge. A single pin was excavated in 2007 from unit U14 level 7. It measures 4.9 cm (1.93 in) in length and .1 cm (.04 in) in diameter (Figure 4.29).

Figure 4.29 Wound wire head brass pin recovered from the Elmina Wreck site, 2007 (Photo by A. Pietruszka).

It remains unclear as to when brass pins replaced iron ones typical of medieval Europe. Noël Hume (1969:254) suggests that "in the sixteenth century brass pins became common but retained the large head in solid or hollow-cast" prototypical of their iron predecessors; round heads fashioned from a second piece of wire wrapped around the shank began in the early seventeenth century. The round or sometimes flattened head often consist of two to three turns anchored to the pin when a treadle operated stamp spread the top of the shank.[115] Pins continued to be manufactured in this style until the

[115] The earliest written or pictorial depictions of pin manufacturing do not occur until eighteenth century (Caple 1991:243; see Diderot 1771; Smith 1776). For a general discussion about the English medieval and post medieval brass pin industry see (Caple 1991). A more detailed discussion of the English pin making industry in the Kingswood area is provided by (Street 1986)

second quarter of the nineteenth century when they were replaced by machine-made, solid headed pins (Cox 2005; Noël Hume 1969:254).[116]

Archaeological examples of wound wire head brass pins have since been discovered in thirteenth and fourteenth century contexts at Southampton (Platt and Coleman-Smith 1975). They are only commonly found, though, in contexts after 14th century with the largest number coming from seventeenth and eighteenth century contexts (Caple 1991). German texts describing round headed brass pins being produced in that country as early as 1568 support an earlier date for continental pins as well (Amman and Sachs 1973:110).

Pins like those recovered from the Elmina Wreck are often found on shipwreck sites but unfortunately, their simple, common design denotes little regarding their age or origin. Although several typologies have been attempted for English wound wire pins, the results are more speculative than fact (Caple and Warren 1983; Caple 1986; also see Caple 1991). While general trends are observable, such as the shortening of overall length over time, the small data sets, an incomplete understanding of intra-set variation, and differences in date ranges prevented statistically significant findings (Caple 1991:249). Furthermore, no comparable work has been undertaken for continental pins and thus far "it has not been possible to isolate any metrical or typological feature which can distinguish between British and imported pins" (Caple 1991:250).

Several references from the seventeenth century note the trade of brass pins on the Gold Coast. De Marees (1987:53) wrote of pins bought by Africans for the purpose of making fishing hooks. Barbot (1992:561) lists them among items traded by the Dutch in

[116] The first patent for a machine was granted in England in 1824 to an American named Lemuel W. Wright.

the 1780s, and Tilleman (1994:41) included them in his list of merchandise at the century's end.

The brass pins may also be interpreted as the personal effects of one of the vessel's crew. Brass pins were commonly used as fasteners for clothing and although they may seem impractical for the active sailor, they have been frequently recovered from historical shipwrecks (e.g. *Batavia* (Green 1989:174); *Hollandia* (Gawronski et al. 1992:463)). The frequency in which only a small number of pins are recovered from a wreck site suggests that they may indeed be personal effects likely associated with a vessel's higher ranking officials.

The fact that pins of this type were widely manufactured throughout Europe at the time of the ship's sinking and that they were found concreted to and within the stacks of basins already established as part of the wreck lead me to believe that the pins were also part of the original cargo.

4.4.7 Wood: Several fragments of wood reflecting a variety of temperate and tropical species were recovered from the site in 2007.[117] Two small pieces of oak (*Quercus*) were recovered from unit H11-level 6 and unit R11-level 2. In both cases, the pieces were small fragments and represent isolated finds. Three fragments of pine (*Pinus*) were recovered from unit O11-level 1, two of which were held together by an iron nail. Two pieces of a birch (*Betula*) were recovered from Unit J11-level 2. Finally, two timbers of tropical origin were recovered from unit H11-level 3. Dendrochronological analysis proved inconclusive in determining a date for any of the pieces.

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[117] The wood was independently analyzed by Dr. Stefanie Kahlheber of J. W. Goethe-Universität Frankfurt and Tomasz Wazny of Cornell University. My conclusions are based on their findings.

Pine and oak are temperate species not indigenous to the West African coast and are not frequently encountered even in modern contexts due to an abundance of local woods and a thriving forestry industry. Therefore it is highly probable these samples are contemporary to the vessel's sinking and are associated with the wreck. Unfortunately, the fragmentary nature of the samples prevented investigators from determining what they might represent. However, the presence of iron fasteners in the pine and the "peg-like" shape of one of the oak pieces indicate tooled pieces of wood. Both pine and oak were commonly used to construct ships in Europe during the seventeenth and eighteenth centuries and the samples may be part of the actual vessel.[118]

The presence of another temperate species, birch, is not as easily explained. Birch, like pine and oak, is not indigenous to West Africa and rarely encountered in either archaeological or modern contexts. Unlike pine and oak, birch was not a common source of timber for shipyards and neither of the two samples recovered show any signs of being worked. The two samples recovered from unit J11 are associated with a much larger cache of wood that began in unit J and extended through units K and L.[119] Excavation notes describe the wood encountered in these units as "tree-like": being made up a series of branches that felt natural in shape with no apparent signs of tooling or shaping. The observations made in the field are confirmed by one of the pieces recovered retaining its bark, a feature not common to worked pieces. While wood is frequently discovered on archaeological wreck sites, it is usually in the context of the vessel's

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[118] It should be noted that both pine and oak wood were used to construct a variety of other items frequently found on board a ship in the nineteenth century including barrel staves, chests, crates, furniture, and tool handles. These items, as well as others not mentioned, offer just as plausible of an explanation accounting for the presence of the small wood fragments as postulating that they might represent part of the actual vessel.

[119] Due to its waterlogged condition, the plant matter was extremely fragile and, other than the samples collected from J11-2, was broken up and lost during excavation.

timbers or manufactured goods carried on board. The presence of portions of a birch tree on the wreck site remains a mystery; although, similarly, beech wood was discovered among the remains of the *Fredensborg*, a Danish slaver sunk in 1768 after completing the triangle trade. Archaeologists on the site believe that the wood remained on board for the entire voyage and has been interpreted as firewood (Svalesen 2000:178).

Two timbers of tropical origin were recovered from unit H11 level 3. Both timbers were fragments of larger pieces, the remainder of which were not found. Each timber possessed clear signs of tooling and both were found partially sheathed with lead held in place by small iron brads. Lead sheathing was a common antifouling agent used on ships to protect exposed wood from the elements and biological degradation. These may represent part of the vessel though it is impossible to determine the exact part due to their small size. As they are tropical species these timber fragments may reflect repairs undertaken after original construction.

Several fragments of wood were also recovered from core samples taken at the site in 2007 (Horlings 2009; 2010). AMS radiocarbon dates obtained for these pieces fall between 1642-1664 (see Epilogue)

Seventeenth and eighteenth century ships were constructed almost exclusively from wood. The wood recovered from the Elmina site could be from any part of the ship.

4.4.8 Fish Hook: A single brass fishing hook was discovered in unit U14 level 6. The small hook is distinctive in shape, its shank having been bent in two ninety degree angles to form an open rectangular shape; however, at this time no comparative hooks have been found (Figure 4.30).

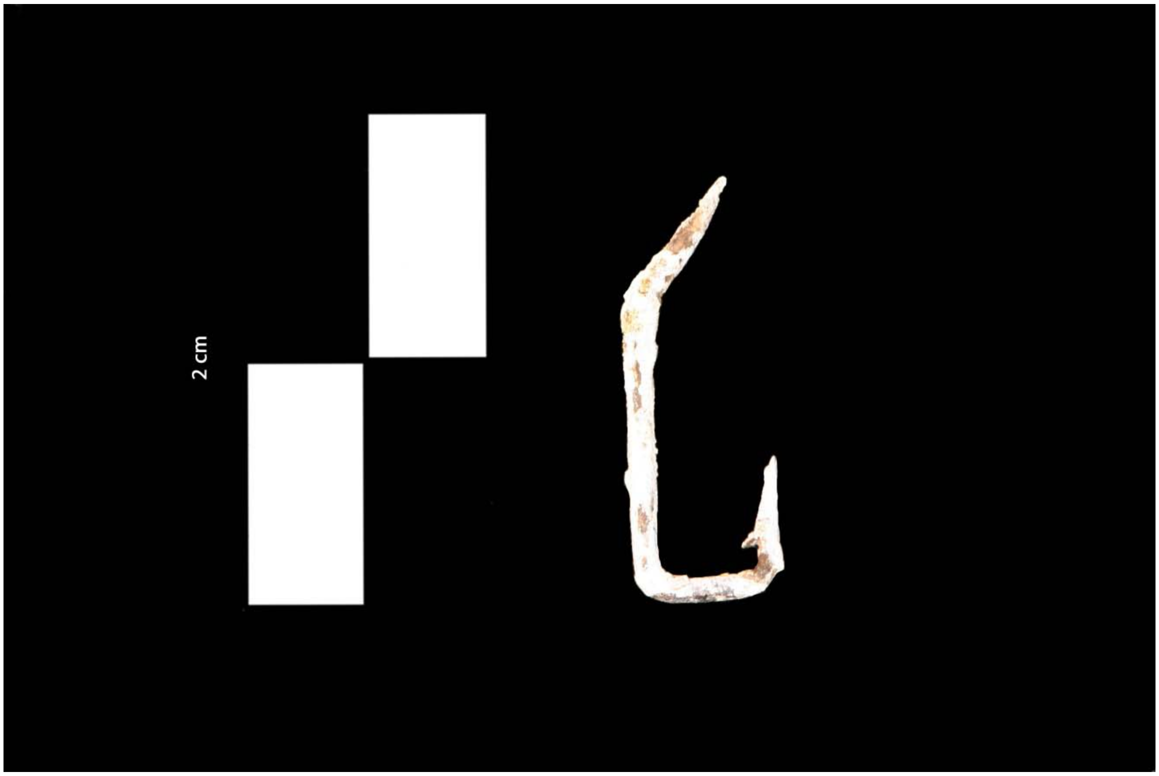

Figure 4.30 Brass fish hook recovered from Elmina Wreck site, 2007 (Photo by A. Pietruszka).

While at the beginning of the seventeenth century Africans fashioned fishing hooks from pins, a steady supply of imported hooks were introduced by the middle of the century. In 1645, Dutch traders at Elmina had on hand 7,850 large, 9,500 medium, and 350,394 small hooks (Ratelband 1953:387) and it was suggested that a single ship seeking prosperous trade along the coast in 1653 carry 1500 bunches of hooks in various sizes (Jones 1995:175-177). Several varieties of hooks were also noted by Barbot (1992:561) and Tilleman(1994:41) at the century's end.

European crews also supplemented a ship's stores by fishing and therefore the single hook found on the Elmina Wreck may equally be interpreted as part of the ship's equipment.

4.4.9 Tobacco Pipe: A single tobacco pipe bowl recovered from the site may also be part of the ship's assemblage as its range of manufacture dates overlaps with the date range proposed for the Elmina shipwreck. The pipe, recovered from unit U13 level 2, has a bowl 27 mm (1.06 in) in length with a 13 mm (.51 in) diameter (Figure 4.31). Approximately 53 mm (2.09 in) of the stem remains attached. The stem is 10 mm (.39 in) in diameter. Although heavily abraded, several markings are still visible including rouletting around the rim, a molded ridge encircling the heel, and a flour-de-leis or lily enclosed in a diamond along the top of the stem. Rim rouletting is a decorative motif most often associated with Dutch pipe makers. Although no longer visible itself, the ridge encircling the heel indicates that it once contained a maker's mark. The lily enclosed in a diamond was a common form of decoration found on Dutch pipe stems manufactured in the middle of the seventeenth century (1625-1660); it closely matches Duco's (1981:249) example 122 (1625-1660) in size, shape, and decoration. The size, shape, and decoration of the pipe bowl as well as the decoration along the top of the stem confirm this to be a Dutch manufactured pipe likely dating between 1625 and 1660.

Indirect documentary information and archaeological findings suggest tobacco was introduced to Elmina sometime in the first decades of the seventeenth century (DeCorse 2001a:163). The timeline concerning the importation of large quantities of European pipes however is less clear. While it is presumed that they were used early on by Europeans visiting the coast, only a small number of these pipes securely dated to the seventeenth century have been recovered at Elmina (DeCorse 2001a:163-164). And

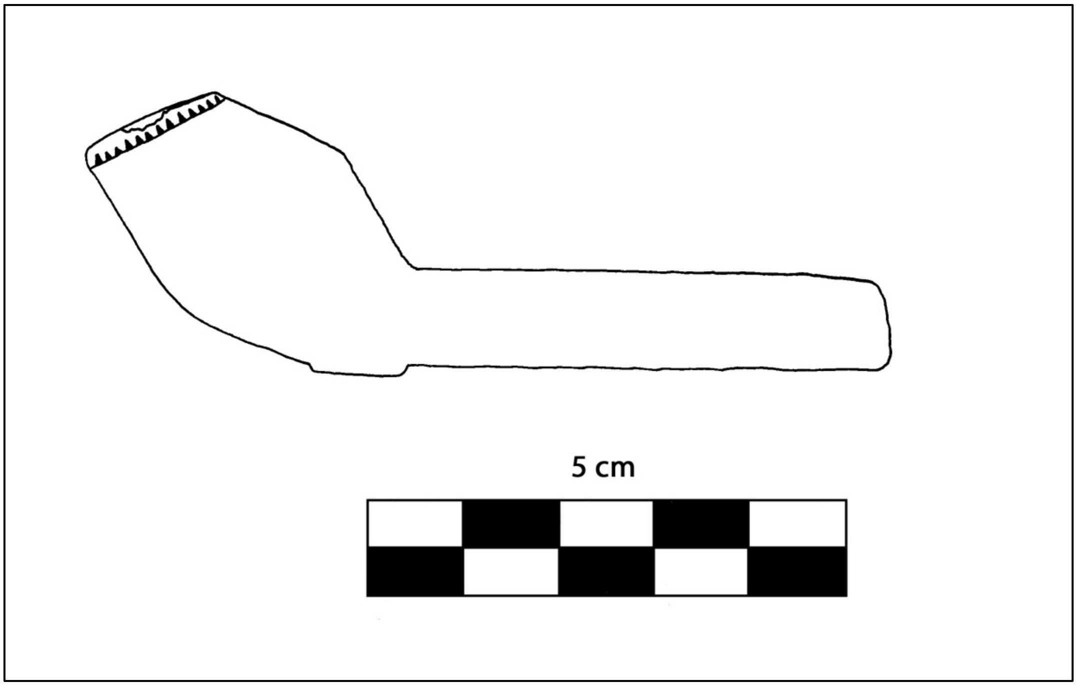

Figure 4.31 Seventeenth century Dutch tobacco pipe bowl recovered from the Elmina Wreck site, 2007 (Drawing by S. Turner).

other than those identified at nearby Asebu, seventeenth century pipes from other sites are typically examples of local forms (Nunoo 1957:17; Walker 1975:184). Documentary evidence suggests the same, for the first mention of tobacco pipes as a commodity to be traded on the coast does not come until 1697 (Tilleman 1994:41).

The use of tobacco pipes by European sailors in the seventeenth and eighteenth century has been well documented and may provide an alternative explanation for their presence on the site.

4.5 The Cargo as a Whole

To this point, I have demonstrated how individual artifacts or types can be associated with the Elmina Wreck by providing historical and archaeological links between their artifact classes and my presumed temporal frame and national origin for the wreck. This process is a cyclical feedback loop where the age and origin of the wreck is determined by the analysis of the artifacts as separate entities (i.e. manufacture dates, geographic areas of production), and then these artifacts are examined within the context they have provided (i.e. seventeenth century European trade items brought to the West African coast). However, these items were neither deposited into the archeological record separately nor were they found in isolation. Therefore, it is important to also examine the assemblage as a whole as compared to what we know about seventeenth and eighteenth century merchant vessels sailing to the coast of West Africa.

Besides treating each artifact class as a separate discernable entity, another valuable way of examining the items believed to be associated with the Elmina Wreck is as an assemblage. As a whole, do the cannon, manillas, brasswares, pewterwares, cowries, beads, lead rolls, ceramics, glass, bricks, pewter tops, lead seals, pins, wood, fishhook, and tobacco pipes make sense in terms of a seventeenth or early eighteenth century merchant vessel?

A proposed merchandise for a Gold Coast cargo drawn by General Jacob Ruÿchaver and counselors at Elmina on April 8, 1653, included a large variety of cloth, 20,000 lbs. of large neptunes, 10,000 lbs. of small neptunes, 5,000 lbs. of pans, 8,000 lbs. of hammered basins, 10,000 lbs. of brass bracelets, 6,000 lbs. of assorted pewter basins, 1,500 bunches of hooks in various sizes, and 1,700 earthenware basins in a variety of sizes, both with and without lids. A second proposal dated December 27, 1653, included brass dishes, assorted light basins, lead, and fine beads, in addition to many of the items stated in the earlier proposal (Jones 1995:175-181). Writing of the merchandise brought by the Dutch in the 1680s Barbot (1992:561) noted:

> "Brass cups with handles, satelas, cauldrons of various sizes, copper basins, Scottish pans, barbers' basins (some chased, others hammered or wrought), brass pots, brass padlocks, brass trumpets, manillas of pewter, brass or iron, tubs, deal chests, dishes, basins with small rims, deep

> porringers without a rim (pewter throughout) fishing hooks of various sizes, lead in sheets and in the shape of organ pipes, knives of three sorts, Venetian glass beads (verrot) of every kind… a few cowries, long yellow [-metal] pins.”

In 1697, Tilleman (1994:41) included brass basins, metal bracelets, pewter plates, bowls, and canisters, three varieties of fish hooks, large pins, earthenware mugs with and without lids, a large variety of glass beads, French brandy, tobacco pipes, and a wide variety of cloth in his list of wares brought by Europeans to be traded along the Guinea coast at the end of the seventeenth century.

While far from being comprehensive (Bosman for example states that 132 items are needed for trade) in their list, nevertheless each of the authors above provides a glimpse into the European trade carried out at the time of our vessel’s sinking. When compared to the assemblage of goods recovered from the site we see that many of the items found associated in the archaeological record are also found associated in this particular historical accounts of seventeenth century cargos. The association of some items such as the ceramics, glass, pewter tops, bricks, wood, and tobacco pipes, however, is less clear as these can be placed in multiple artifact categories and may represent the personal effects of sailors, ship’s provisions, the actual ship, or its cargo. The small representative samples so far discovered makes it impossible to delineate functionality at this time.

4.6 Conclusion

The analysis of the materials recovered in 2005 and 2007 utilizes large-scale patterns of manufacture, consumption, and demand regarding European commercial wares to identify an unknown shipwreck event. Despite an artifact assemblage riddled with intrusive materials, several items could be definitively associated with the actual wreck wither by their large size or quantity. These items included: cannon, pewterware, manillas, brassware, cowries, beads, and lead rolls. The analysis of these items indicates that the wreck dates between 1600 and 1730 and is most likely Dutch. As seen in Chapter Three, this fits with the historical record as Elmina was the seat of Dutch West African trade from 1637 until 1872.

Several other artifacts including ceramics, glass, bricks, pewter bottle tops, lead cloth seals, pins, floral remains, fish hook, and tobacco pipes may also be associated with the wreck as their manufacture and style place them within this timeframe. Their small size, though, makes them susceptible to wave action and thus mobile in the dynamics of coastal currents. Coupled with the infrequency of each item and the presence of a large number of intrusive materials in the assemblage, it is not possible to positively associate these artifacts with the wreck. However, when taken as a whole, all of these items, both definitive and possible, match those expected of an eighteenth century Dutch African trader.

Interestingly, the profile of the only other shipwreck known to have wrecked at Elmina fits the provisional date and origin of the wreck that was derived from the analysis of the material culture. On February 28, 1647 the ship *Groeningen* belonging to the Dutch West India Company, laying at anchor in the Elmina roadstead, caught fire and sank taking with it the lives of eleven seamen and eight soldiers. The fire started when a cannon, fired in salutation of the ship's arrival off the Castle, burst. The brunt of the explosion "took its chief force downwards, breaking the orlop [deck] in piece[s] which fell into the hold where it made a fearful fire" (Furley Collection Notebook 1646-

1647:163).[120] In the hold were several casks of brandy; broken by the explosion, the strong alcohol fueled an intense fire that quickly doomed the ship.

The date of the *Groeningen's* sinking (1647) fits precisely within the date range suggested by the artifact assemblage (1600-1730) and AMS radiocarbon dates (1642-1660). Several artifacts recovered from the site, including the touchmarks on the pewter and brass basins, pipe bowls, yellow bricks, and pewter screw tops, are indicative of a Dutch vessel. Laden with what was described as a "goet cust cargesoen [good coast cargo]", the *Groeningen*, newly arrived on the coast, had yet to be unloaded prior to its loss (Nationaal Archief, Den Haag [NL-HaNA], Oude Westindische Compagnie (WIC), 1621-1674, nummer toegang 1.05.01.01, inventarisnummer 11 (-14, (h))).[121] On the site large stacks of nested basins can be observed lying in rows as if still stored in the ship's hold. In addition, a high quantity of imported trade goods such as beads, cowries, manillas, and lead rolls, indicate that the Elmina Wreck site is the remains of a fully burdened inbound vessel. The *Groeningen* also matches the location of the Elmina Wreck site. Although void of an exact location, contemporary accounts of the accident indicate the *Groeningen* was lost in the Elmina roadstead. From a description of the coast written sometime in the 1650s we know that "the roadstead where the ships lie at anchor is to the East of the castle [*São Jorge da Mina*], so that the stone redoubt on St. Jago's Hill lies East of them, free from the castle, i.e. one can see in between the two" (Jones 1995:25). A similar description is also provided by Tilleman (1994:22) who

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[120] The orlop is usually considered the lowest deck in a ship. It is often described as the deck or part of the deck where cables are stowed and is usually below the waterline.

[121] Although some of the cargo was salvaged at the time of its sinking, the overwhelming majority of the goods recovered were textiles; other items included a few pieces of the ship's equipment (sails, ropes, spars, anchors, etc.) and some barrels of food (NL-HaNA, WIC, 1621-1674, 1.05.01.01, inv.nr. 11 (-14, (h))). The large amount of textiles salvaged after the explosion may explain the limited number of cloth seals so far recovered from the site.

added that it was “6, 7, and 8 fathoms [deep] with a good sand ground.”[122] The location of the Elmina Wreck site, approximately 1.5 miles southeast of Elmina Castle and lying in about forty feet of water, fits both of these descriptions. As seen in figure 4.32, a clear view of the land between the castle and St. Jago’s hill is visible from the site.[123]

Figure 4.32 View of Elmina taken while anchored over the Elmina Wreck site (Photo by G. Cook).

[122] Although according to today’s standardization one fathom is equal to six feet, historically its exact measure varied. Up until the nineteenth century, a fathom could range anywhere from five to seven feet.

[123] A nineteenth century description states that “the usual anchorage off Elmina is in 7 or 8 fathoms, sand, shells and mud, with St. George Castle bearing N.W. ½ W. distant about a mile” (Findlay 1883:591). This suggests continuity over time and the distance described is close to that of the site. The continual use of the same anchorage for over 400 years may help explain the large amount of intrusive material found on the site. These materials may be goods that were disposed of or dropped overboard from ships lying at anchor. These would have been in the near vicinity of the Elmina Wreck site and it is easy to see how these goods would quickly accumulate on such an old site protruding from flat bottom.

CHAPTER FIVE: MULTISCALAR ARCHAEOLOGY AND SITE INTERPRETATION: THE CASE OF THE BENYA LAGOON SITE

In October 2007, the remains of an historic vessel were discovered in the Benya River by employees of Dredging International. Members of the Central Region Project were subsequently contacted and the remains documented. The site, which consists of 15 disarticulated timbers and 3 cannon recovered from the dredge spoil, appears to be the remains of an early eighteenth century Dutch ship abandoned in the Benya Lagoon. The Benya Lagoon site and the Elmina Wreck site, thus represent very different time periods, historical settings, and archaeological contexts. Whereas the assemblage from the Elmina Wreck site is largely composed of the material traces of its cargo almost void of the actual vessel, the remains of the Benya Lagoon site are wholly composed of elements of the ship, absent its cargo or associated objects. The intrasite utility of a multiscalar approach in the interpretation of shipwreck sites has already been shown through my serial analysis of a variety of artifact types recovered from the Elmina Wreck site. By way of comparison, the dramatically different datasets representing both sites demonstrate its utility across sites. Between the two, a wide array of large-scale cultural processes has been applied to interpret a myriad of archaeological data recoverable from an unidentified archaeological event. Yet, the value of both to the reconstruction of the West African past lies with both their local and global contexts. On one hand, they represent unique insight into the construction of the European ships that traded on the coast and their cargoes. On the other, data on the cargo and associated artifacts provide information on trade and exchange in world area that has received little attention from underwater archaeologists.

Given the limited time available, the nature of the find, and the particulars of the dredging operation, this site was approached as a salvage project. Documentation of the site entailed records of the site location, detailed drawings and photographs of the recovered timbers, and the examination of the cannon. Cross-section cuttings collected from several timbers for dendrochronological and wood type analysis indicate a felling date of 1700-1701 and a North German provenience. Using this data as an endpoint, I sought an explanatory starting point through the macro-scale cultural processes of production and consumption within Africa and the Atlantic World during this time period.

The site interpretation is predicated on the analysis of large-scale trade patterns—in particular the European timber, ship building, and arms trade—as much as it is on the analysis of the fourteen timbers and three cannon. The dendroprovenience of the ship's timbers, which was key in determining the age of the ship, is contextualized by a discussion of how three major maritime traditions—English, French, and Dutch—procured the timber used to construct their vessels. The distinctive attributes of the political economies of these nations at the beginning of the eighteenth century provide clues to the likely origin of the vessel. Likewise, attributes of the ship's construction exhibited in the timbers are examined in relation to European building practices. The comparison of turn of the century European ship building reveals idiosyncrasies in regional techniques. When matched with the characteristics of the Benya Lagoon vessel's construction, these provide valuable clues as to its probable Dutch origin. Last is the analysis of the three cannon recovered from the site. The guns' form and markings provide important information concerning when and where they were forged.

Understanding their relationship to the European arms trade in the eighteenth century provides a third clue to the vessel's origin.

5.1 Discovery

Located in the town of Elmina, the Benya River is actually a lagoonal system that drains a network of salt marshes fed by small feeder streams to the west (Figure 5.1). The river, which provides a protected anchorage along an otherwise exposed and thus tumultuous coast, is intensely trafficked by the town's fishermen and is vital to a local economy heavily dependent on coastal fishing for subsistence. Over the years, both man-made and natural forces have contributed to heavy siltation leading to significant degradation losses to the main channel. Seeking to maintain the river's utility, the Government of Ghana contracted the Belgium firm Dredging International to re-engineer the town's breakwater and dredge the river's channel in 2007. Due to an exorbitant amount of trash and debris within the river, the company chose excavation over siphon dredging. A large barge equipped with a clamshell scoop and sediment hampers was used to widen and deepen the channel. Once deposited on deck, mixed loads of trash and soil were filtered through 15 cm x 10 cm screening using high powered water jets. Larger items were removed leaving mud slurry to be pumped to the nearby beach via pipeline. The remaining debris was periodically offloaded to a large trash pile on the shore which was then hauled away to a local landfill. It was in the course of conducting these operations that company employees stumbled upon the vessel's fragmented wooden remains. Unaware of its significance, the company's laborers relegated the timbers to the trash heap for removal. If not for the discovery of four small cannon, a find deemed worthy of reporting to management, this site might have remained unknown forever.

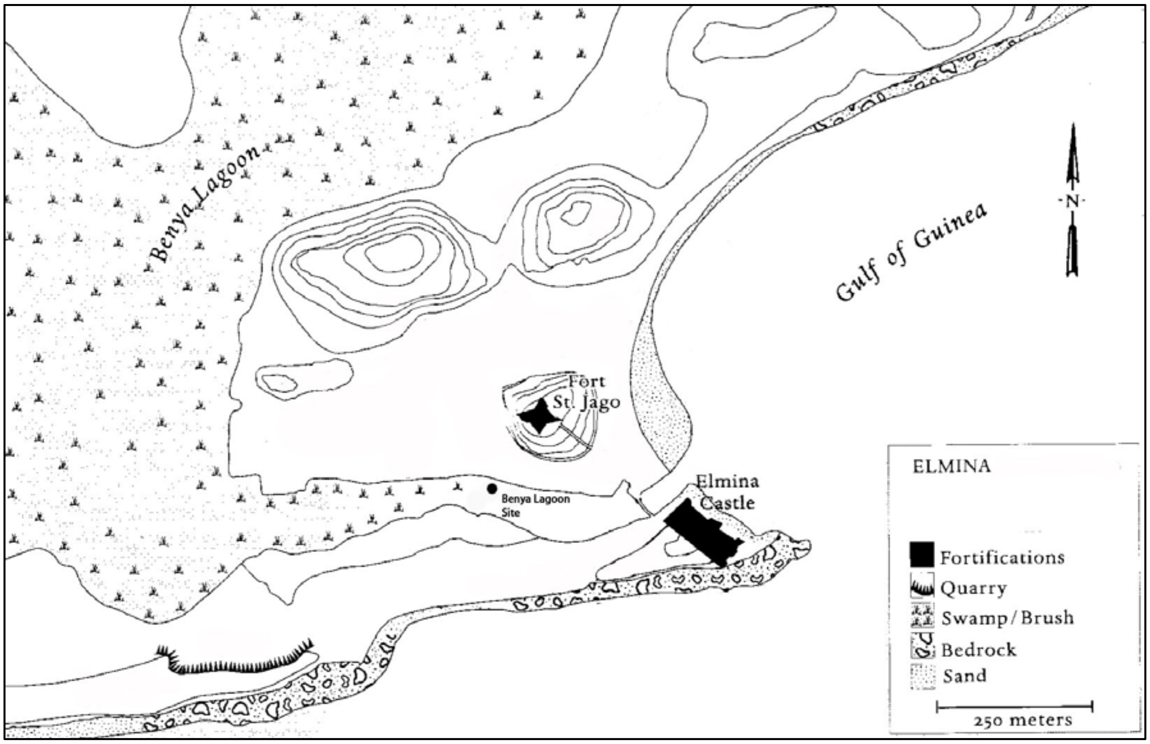

Figure 5.1 Map showing the location of the Benya Lagoon site (adapted by A. Pietruszka 2010 from DeCorse 2001:53, Figure 2.6)

Upon discovery, Dredging International's site managers notified archaeologists from the Central Region Project who were conducting archaeological surveys offshore at Elmina. While no cultural resource management protocol or legislation to halt dredging and perhaps further destruction of the site existed, the company invited archaeologists to document and remove the remains, provided equipment and man-hours towards logistics, and allowed unfettered access to an otherwise restricted work area. Unfortunately, since the dredging was carried out by a clamshell scoop excavator, much of the context of the cultural remains was destroyed in the ship's initial discovery (Figure 5.2). The materials that did survive, however, made it evident that the cannon and timbers were the remains of an historic European vessel.

The excavator's clamshell inflicted severe damage to the ship's timbers, many broken beyond recognition, making it impossible to recover and document all of the pieces. Therefore, it was decided that only timbers retaining identifiable characteristics would become the focus of the salvage project. From the dredge spoil it was possible to recover fourteen timbers sufficient in size to make reasonable conjectures concerning their placement in the ship's construction. These timbers are believed to represent a wide range of the ship's structural components, including planking, floors, futtocks, deadwood, beams, and knees; however, due to the disarticulation and fragmentation of the timbers some categories remain speculative. The wide range of components, along with the associated cannon, do indicate the entire vessel had likely been present prior to dredging. Below I review the identifiable portions of the vessel recovered.

Figure 5.2 Photograph of ship remains from the Benya Lagoon after their removal during dredging operations. A large section of wood is visible bottom center. Eighteenth century timbers and historic cannon were mixed with modern trash and debris (Photo by A. Pietruszka).

5.1.1 Planking: Planking is represented by a single fragmentary piece (timber 1) measuring 80 cm (31.5 in) long, 30 cm (11.81 in) wide and 6 cm (2.36 in) thick.[124] Five treenails evenly spaced in an alternating offset pattern run along its length. Because of its small size and lack of archaeological context it, is impossible to determine what type of planking (deck, hull, ceiling, etc.) this timber represents.

5.1.2 Deadwood: Timber 13 is the largest in terms of mass. Incomplete in both its length and width, it measures 85 cm (33.46 in) in length, 55 cm to 18 cm (21.65 in to 7.09 in) in height, and 22 cm (8.66 in) in width (Figure 5.13). The timber's triangular shape and large size is suggestive of the ship's deadwood: that is the "blocks of timber assembled on top of the keel, usually in the ends of the hull, to fill out the narrow parts of a vessel's body" (Steffy 1994:270). From the top, two treenails are aligned linearly and penetrate the entire timber. An additional third treenail, visible only from the bottom, is in line with the top two treenails; however, it does not penetrate the timber and therefore must have been inserted from below during construction. The line of treenails may represent the original central axis of the timber. This was the only timber that exhibited extensive toredo damage, evidence which perhaps supports its presence on the exterior of the vessel.

5.1.3 Beam: Timber 14, a small squared timber 72 cm (28.35 in) in length measuring 21 cm by 21 cm (8.27 in by 8.27 in), may be the remains of a beam. Two treenails set in a linear pattern traverse the timber (Figure 5.14).

5.1.4 Knees: One complete knee was recovered. The dimensions of timber 15 were 20 cm (7.87 in) molded by 18 cm (7.09 in) sided. Four holes traverse the timber along the sided face. The holes measure 2 cm (.79 in) in diameter and contained evidence of iron

[124] Due to its small size and poor preservation Timber 1 was not photographed or drawn.

concretion, suggesting iron through pins were used to fasten the timber. Nine treenails in an alternating offset pattern traversing the molded dimension indicate this to be a lodging knee; the treenails likely held deck planking in place (Figure 5.15).

5.1.5 Frames: The largest proportion of timbers recovered represent components of the vessel's frame. Timbers 2, 4, 5, 8, and 10 exhibit similarities in shape and size, but lack consistent uniformity (Figures 5.2, 5.3, 5.4, 5.7, 5.9). Dimensions range from 13-15 cm (5.12-5.91 in) molded and 16-23 cm (6.3-9.06 in) sided. Four of the five timbers taper along the molded dimension.[125] Timbers 9 and 11 also appear to be futtocks but their irregular shape and size clearly differentiate them from the other five (Figure 5.9, 5.11). Timber 9 measures greater than 20 cm (7.87 in) molded (it is sheared off at the top making it impossible to get the full dimension) by 21 cm (8.27 in) sided and timber 11 measures 11-15 cm (4.33-5.91 in) molded by 15 cm (5.91 in) sided. Both timbers taper along the molded dimension. Treenails aligned in an alternating offset pattern run the length of the sided dimension on all seven futtock.

Three floors are believed to be represented by timbers 6, 7, and 12. Timbers 6 and 7 measures 23 cm (9.06 in) molded by 19 cm (7.48 in) sided and 25 cm (9.84 in) molded by 14 cm (5.51 in) sided respectively. These two timbers suffered severe damage and are only a small portion of what would have been much larger timbers (Figures 5.6, 5.7). Both timbers have multiple treenails dispersed along the sided dimension; however, their patterns differ. Timber 7 has two pairs of treenails evenly spaced from the timber's center, each aligned in a linear pattern along the central axis of the sided dimension, while timber 6 has the more common alternating offset pattern observed on the other timbers. Timber 6 has a centrally located hole measuring 2 cm in diameter on its sided

[125] Timber 10 was missing both ends making it impossible to tell if it tapered.

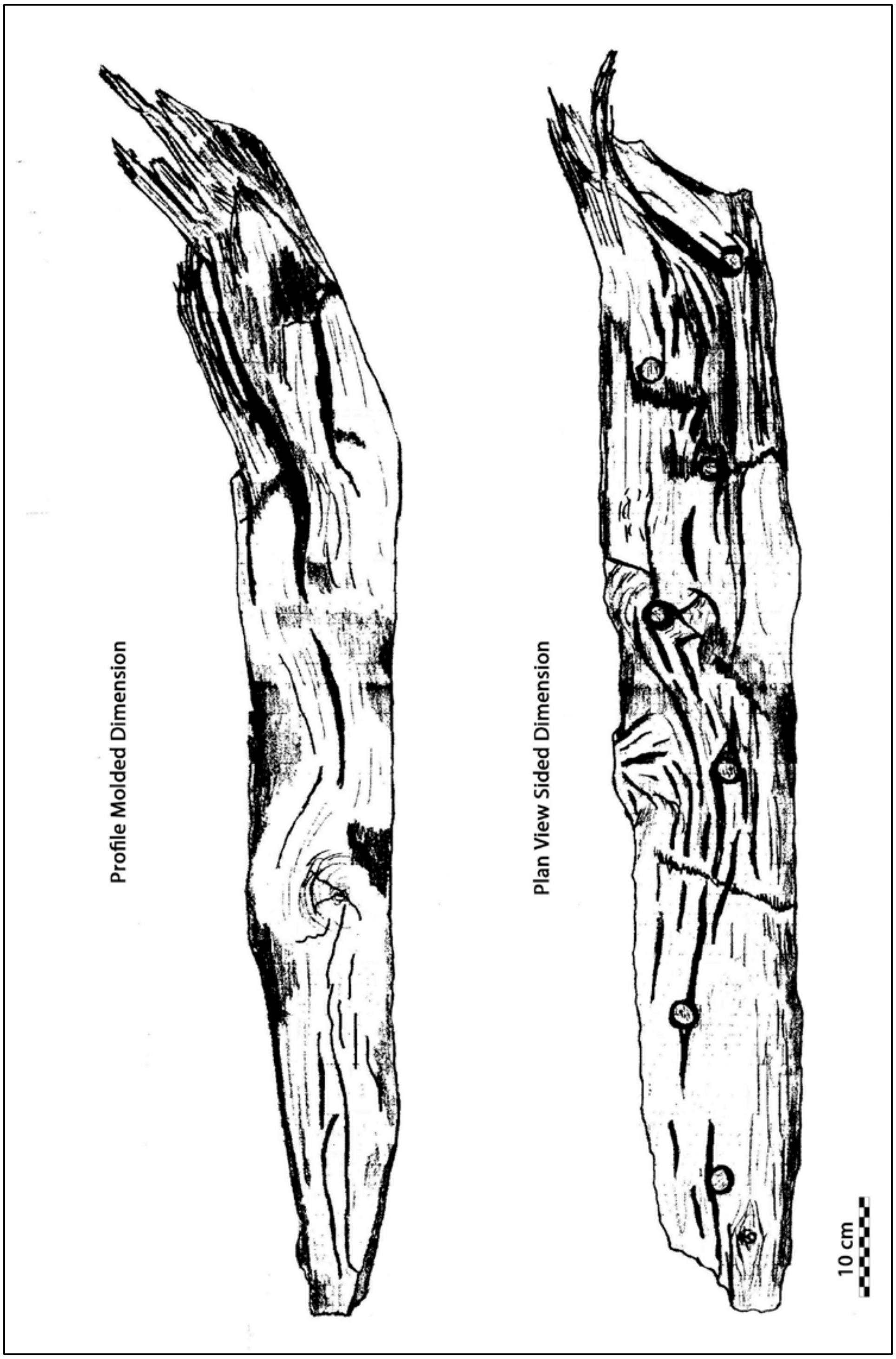

Figure 5.3 Timber 2 (Drawing by R. Horlings)

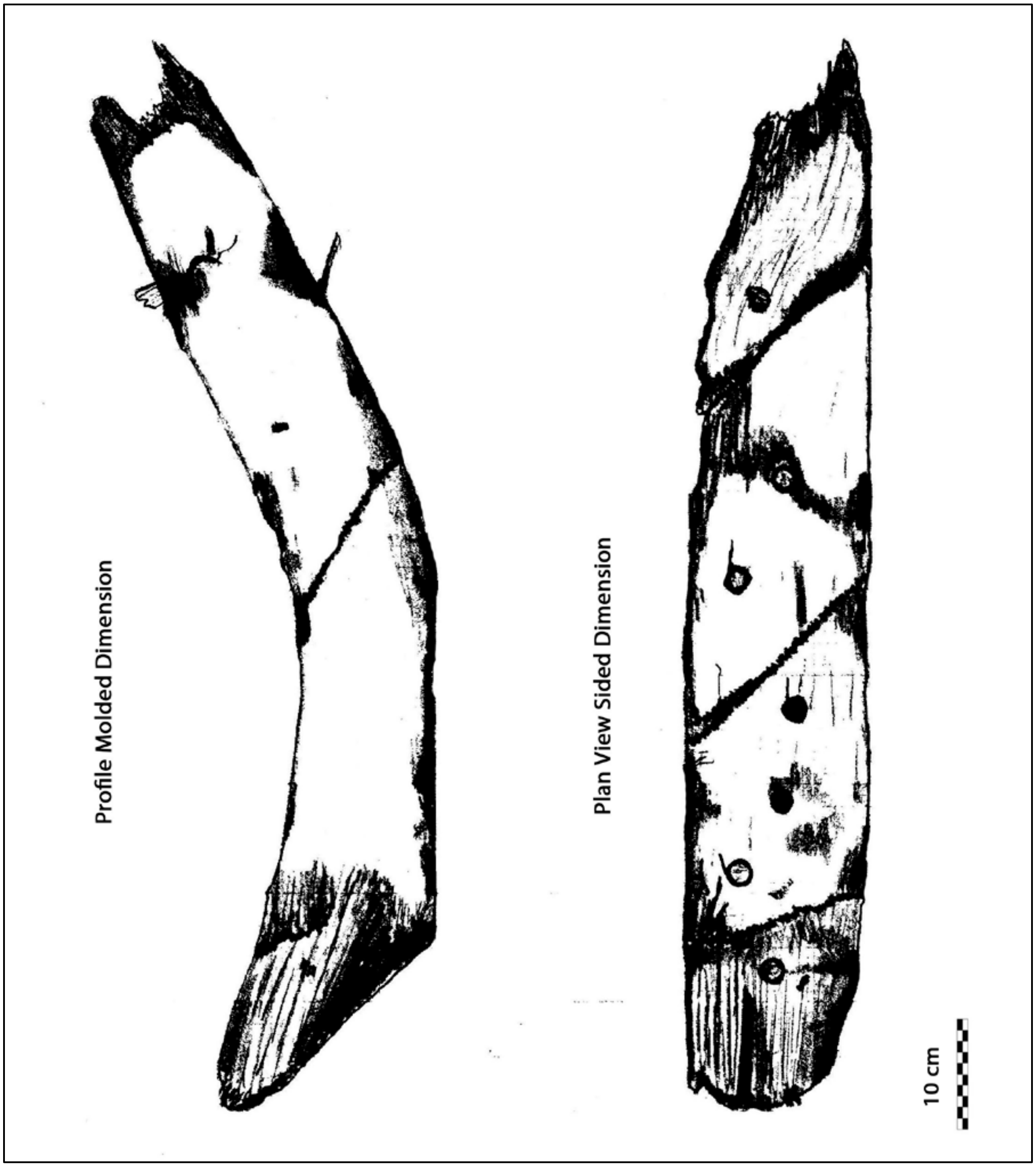

Figure 5.4 Timber 4 (Drawing by R. Horlings)

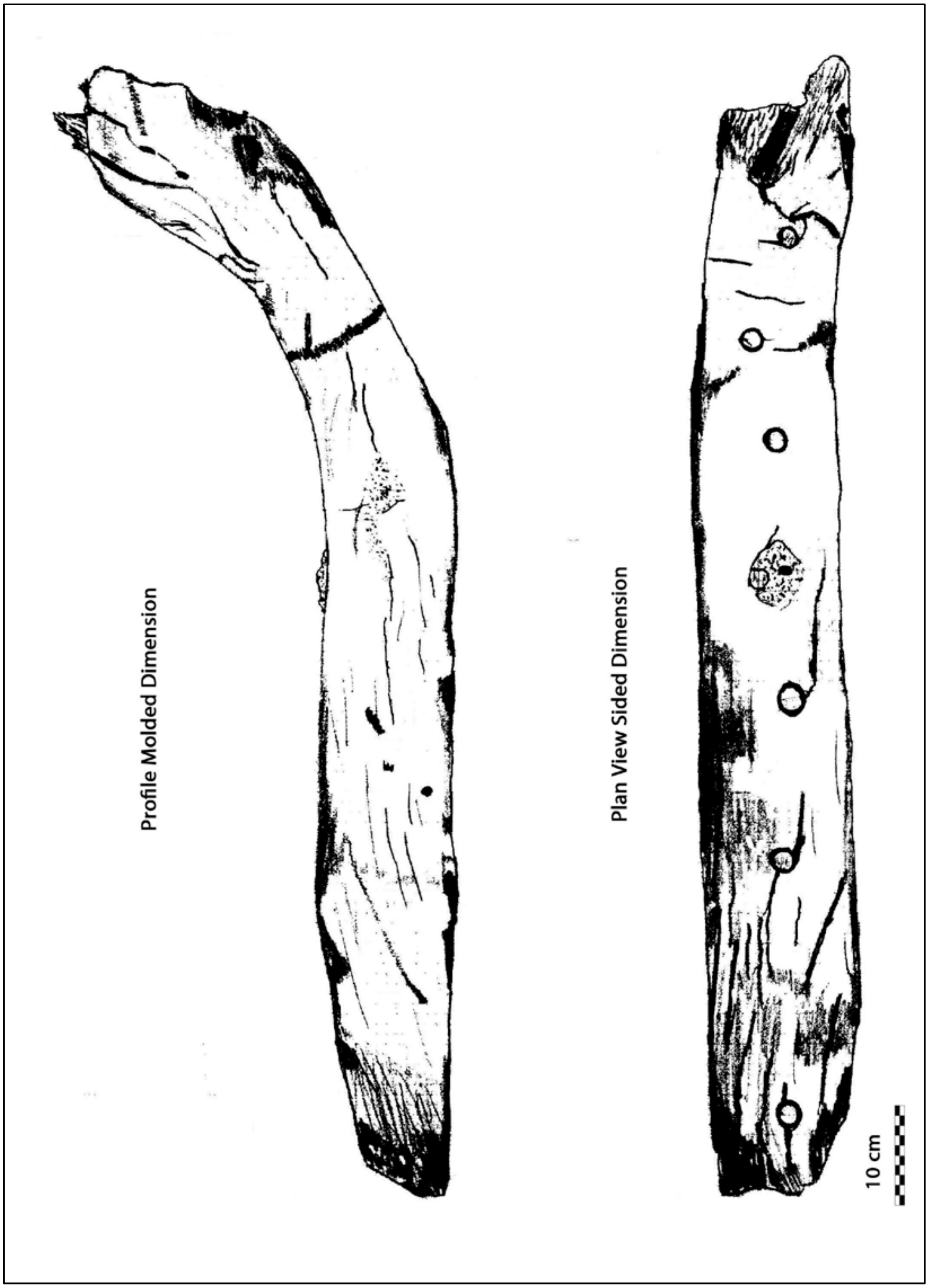

Figure 5.5 Timber 5 (Drawing by R. Horlings)

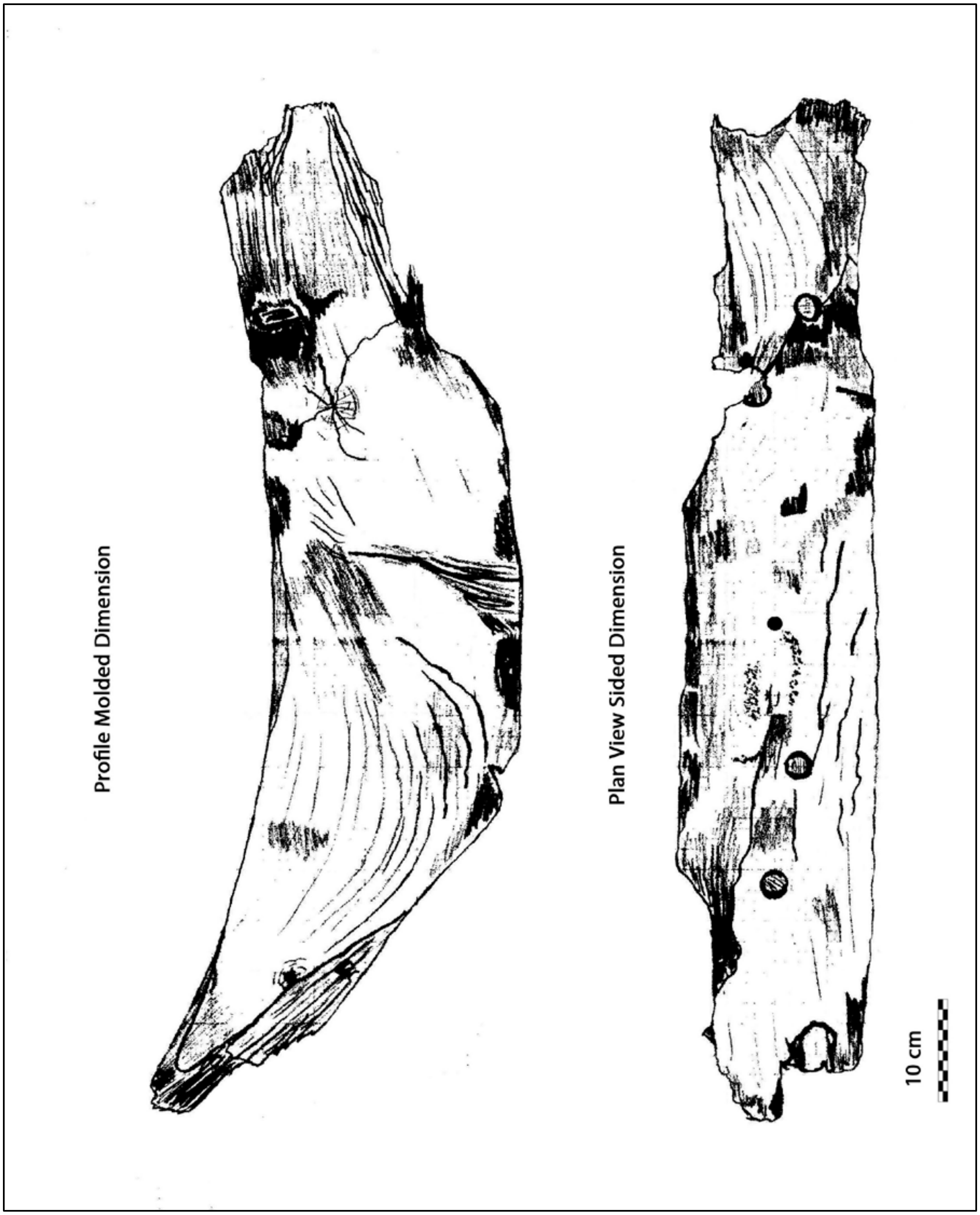

Figure 5.6 Timber 6 (Drawing by R. Horlings)

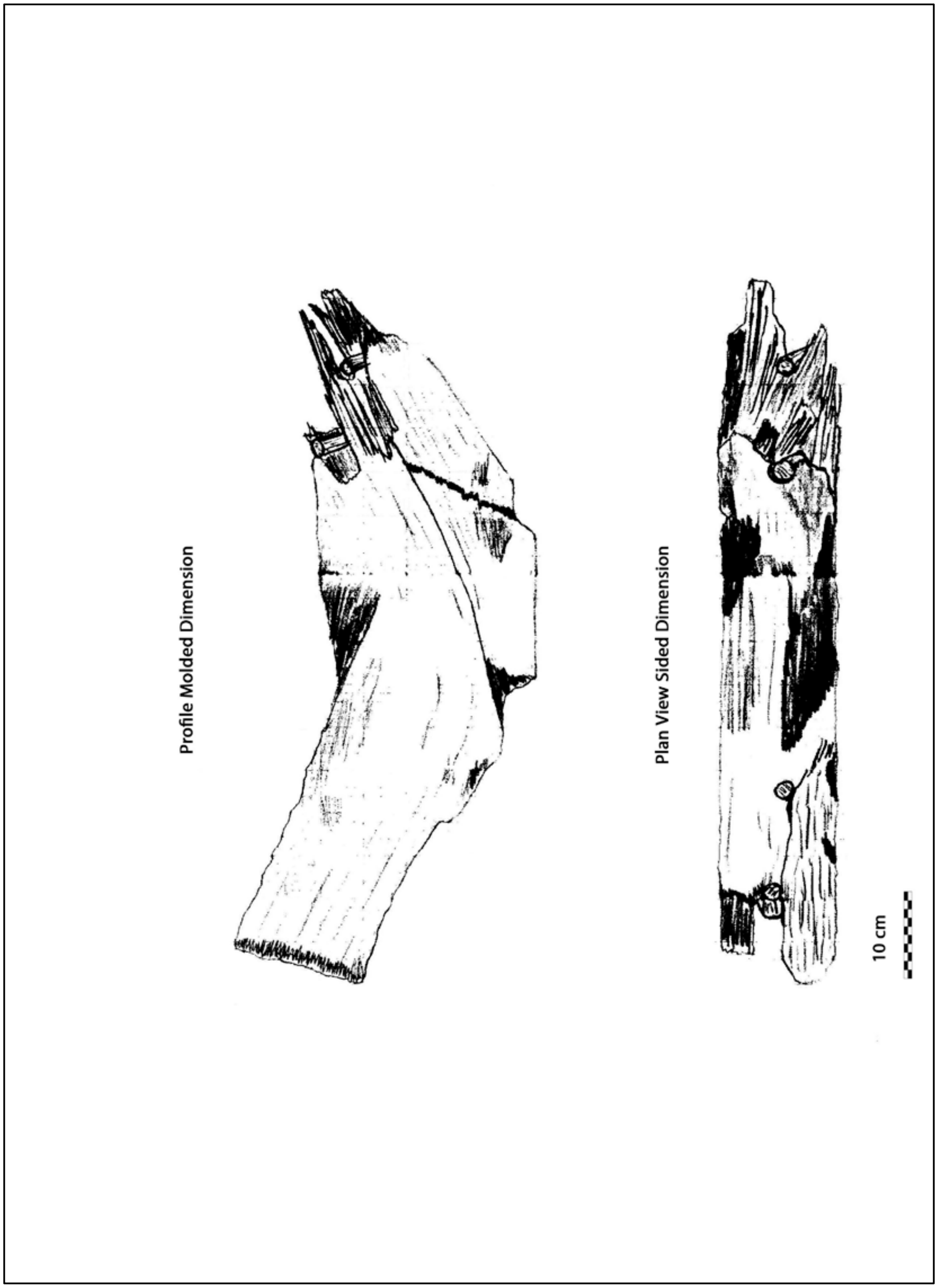

Figure 5.7 Timber 7 (Drawing by R. Horlings)

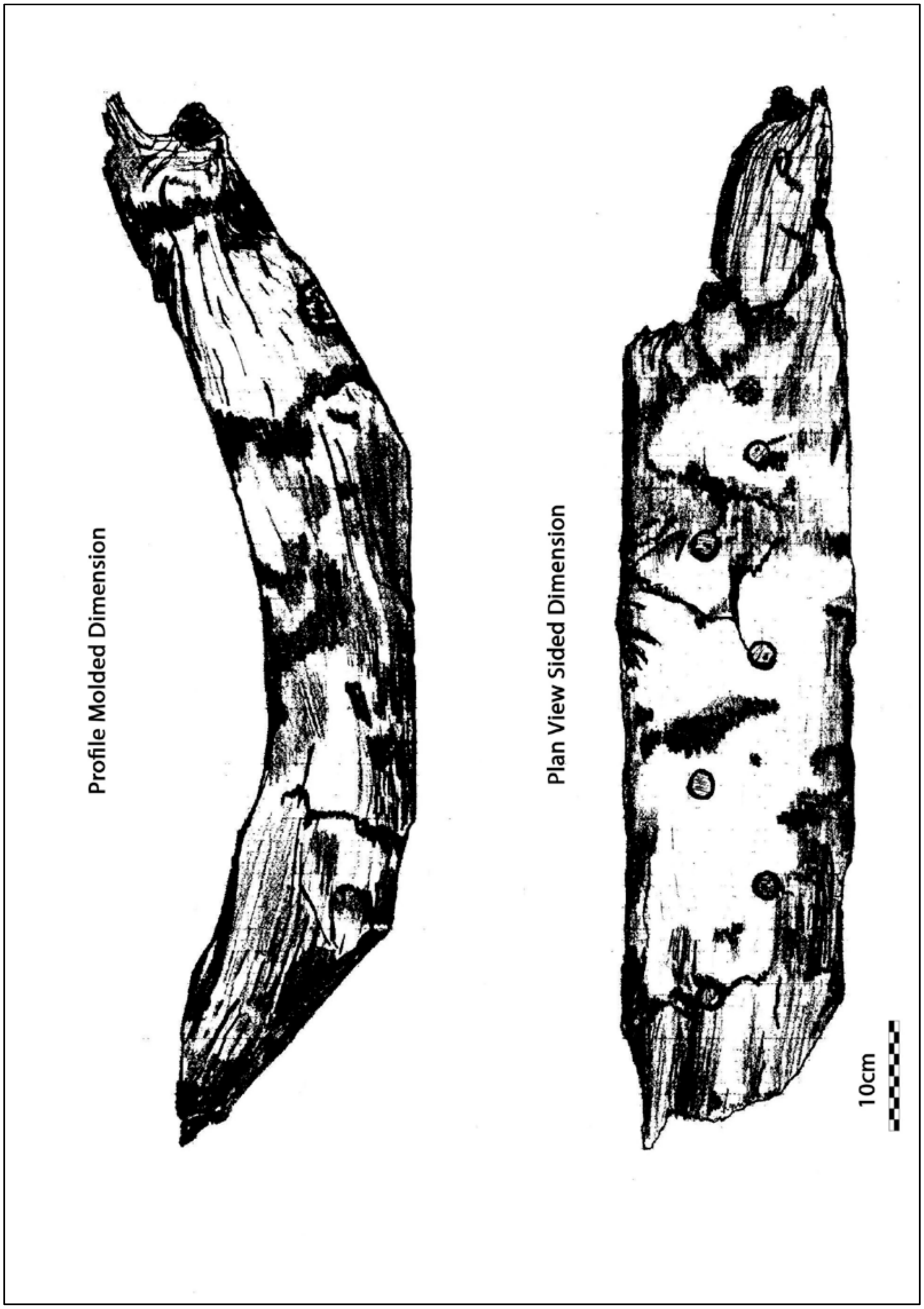

Figure 5.8 Timber 8 (Drawing by R. Horlings)

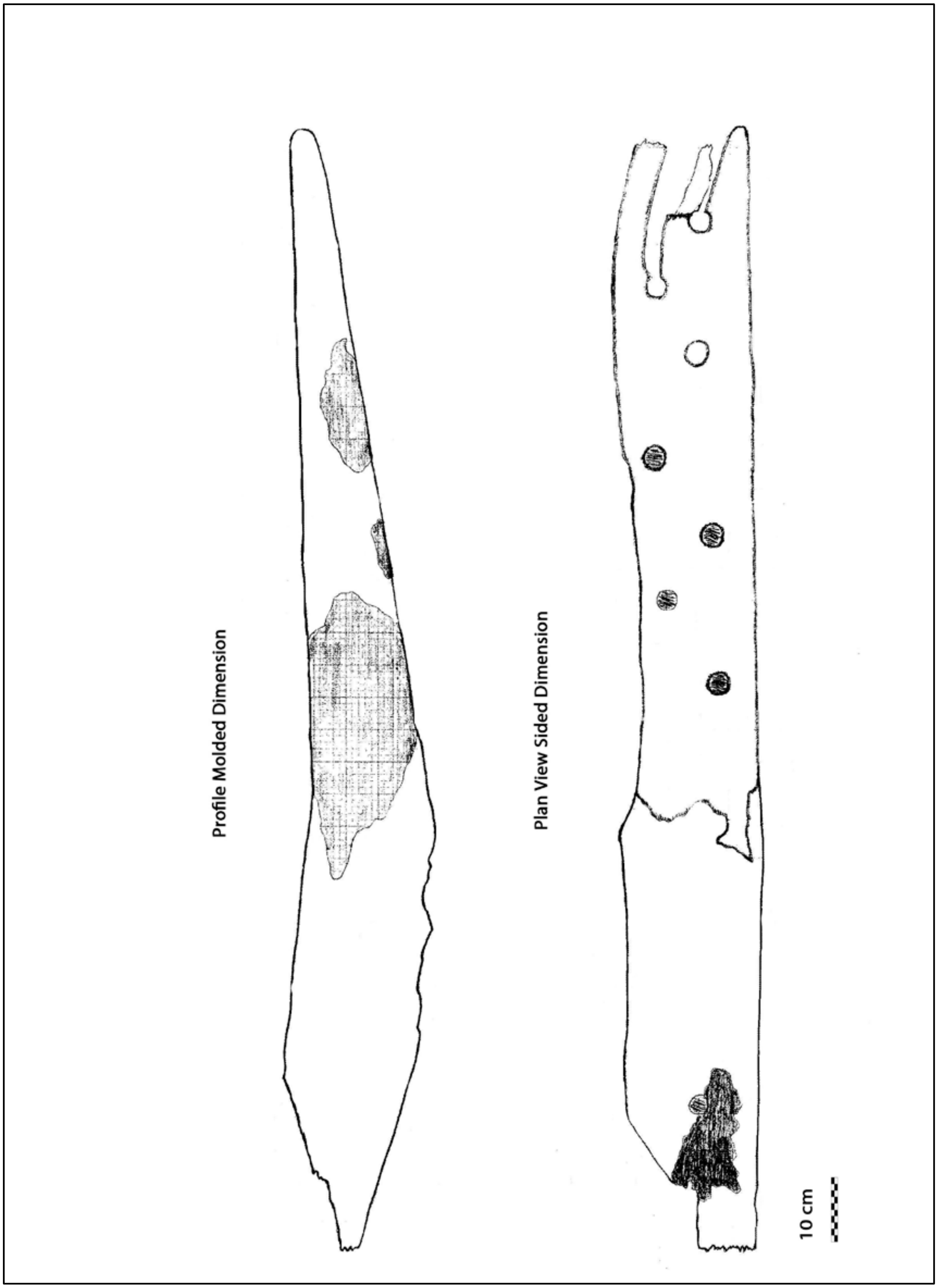

Figure 5.9 Timber 9, Benya Lagoon site, 2007 (Drawing by A. Pietruszka)

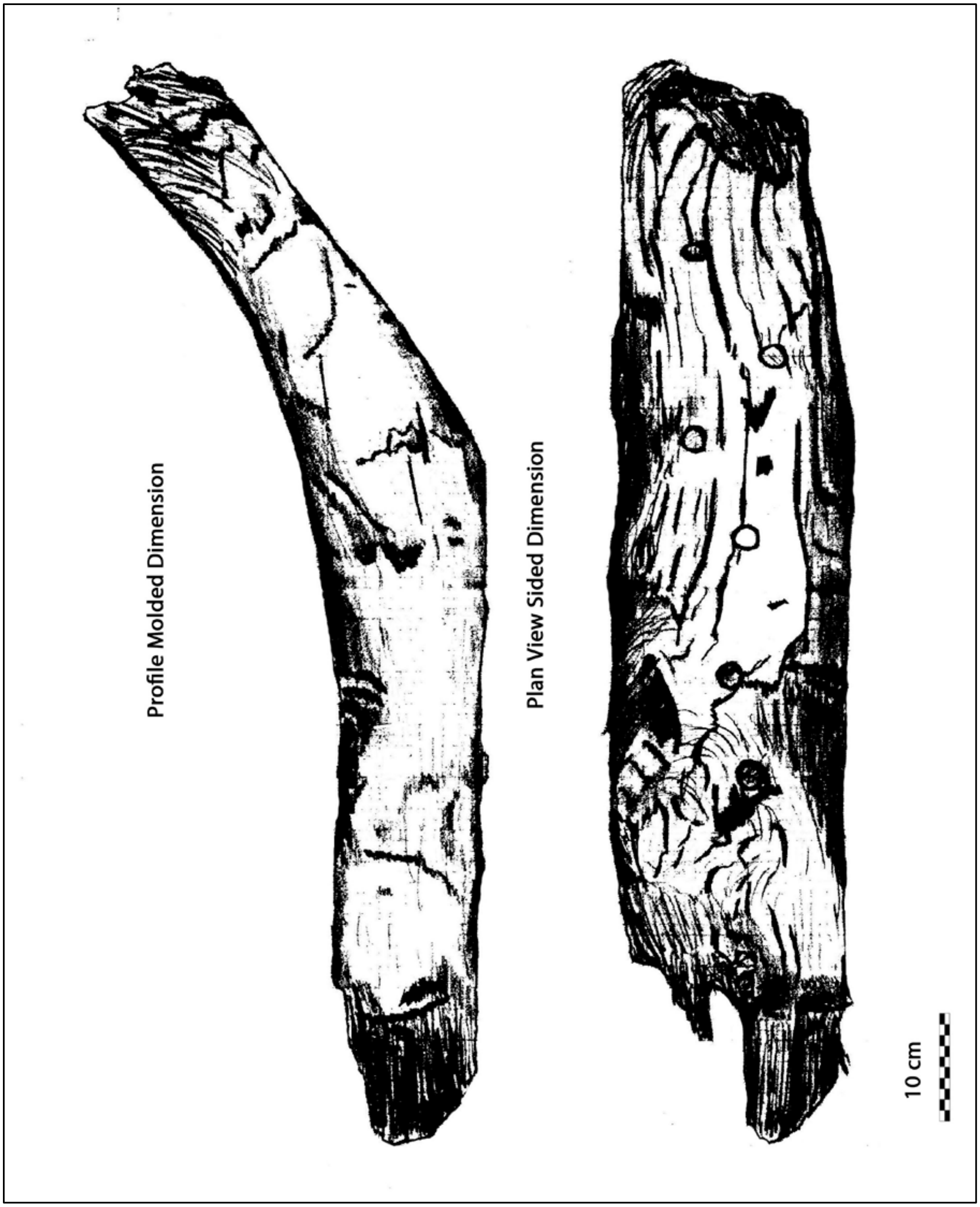

Figure 5.10 Timber 10 (Drawing by R. Horlings)

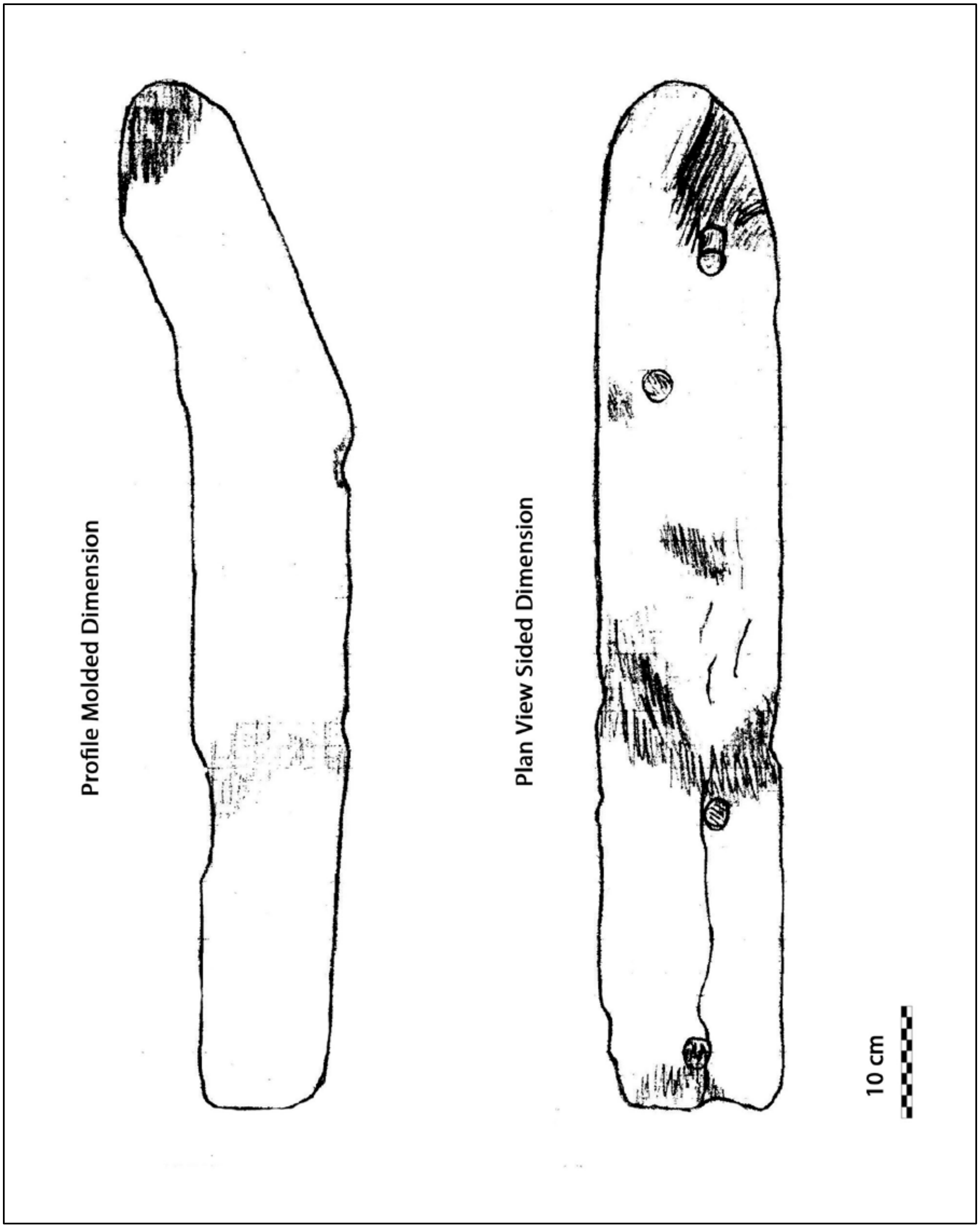

Figure 5.11 Timber 11 (Drawing by R. Horlings)

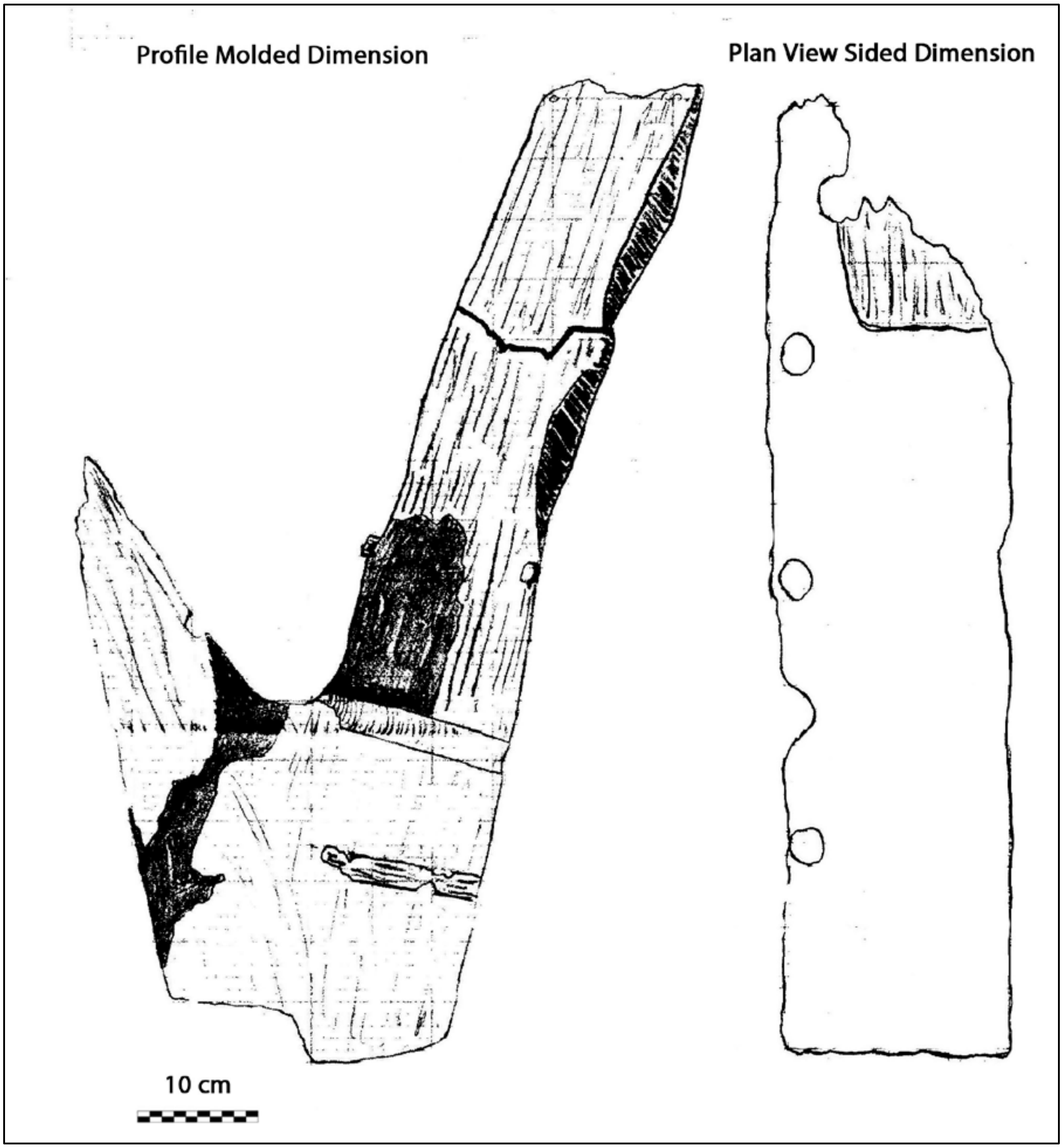

Figure 5.12 Timber 12 (Drawing by A. Pietruszka)

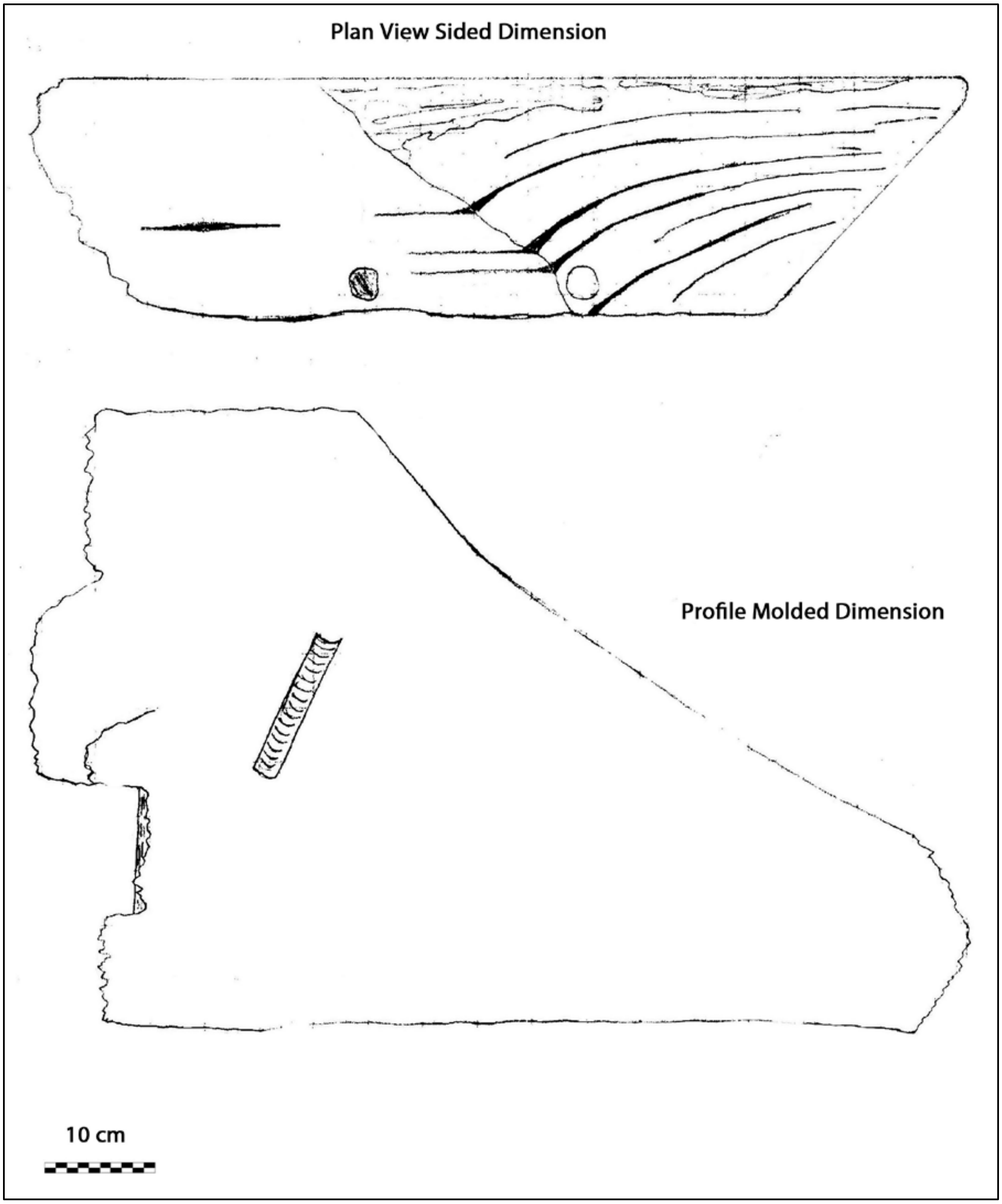

Figure 5.13 Timber 13 (Drawing by A. Pietruszka)

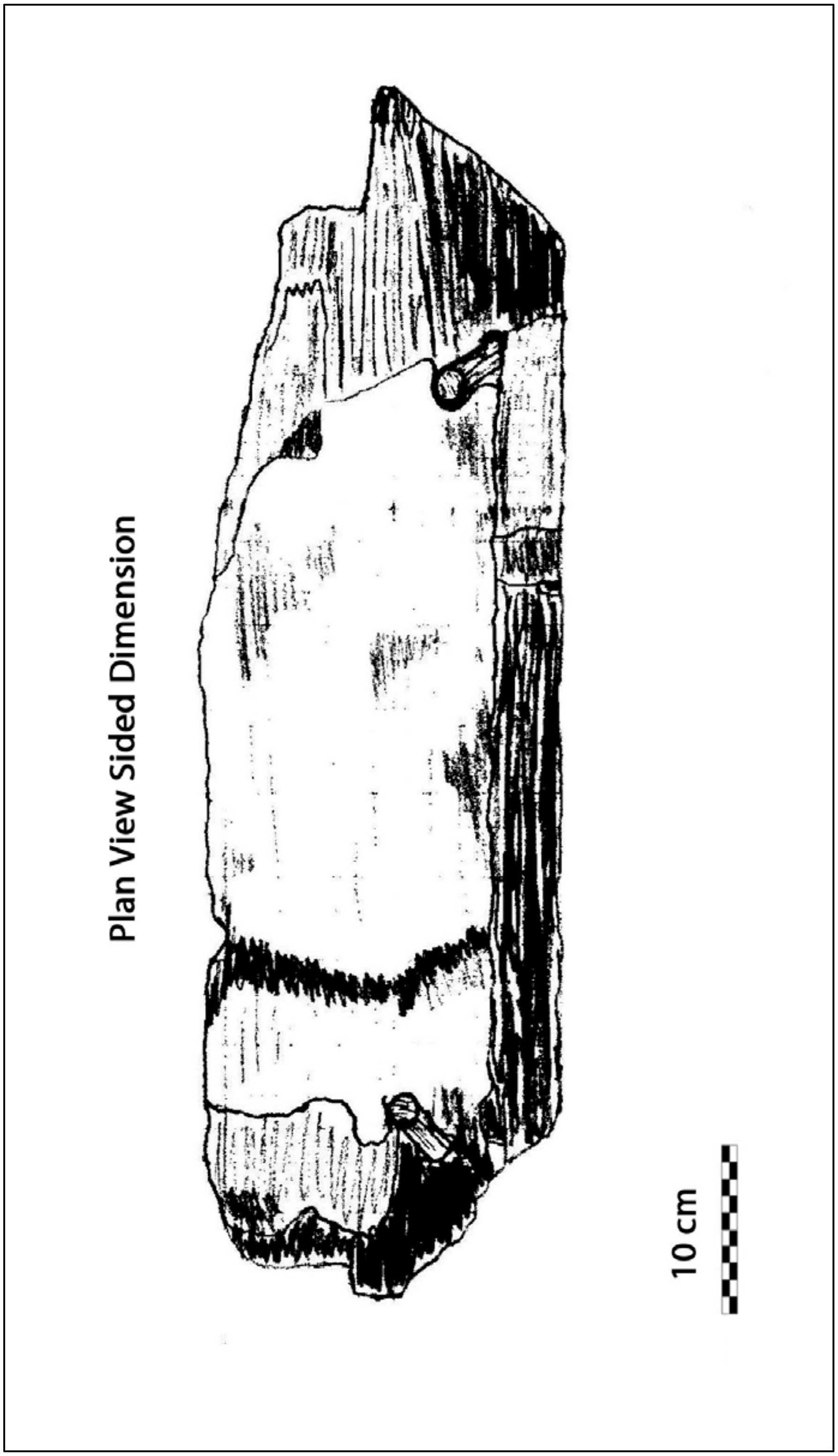

Figure 5.14 Timber 14 (Drawing by R. Horlings)

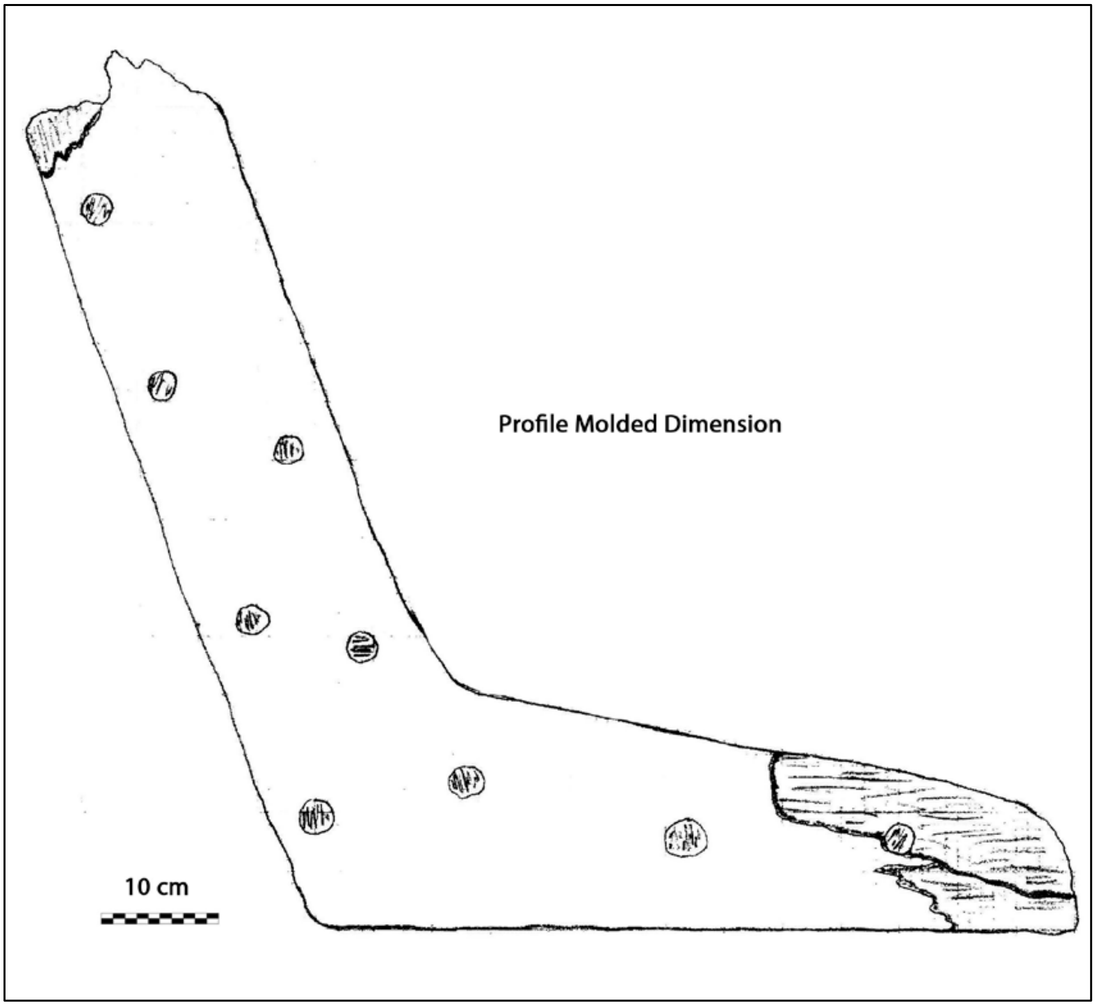

Figure 5.15 Timber 15 (Drawing by A. Pietruszka)

face. Iron concretion lining the hole suggests that an iron through spike was used to fasten the floor to the keel. The distinctive shape of timber 12 indicates a floor from the extreme stem or stern section of the vessel commonly referred to as a rising timber or crutch timber (Figure 5.12). It has a molded dimension of 13 cm (5.12 in), a sided dimension of 20 cm (7.87 in), and is greater than 80 cm (31.5 in) in height, though the timber is incomplete. Five treenails in an evenly dispersed linear pattern offset from the central axis run along the sided dimension. Four of the five traverse the entire molded dimension, but the fifth or bottom-most only penetrates halfway into the timber.

5.2 Dendrochronology

Cross sections were collected from timbers 1, 4, 8, 10, 15, and 14 for dendrochronological and wood type analysis conducted by Dr. Tomasz Wazny, of the Cornell Tree-Ring Laboratory. The wood was preserved in a good condition, especially considering the tropical environment in which it was discovered. Despite favorable living conditions for wood destroying marine organisms—high temperature and high salinity—only one sample contained shipworm (*Turedo navalis*) tunnels.[126] This degree of preservation suggests a high sedimentation rate in the lagoon at the time of deposition; the lower part of the vessel, having been rapidly covered by sediments, was protected against the main deterioration causes.

The study was carried out using classical dendrochronological methods (see Ballie 1982, Hillam 1998, Wazny 2001). The annual rings were measured via LINTAB measuring stage to an accuracy of 0.01 mm. The tree-ring series were compared and synchronized with European master chronologies. Cross-matching was undertaken using the programs CATRAS v. 4.35 (Aniol 1980-2003), TSAP (Rinn 2005), DENDRO for Windows (Tyers 2004), CORINA (Harris, Hamid, Madar unpubl.) and supported by visual comparison. The "t-values" reported were calculated using the Baillie-Pilcher algorithm (Baille and Pilcher 1973) and sapwood statistics were calculated after Eckstein and Wrobel (2005).

All six samples were identified as oak (genus *Quercus*); however, the exact species was indeterminate. Absolute dates were obtained for all six samples; although only two contained sapwood. To determine the exact date when a timber was cut, both

[126] An annual salinity range of 29.5-40 % has been recorded for the Benya Lagoon (Obodai 1990 in Yankson 1996).

the sapwood and bark must be present; however, a *terminus post quem* is still possible in their absence. Based on this timber 1 was cut after 1690, timber 4 1673, timber 10 1692, and timber 15 1690. A more precise date was obtained for the two samples that did contain sapwood: timber 8, which contained two sapwood rings, dates between 1678 and 1698, and timber 14, with completely persevered sapwood including a bark edge, was dated to 1700 or 1701. These dating results indicate the ship was built using trees felled around 1700 AD. It can therefore be assumed that the vessel was constructed sometime during the first years of the eighteenth century.

The tree-ring series for the six timbers were also examined with regard to their provenience. Internal correlations of tree-ring series from the samples reveal timbers 4 and 8 represent the same forest stand, probably neighboring trees or even the same tree. All other timbers are from the same region, but low correlations between their series indicate different stands. Three tree-ring series from the Benya Lagoon samples (timber 15, timber 14, and the mean of timbers 4 and 8) were also compared against a series of master chronologies for European oak. A high level of similarity of a tested tree-ring sequence against the master chronology representing a defined geographic region indicates its likely origin. In this way dendrochronology can be applied to determine the source of timbers used in construction. The dendroproveniencing study of the timbers from the Benya Lagoon site, the results of which are shown in Table 5.1, revealed a north German origin for the wood.

Country	Chronology	Timber 14	Timber 15	mean of 4 & 8
Netherlands	Bauholz	2.70	4.17	4.82
Germany	Weser	6.42	5.66	6.58
Germany	**Northern Lower Saxony**	**9.54**	**7.37**	**8.29**
Germany	**Coast of the Northern Sea**	**10.41**	**7.72**	**8.26**
Germany	**Lüneburg**	**9.07**	**7.18**	**7.89**
Germany	Hamburg	8.48	5.57	5.98
Germany	Lübeck	6.82	5.12	5.31
Germany	Schleswig-Holstein	6.85	4.06	3.98

Table 5.1 Comparison between selected tree-ring series of timbers from Benya Lagoon and European oak chronologies. T-scores indicate correlation between tree-ring series.

5.3 Provenience and the Timber Trade

The evidence provided by dendroprovenience can be linked to a place of origin for the vessel (where it was constructed) by examining the various European nations trading on the Gold Coast and ascertaining where they procured the wood to construct their vessels. These data indicate a likely Dutch origin for the vessel. The varied patterns of trade between different European nations illustrate the importance of the macroscale in contextualizing the timber finds. Here I briefly review the timber utilized in early eighteenth century shipbuilding traditions.

During the first quarter of the eighteenth century, the Dutch, Danes, English, French, and Brandenburgers all vied for their share of the West African trade. Each of these nations had a unique maritime tradition that was derived from and dictated the availability of natural resources; the most important of these being timber suitable for the construction of ships. By describing the maritime traditions and timber policies of three of these nations—England, France, and the United Dutch Republic—I demonstrate the uniqueness of each nation's strategy, thus providing an undisputable link between where the vessel was constructed and the origin of the ship's timbers. Ultimately, a combination of factors including—cultural prejudices, national policies, access to natural resources, and international trade relations—suggest the vessel is most likely Dutch.

5.3.1 English: By the middle of the sixteenth century, England had begun to amass a significant naval force; but her merchant fleet still paled in comparison to rival European maritime states. Beginning in the 1570s, however, this began to change and the English merchant fleet began a slow and steady expansion. Key factors in this expansion include: the development of a coastal coal trade, an expansion of English fisheries, a decline of imports normally supplied by Dutch carriers now preoccupied fighting Spain, a diminishing respect for Spanish claims in the New World, and an entry into the Mediterranean trade (Davis 1962:1-7). The effects of these events were two fold, an increase in the size of the merchant fleet and the territory it covered. In 1572, the total tonnage carried by English merchant ships totaled 50,000. Ten years later that number had increased to 67,000, and by 1629 it reached 115,000 tons, nearly two times the amount carried just 50 years earlier (Davis 1962:7, 10). In the seventeenth century, the English would continue to push the Dutch for primacy in shipping and by the middle of the eighteenth century they would achieve primacy.

The long-term expansion of the English naval and merchant fleets during the sixteenth, seventeenth, and eighteenth centuries meant a volumetric increase in ship construction and a resultant growth in the demand for timber. Several scholars believe that such growth in timber demands overtaxed England's domestic forests, forcing them to look elsewhere for raw materials. Indeed, beginning in 1651, we see a sharp rise is visible in England's involvement in the Baltic trade, the largest purveyors of timber in Europe at this time. (Davis 1962:212). However, while the increase of imported timber is unquestionable, the role it played in the construction of English ships (both naval and merchant) is ambiguous. Davis (1962:19-20) notes that seventeenth century merchant shipbuilders were gradually driven to accept foreign timber, including Baltic oak for frames, but concedes "much of the material used in shipbuilding—most of the timber, which was the principle item—was in fact home produced." Similarly, Albion (2000) has argued the majority of English naval vessels prior to 1804 were built of English oak.

We might be better served to view the importation of timber as a protective measure towards the preservation of valuable timber reserves required to construct England's fleets. England's dockyards were hardly the country's only consumers of timber during the seventeenth and eighteenth centuries. The country's growing population put a heavy toll on timber resources as the majority of English domestic structures were built of wood. Likewise, growing industry had a hardy appetite for wooden barrel staves for shipping. Imported timber could have offset these demands and protected the forests of English oak so heavily desired by English shipwrights. Here in lies another piece crucial to understanding the role imported timber played in the construction of English ships. English shipwrights had long grown to revere English oak as the best shipbuilding material in all of Europe. It is this very prejudice that Albion (2000:16) cites to justify why a majority of English vessels were built from English timber. The supply of English oak, however, was finite; therefore concessions had to be made, and imported timbers were sparingly used in the construction and repair of both naval and merchant vessels.

When English shipwrights began substituting imported timbers for English oak, this was largely in the form of spars, masts, deals, and planking (Barbour 1930:269). For the major structural components from which a vessel drew its strength, only English oak would suffice. Blaise Ollivier, master shipwright to the king of France, observed this during his 1737 visit to British naval dockyards. For example, recording the timbers used by English shipwrights in the Deptford naval yard he wrote "The compass timber which I saw used at Deptford arrives in the Dockyard rough-hewn or only worked on two faces...The timber is from English forests...The plank is stacked with great care under cover and seems to be timber of old felling, sawn already long since and very dry. It is believed to be for the most part East Country [Baltic] plank" (Ollivier 1992:54).[127] Here Ollivier presents a clear distinction between the use of English compass timbers and foreign planks. English prejudice for native oak was not the only determining factor, for even if foreign compass timber would have been deemed equal in quality, the crookedness of compass timber and the large amount of space they took occupied in a vessel's hold meant importation was not cost effective (Albion 2000:21).

As an in depth examination concerning the importation on foreign timber utilized in English dockyards is beyond the scope of this work, suffice it to say that prior to 1804 the overwhelming majority of imported timber used in constructing English ships was

[127] Robert notes that he believes the East country plank refers to New England timber; however, in describing planks in the Chatham naval yard Ollivier writes "Most of this is East country plank, or from New England" wording suggestive of two different places of origin. In his examination of the role of timber in the English royal navy, Albion (2000:139), has interpreted East country as referring to the Baltic. Further evidence of a Baltic meaning for East country can be found in Ollivier's discussion of the Dutch naval shipyards of which he writes that East country oak is one of three types of oaks utilized in the construction of Dutch naval vessels. The Dutch who were never involved in a large-scale transatlantic timber trade were, like their English counterparts, heavily involved in the Baltic timber trade.

procured from North America and the Baltic (Albion 2000:14; Davis 1962). The English considered Bremen timber from the banks of the Wesser River (an area in close proximity to the dendroprovenience of the Benya timbers) to be inferior in quality. Furthermore, beginning in the middle of the seventeenth century, the importation of timber from the Rhine and Elbe into England was heavily restricted due to the imposition of the Navigation Acts (Albion 2000:142). Up until 1721 the timber imported from Hamburg, the seat of trade for the Elbe River region, was relegated to pipestaves. Only after this were other forms of German timber were allowed in (Davis 1962:206).

5.3.2 French: Unlike the Netherlands and England, France's maritime commerce during the sixteenth to eighteenth centuries played a minor role in European shipping. While France's oceanic maritime tradition is rooted in the sixteenth century exploitation of Newfoundland cod fisheries and includes transatlantic explorations of the New World, in volume its merchant marine paled in comparison to its European rivals. For example, of the estimated 20,000 ships found along the coast of Europe or engaged in overseas commerce in 1661, only 600 are believed to have been French (Quinn 2000:43).

In 1661, Jean-Baptiste Colbert, the most significant figure in French overseas expansion, became the chief administrator of royal finances to Louis XIV and began his implementation of a French maritime policy. The policies that he laid out over the next twenty years sought to expand French naval power, decrease her dependency on foreign shipping, and expand her merchant marine. For Colbert, the importance of French naval power stemmed from its connection to the growth of commerce and role in the protection and expansion of France's overseas empire. He found it intolerable that France's trade was carried in Dutch and English bottoms and that these nations could close the sea-lanes to French ships in times of war (Bamford 1956:4-5). The success of Colbert's policies was intimately connected with the development of France's shipbuilding capacity and, to this effect, the achievements of his desired goals were limited. Although France's navy expanded in considerable size—between 1663 and 1671 the number of naval ships increased from 32 to 140—nearly all of these were built abroad (Glete 1993:191; Bamford 1956:14). A similar trend is apparent in France's merchant fleet: of the 27 vessels in 1664 that comprised the merchant fleet of La Rochelle, a leading French port, only 12 were constructed in French shipyards (Bamford 1954:213).

By the end of the seventeenth century, Colbert's policies were successful in increasing the proportion of French built ships in its merchant fleet; however, foreign purchase remained common and likely the preferred method to acquire ships well into the eighteenth century (Bamford 1954: 213). Colbert's greatest achievement was the implementation of Europe's greatest domestic timber policy. For him France’s natural resources, specifically her timber, was the common denominator linking the growth of a domestic shipbuilding industry, development of a self-sustainable navy and merchant fleet, and weaning off foreign shipping. In order to ensure the domestic production of his naval fleet, Colbert implemented a series of ordinances decreeing the navy's right to domestic timber standing six leagues from navigable rivers and fifteen leagues from the sea (Bamford 1954:211). But even here, in his greatest legacy, the totality of his maritime policies was not achieved, for precedence was given to the navy at the expense of the merchant fleet. While his timber polices successfully maintained a reliable stock of shipbuilding timbers for the navy well into the eighteenth century, the wide sweeping preserves meant that the extraction of timber from forest beyond these boundaries was impractical for France's merchant dockyards.

During the seventeenth and much of the eighteenth century, France's merchant fleet remained relatively small and relied heavily on foreign producers to supply her vessels. Beginning with the policies of Colbert, the French navy grew steadily and was able to sustain itself with domestic production. Archaeologically, the implications of France's maritime history possess serious difficulties when discerning a ship's origin. Relying solely on the dendroproveniencing of ship timbers, as in the case with the Benya Lagoon site, foreign bought vessels utilized by French merchantmen would be indistinguishable from the vessels of the nation of purchase. However, some hypothesis regarding "French" vessels is still possible. Prior to 1670, almost all French naval vessels were constructed elsewhere in Europe, making them indistinguishable. After 1670, however, France's naval dockyards account for the majority of her naval vessels and until the middle of the eighteenth century French forests satisfied most of the navy's need for timber (Bamford 1956:27). Regarding the merchant marine, the navy's preemptive right to a majority of France's timber stands necessitated the use of foreign timber when domestic construction was chosen over foreign production. The question is to what extent? While the navy preserved its right to prime timber, it did not consume the whole of France's timber stocks. Merchant shipwrights who employed lower standards for timber quality than their naval counterparts often utilized oak rejected for naval service and supplemented their stock with cheaper, less durable types of wood. The Crown also occasionally granted special permission for the cutting of first-grade timber for the construction of commercial vessels (Bamford 1954:211). Imported timber predominantly came from the Baltic and was used as planks, masts, spars and deals. It is likely that the French, similar to the English, preferred to construct their ship's frames from domestic oak, but where the English preference was driven by their prejudice, the French predilection for domestic framing was purely economic. As late as the end of the eighteenth century, France's small merchant fleet had not established a large-scale direct trade with the Baltic.[128] France's shipyards therefore were forced to purchase Baltic timber through foreign middlemen at increased prices. For archaeologists this means that the higher probability for proveniencing French built shipwrecks is through the inspection of framing timbers. In the case of the *La Belle*, a French vessel lost off the Texas coast in 1686, the majority of timber samples were provenienced to French forests (see Bruseth and Turner 2005). Seventy three percent of the samples were identified as French white oak including all of the frames, keel, keelson, deck beams, and planking.[129]

5.3.3 Dutch: "Nature had pent them behind sand-bars in shallow waters that were frozen three months of the year, and the prevailing wind dead against their getting to sea at all. Their ports were singularly unfavored, and the small area of meadow, dune and heath that constituted the Republic bore no trees fit for ships' timbers; nor did it yield iron or any other material used in the building and equipment of ships except hemp and flax and not enough of either." (Barbour 1930:272)

In 1930 Barbour penned these words describing what he refers to as the "curious perversity" of the Dutch going to sea; but, despite the impressive array of impediments, go to sea they did. For much of the seventeenth century, the Dutch ruled as Europe's dominant commercial maritime power. Dutch hegemony was threefold as they obtained

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[128] For the years 1713-80 on average only 10 French ships a year registered at the Sound; during the same time period the British average was over 500 and that of the Dutch over 800 ships a year.

[129] 21% were identified as European pine and 3 % were European fir.

superiority in shipping volume, vessel construction, and freight rates. Averaging estimates from its peak in the second and third quarters of the century the combined naval, merchant, and fishing fleets totaled 3,000 to 4,000 vessels (half exceeding 100 tons) in any given year with a carrying capacity of 450,000-550,000 tons annually (de Vries and van der Woude 1997:297). For perspective, in 1670 the English fleet totaled 94,000 tons; that same year the Dutch fleet boasted a whopping 600,000 tons—over six times that of her closest competitor (Unger 1997:261). The Republic's merchant marine flourished, transporting Europe's goods at 1/3 to 1/2 the costs of their competitors (Barbour 1930:285); and lowland vessels were highly prized throughout Europe for their superiority in both design and cost.[130]

Central to maintaining its position as Europe's preeminent commercial naval power was the development of the Dutch ship-building industry. The major production areas were located in or near the admiralty towns of Amsterdam, Saardam, Rotterdam, Middelburg, Harlingen, and Hoorn where separate stocks supplied the merchant and naval fleets. Output varied regionally and often fluctuated under exogenous circumstances. Various estimates based on shipping volume and accounting for vessels produced for export suggest a production rate of 300-500 vessels annually (De Vries and Van Der Woude 1997:297; Unger 1975:57). In any given year, the industry employed some 10,000 persons, making it one of the Republic's largest industries. In Holland, where the largest concentration of shipwrights were located, it accounted for nearly five percent of the total labor force (De Vries and Van Der Woude 1997:297).

In order to keep up with demand, the Dutch amassed great stores of wood. Saardam alone was said to have enough wood on hand to build between four to five

[130] Dutch ships were constructed for 1/3 cost (Albion 2000:156; Barbour 1930:275)

thousand ships at any one time (Barbour 1930:277). Holland and Zeeland, however, had no domestic supply of wood. Therefore, all shipbuilding material had to be imported, creating an inherent link between the ship building industry and timber trade.

The timber trade was not, however, confined to the construction of ships. It was indispensable to the seventeenth century growth of the Dutch economy and used in almost every facet of society including urban construction, diking, and production of almost all manufactured goods.[131] Dutch demand surpassed all European competitors. Dutch financing garnered her merchants control over the vast majority of Europe's timber trade, the largest section of which was the Baltic trade.[132] The Sound Toll Registers show that from 1661-1720 Dutch vessels comprised 46.7 percent of the timber trade; in comparison her closest competitor England accounted for a mere 18.4 percent (Unger 1959:215).[133] During the middle of the seventeenth century the Dutch timber fleet transported an estimated 375,000 m^3 annually (De Vries and Van Der Woude 1997:423). In addition to Baltic supply, the Dutch imported timber from Norwegian and German forests. Until 1650, Norway (then part of the Danish Kingdom) was the largest supplier after which time the emphasis shifted to the Baltic. The majority of timber imported was destined for domestic use, though a portion was exported to other European nations.

Problematic to sourcing Dutch ship timbers is an inability to separate timber consumed by the ship building industry from the overwhelming majority imported for other industries. While we know that one hundred percent of the timber used in

[131] So vital was the timber industry to the Dutch economy that a special type of ship, the *noortsvaerder*, was developed specifically to carry out the trade.
[132] Dutch finance and shipping were so efficient they could supply their shipwrights with Norwegian masts and timber at lower prices than those paid by Norwegian shipwrights (Coke cited in Barbour 1930:273)
[133] This average is skewed as for 45 of the 60 years examined the Dutch reached 60 percent. In one extreme case, 1689, the figure was as high as 90 percent (Unger 1959:215)

constructing Dutch vessels came from foreign stands, the percentage of imported timber destined for ship construction is unknown. This unanswered question forces archaeologists to interpret the data of timber imports in relation to our knowledge of ship construction and timber usage. For example, it has already been noted that two of the leading suppliers of timber to the Republic were Norway (prior to 1650) and the Eastern Baltic (post 1650). Therefore a logical assumption might be that the majority of ship timbers during these periods were also derived from these areas. However, these stands largely consisted of pines and other softwoods not suitable for ship framing and the hardwoods would have been milled into standard shapes suitable for shipping (see North 1996:3). Instead softwoods would be used as masts, spars, and planking, which indeed they were, while oak, the principal wood used in constructing hulls, would be sourced elsewhere (Unger 1978:60).[134]

The Republic obtained its shipbuilding oak from three main sources: interior Germany along the Rhine river, north Germany from the banks of the Weser and Elbe rivers, and the Baltic. While scholars typically agree on the sources of imported oak, discrepancies exist concerning when these sources were most utilized. It appears that the earliest source of oak ship timbers came from Westphalia and the banks of the Rhine as far south as Switzerland. From here large quantities of wood were cut, rafted, and floated down the Rhine and its tributaries, destined for the auction houses in Dordrecht and Amsterdam. Being the closest and requiring no shipping per se made these regions the most logical and cost effective. Over the course of time these sources became exhausted and were supplanted by timber from North German and Baltic forests from which a

[134] Barbour (1930:275) notes that pine and fir were employed in the construction of merchantmen while oak was utilized in the construction of men-of-war and ships destined for long-distance voyages.

minority trade had existed since the sixteenth century. The timing of this shift, however, is debatable. Unger (1975:66) has argued that by the end of the seventeenth century the Westphalia and Rhine forests were "all but exhausted," proposing a shifting reliance on the Baltic after 1700. De Vries and van der Woude (1997:424) paint a different picture, one in which "durable foundations were laid for the German timber trade [with the Dutch] after 1691" when navigational improvements on the Upper Rhine allowed rafts of logs up to 28,000 m^3. They go on to suggest a Baltic dominance starting in the second quarter of the eighteenth century.

Primary sources suggest something more consistent with the latter argument, though clearly emphasizing the importance of Rhineland timber prior to 1691. For example, in addressing how and why the Dutch built more ships and constructed them cheaper than the English, Coke (1670:35) explained "the Dutch have down the Rhine, Maez and Sceld out of Germany, France, Lorain, Flanders and other Spanish Provinces greater quantities of Timber." The Meuse [Maez] and Scheldt [Sceld] originate in France, flow through modern Belgium to their estuaries in Holland, and would have supplied needed timbers to the lower Republic while the Rhine would have supplied the major shipbuilding industry of the north. Nearly fifty years later, in 1737, Blaise Ollivier, master shipwright of the King of France, was sent to inspect the Dutch naval dockyards for his master. In his reported observations to the king, he wrote: "the Dutch employ in the building of their ships oak of three different qualities. They have some which comes from the banks of the Saar and the Mosel, which is the same timber we [French] call Lorraine oak. They also take oak from the banks of the Main, which is of a quality inferior to Lorraine, and East country [Baltic] oak of indifferent quality" (Ollivier

1992:228). The Mosel, of which the Saar is a tributary, and the Main are both tributaries of the Rhine; so Ollivier's statement is a testament to the continued reliance on Rhine sources nearly forty years following Unger's supposed exhaustion.[135]

Curiously, both Unger and De Vries and Van der Woude neglect the North German sources of oak in their summation of the Dutch trade. However, due to their closer proximity to the United Provinces these forests likely served as an intermediary in the shift from Rhineland forests to Baltic oak. Support for such a hypothesis is apparent in several contemporary accounts. In 1690, an English observer wrote the "Dutch fetch Yearly thence [Hamburg] 350 or 400 Ships loading of timber" (Child 1690:102). Ten years later the book *Memior of the Dutch Trade*, described how "The *Dutch* sometimes go up the *Elbe* as far as *Harburgh* and *Madgeburgh*, where they lade great Quantities of Wood...and sometimes hew down whole Forests, and take away the Wood as they have Occasion" (Huet 1700:60). Of the Wesser and its port Bremen, "The Provinces bordering on the Wezer, and the Rivers that fall into it al [all] along its vast Course furnish Bremen with excellent Timber, of greater Esteem and Value, and much dearer than that of Norway and the Baltic" (Huet 1700:60). And of Cologne at the confluence of the Mosel and Rhine, "Cologne...is a Place of the principal Trade of that River [Rhine], as well as of the Moselle. There comes down to Cologne by these two Rivers a great deal of excellent Oak." (Huet 1700:61). Further proof is found in his description concerning ship construction contained in his section regarding the Baltic trade. He writes: "Ship-Mast, as I observed before come from Norway, Muscovy, Riga, Nerva, Revel, and Dantzick. The Dutch bring besides great Quantities of Timber into Holland, by the River Rhine,

[135] It should be cautioned that Ollivier's observations only concerned naval dockyards and therefore do not speak to the timbers used in the merchant fleet.

Elbe, and Weser; so that this may be reckon'd as one of the most important and necessary Trades to the Republick. To be convinced of this, one need only see their Magazine at Sardaam." (Huet 1700:54). The fact that he specifies the Baltic ports as the sources of masts and deliberately includes the Germanic rivers for the sources of timbers suggest he is differentiating between the major sources of oak hull timbers and softwood masts, spars, and deals. These sources provide a clear link between Germanic timber, Dutch shipwrights, and the Benya Lagoon timbers.

The dendrochronology and dendroprovenience ascertained from the hull timbers suggest the vessel was constructed in the Dutch Republic sometime during the first decade of the eighteenth century. By the beginning of the eighteenth century, many maritime nations had come to rely on imported timber to supplement their declining stands; however, Holland stands as the sole nation completely dependent upon foreign timber for the maintenance of its fleet. This distinction plays a critical role in explaining how and why various nations used imported timber. Shipwrights with access to native stands of oak, like those found in France and England, favored domestic oak for a vessel’s major structural components, relying on imported timber mostly for masts, spars, and planks (Albion 2000; Bamford 1956:27; Barbour 1930:269, Davis 1962:19-20). For French and English shipwrights the importation of large oak compass timbers was not cost effective as these awkwardly shaped pieces consumed excessive space in a cargo vessel’s hold. In contrast, masts, spars, and planks sawn from coniferous forests not abundant domestically could be compactly fitted into vessels. Besides economic factors national prejudice also played a role in determining a shipwright’s predilections. This was especially true for English shipwrights whom deemed English Oak far superior to any found throughout the rest of Europe.

5.4 Construction

A second clue to the origin of the Benya Lagoon vessel is provided by the ship's construction. Just as unique international relations, domestic political policies, and local prejudice influenced the European timber trade which contextualizes the dendroprovenience of the ship's timbers, idiosyncratic characteristics of regional ship-building practices contextualize construction techniques evident in the recovered timbers. This is particularly true regarding turn of the century Dutch construction techniques. A reliance on treenail fastening, non-interconnected framing timbers, and a hard chine are all characteristics of the Dutch-flush shipbuilding technique and can be seen in the timbers recovered from the Benya Lagoon.

5.4.1 Peculiarities of Late Seventeenth, Early Eighteenth Century Dutch Ship Construction: A large portion of our current knowledge regarding the construction of Dutch ships at the turn of the century can be accredited to the surviving works of Nicolaes Witsen and Conelius von Yk. Published in 1671 and 1697 respectively, these two treatises provide precise accounts detailing the step by step process taken in constructing large sailing vessels in the Netherlands. Curiously, the two authors, writing less than thirty years apart, describe drastically different methods. What may initially appear to be conflicting accounts negating the validity of both is actually a description of two different methods simultaneously in use in the Dutch Republic at this time. These methods were regional; the southern was practiced in Rotterdam, Zealand and Flanders while Amsterdam was the center of the northern method. The northern method, as described by Witsen, employed a unique, carvel planked shell-first process in the construction of a vessel. "Dutch flush", as it is commonly referred to in today's archaeological lexicon, melded the longstanding shell-first construction of earlier northern European clinker built vessels with the innovative carvel (flush) planking developed in the Iberian peninsula.[136] The southern method, as described by von Yk, entails a frame-first construction similar to that employed throughout the rest of Europe during this time. It is presumably newer, a likely adaptation of Spanish boat building traditions introduced during Spain's occupation of the lowlands in the sixteenth century, Spain's political grip being greater in the south (Hoving 1992:36).

In Holland, the contract forged between client and shipwright centered on the vessel's function and general dimensions (timber trade, corn trade, warship, etc.); the client entrusting the translation from function to form entirely to the shipwright. With the desired function in mind, the shipwright proceeded guided by his own unique series of ratios he believed suited the desired type of vessel.[137] The physical construction began in the same manner observable in English dockyards. The keel was laid on top of blocks and the stem and sternposts attached. From here on, though, the two methods diverge radically. In England, the frames would be installed and the hull planked. Shipwrights in the north proceeded in an opposite manner, first constructing the hull bottom then attaching the vessel's frame (Figure 5.16). First, the garboard strake was fitted to the keel and the hull planked up to the bilge. Planking tongs (*boeitangen*), a system of chains and

[136] For example see (Hocker 2004; Maarleveld 1992, 1994; Maarleveld et al. 1994)
[137] While historical research has provided us with patterns and defined general trends for many of the ratios (see Hoving 1992:36-37), it was up to the individual shipwright to implement these in ways he saw fit, leading to a more highly stylized profession than much of the rest of Europe at this time. Witsen (1671:104) confirmed this notion, when he noted that two vessels built following the same contract but by two different shipwrights would not be the same.

poles (*hel*), and temporary cleats prevented horizontal slippage, ensured tight fitting flush joints, and temporarily held the strakes in place as the vessel lacked any internal support. When the planking reached the vessel's desired breadth, a single floor was laid at one-third the distance between the stem and stern and its complimentary first futtocks (*sitter*) attached. Thereafter the bilge was planked to one-third the height of the waterline and the resulting shell filled in with the floors, first futtocks, and a few *oplangen* (likely second futtocks). To the *oplangen*, the shipwright attached a temporary batten called the *scheerstrook* which guided the next phase of construction, the installation of the remaining vertical futtocks. After the keelson was laid and the ceiling planked, top-timbers (*stutten*) were place in the gaps between vertical futtocks and planking. Finally, the deck beams were installed, the vessel was planked from the top of the bilge to the gundeck, and the ship was launched in order to free up space in the yard. The ship was then finished afloat.

The southern method, more in tune with the frame-based method practiced throughout Western Europe, parallels the northern method up to the attachment of the garboard strake to the keel. Southern shipwrights then affixed two identical frames spaced apart at the vessel's maximum beam, the space between dictated by the vessel's overall length.[138] A single frame was erected at the butt of keel and stem and at a spot equidistant from the stern as the forward frame was from the stem. A series of ribbands temporarily attached to the four defining frames outlined the shape of the hull and added support for subsequent framing. Once framed, the keelson and ceiling was added along with the deck beams which supplied necessary rigidity. Lastly, the vessel was planked and launched to be finished afloat (Figure 5.16).

[138] See Batchvarov (2002:106-122) for a more detailed analysis of Yk's ratios.

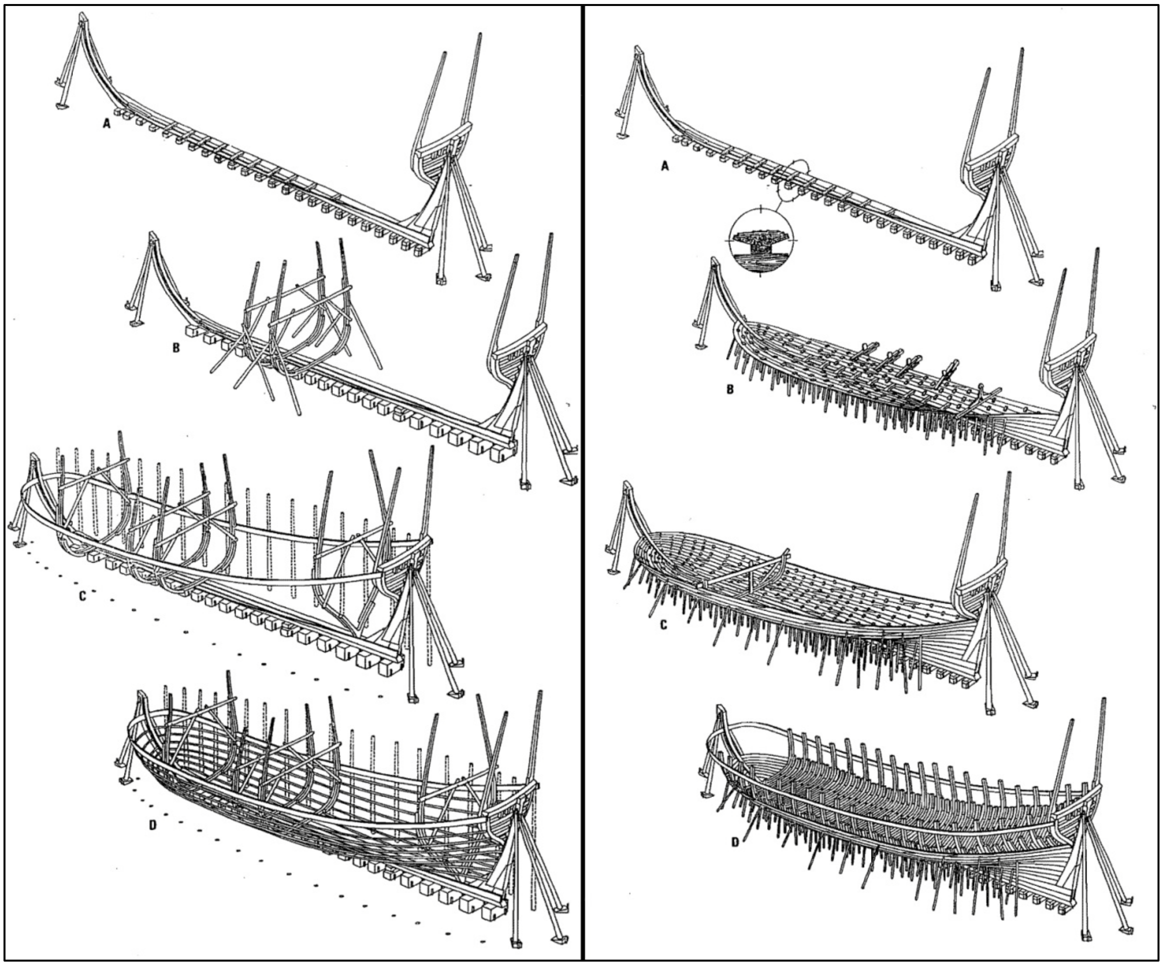

Figure 5.16 Left: Frame first building tradition of southern Holland as described by van Yk. Right: Northern Dutch-flush building tradition as described by Witsen (Drawings by Anton van den Heuvel in Hoving and Lemmers 2001:23, 53)

Comparing these two methods reveals a major contrast. In conventional frame-first vessels, the hull planking is added only after the internal framing has been installed, while in the shell-first vessels the internal framing is added only after the hull is partially planked. Therefore, in frame-first vessels, such as those built in the southern Netherland, Spain, France, and England, the frames determine the vessel's shape; in Dutch-flush built ships, it was the alignment of the hull's strakes that dictated the vessel's overall form. The shape formed by laying these bottom strakes using planking tongs, chains and poles rather than internal supports is a vessel with a characteristic transversely flat bottom and angular bilge (Hoving 1988a; 1992:37; Hocker 2004:83.)

5.4.2 Timber Shape: The seven futtock timbers exhibit several characteristics that may provide clues as to where and when the vessel from the Benya Lagoon was constructed, the first being shape. More specifically, the shape of the timber's outboard face is significant because, depending on how the ship was built, it either defines or is defined by the shape of the vessel's outer hull. Moving from foot to head, the outboard face of the timbers recovered from the Benya Lagoon exhibit a long, linear flat followed by an abrupt, angular turn (Figure 5.17). This shape corresponds to the flat bottom and angular bilge often cited as one of the defining characteristics of Dutch flush built vessels (see Batchvarov 2002:121; Hocker 2004:83; Hoving 1988a:217, 1992:37; van Yk 1697:70).

The distinctive shape of Dutch flush vessels derived from affixing planks flush to one another without the support of an inner rigid frame. Lacking an internal frame to which they could attach the hull's strakes, shipwrights of the northern tradition used planking tongs, chains, and temporary cleats to retain the vessels shape. These mechanics resulted in a transversely flat bottom from keel to bilge. In order to make the transition to the side, the bilge planks had to be set at an angle. Futtocks installed into such a hull should exude the same characteristics. As these characteristics are present in the Benay Lagoon site we may conclude that it was constructed in this style.

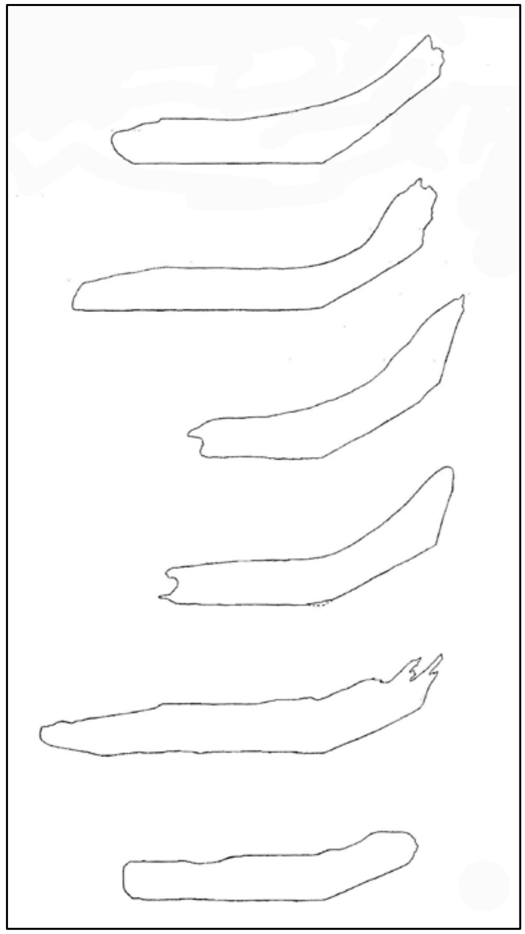

Figure 5.17 Drawing of six futtocks recovered from the Benay Lagoon site. The abrupt, linear angle of the bilge is indicative of Dutch-flush construction (Drawing by A. Pietruszka).

5.4.3 Fastening Patterns: The second characteristic of interest is the fastening pattern of the futtocks. After carefully examining all seven timbers it became clear that fore and aft fastened frames were not used in the construction of the Benya Lagoon ship. While not exclusive to Dutch flush or shell-based construction, the absence of fore and aft fastened framing timbers has been cited as evidence for shell-first construction in earlier Dutch flush ships (Green 1991:70; Hoving 1991:79, Oosting 1991:73). The assembly of component frames by using transverse fasteners became the standard practice of English, French, Swedish, and Danish shipwrights by the last quarter of the seventeenth century; however, this practice was not adopted by the Dutch until sometime in the second quarter of eighteenth century. Like angular futtocks, the use of lateral fastening is related to the distinctly different methods shipwrights employed when building their vessels.

While laterally fastening frames was common practice of Iberian shipwrights dating back to fifteenth century, it was not widely adopted by their northern counterparts until sometime after 1650 with the adoption of the fore and aft fastened double frame.[139] While the English continued to construct frame-based vessels as previously described, some alterations had to be made. Previously, the floors were attached to the keel first, after which subsequent framing progressed in unison with planking. The hull planking supported the frame timbers and provided an anchor point to which they could be fastened. Frames were held in place vertically, each one being attached only to either the hull or ceiling planking. In the new method, composite frames, consisting of floor, first futtock, second futtock, and top timber, were assembled on the keel prior to the planking of the hull. Free standing frames could only be secured by laterally attaching the components to one another. In this manner, frames were assembled piece meal in an alternating overlapping pattern. The floor attached to the keel, the first futtock was fastened to the floor, the second futtock was secured to the first, the third to the second, the pattern repeating until the frame was completed (Figure 5.18).

[139] The exact date of this shift is unknown. Goodwin (1987:14-15), one of the preeminent scholars of British ships of war, suggests that fore and aft fastening was common practice in the building of English men of war as early as 1650. A later date is provided by Batchvarov (2002:58-61) who suggests the transition took place sometime after the third quarter of the seventeenth century. At this time, neither date can be validated as no archaeological examples of vessels constructed during this time period have been recovered and recorded. Ultimately, whether Goodwin's or Batchvarov's assessment proves right has little effect on my interpretation. Both dates suggest that if the Benya Lagoon vessel, constructed sometime after 1700, was built in England then its futtocks should have been laterally fastened to the floors. Archaeological evidence from the Cattewater wreck, circa 1520, indicates the early use of fore and aft fastening by English shipwrights; however this practice appears to be exclusively coupled with frame mortices (Redknap 1984). The exclusion of such a technique from contemporary writings and a lack of further archaeological examples suggest that this practice was short-lived and not widely used.

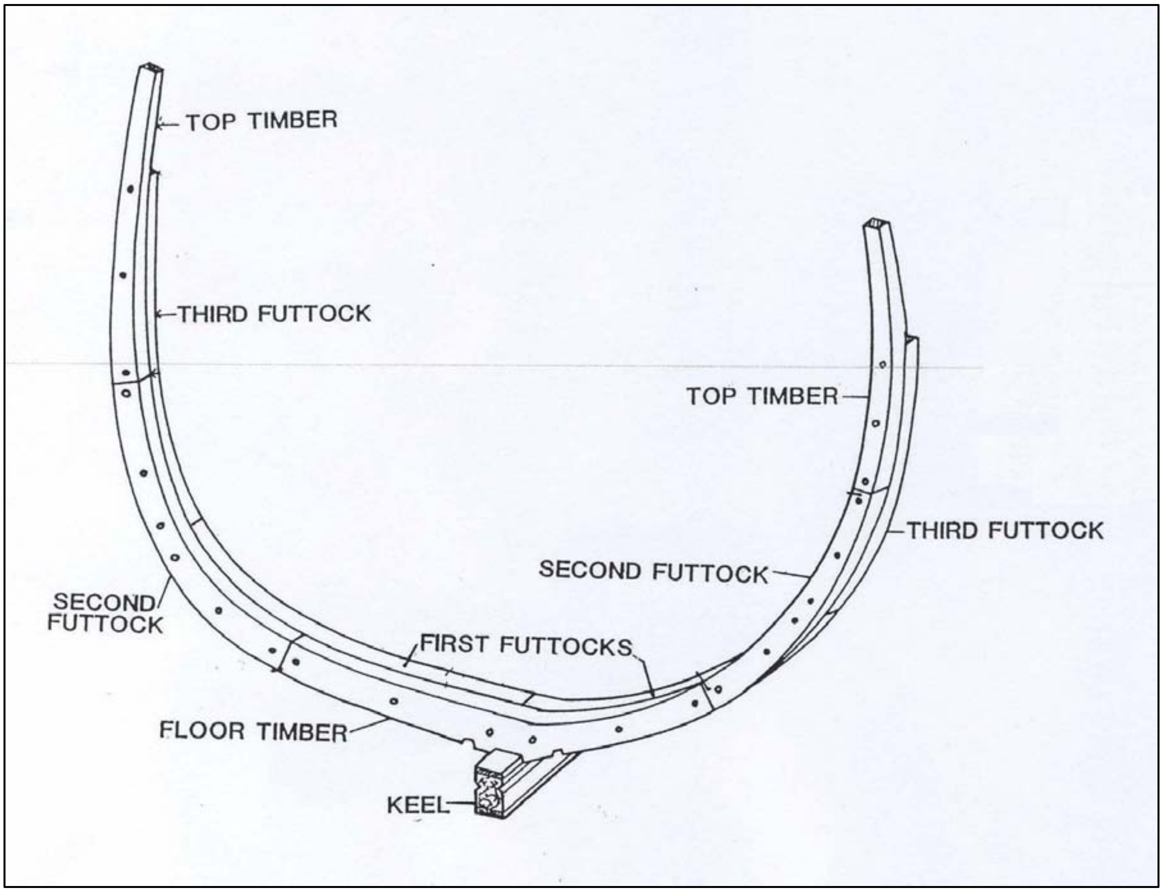

Figure 5.18 Drawing of fore and aft fastened double framing (Steffy 1994:293)

The adoption of double frames and lateral fastening spread quickly throughout Europe. In France, the adoption of lateral fastening likely occurred during the 1670s as French builders gradually adopted the double framing system pioneered by English shipwrights. As with most change, the incorporation of laterally fastened frames into French vessels likely progressed gradually, but beginning in the 1680s, a steady trend is observable in the surviving archaeological record. The French-built *La Belle* (1684), *Henrietta Marie* (pre 1697), *Hazardous* (1698) and the Beaufort Inlet site 0003BUI, now believed to be the remains of *Concorde* (1700-1713), were all constructed using laterally fastened frames (Batchvarov 2002:129-130; Lusardi 2000:60; Moore 1989:85; Owen 1991:327). Documentary sources suggest Swedish and Danish shipwrights followed suit, adopting double framing sometime during the late 1670s or early 80s; archeological remains suggest a similar date for Norwegian vessels (Batchvarov 2002:141,146; Molaug 1998:160).[140]

Dutch-flush vessels did not require fore and aft fastening to secure frame components as each component could be supported by and fastened to the pre-erected hull planking. Archaeological examples demonstrating the lack of fore and aft fastening in Dutch-flush vessels include the *Mauritius*, *Batavia*, Scheurrak T24, and Inschot/Zuidoostrak (Green 1991; L'Hour and Long 1990; Maarleveld et al. 1994). In the end, the combination of the documentary records and archeological evidence expunges the likelihood of the Benya Lagoon ship being constructed in England, France, Sweden, or Denmark, while adding further credence to a northern Dutch origin.

5.4.4 Variability of the Sided Dimensions: Another trait often considered characteristic of Dutch-flush building is a high degree of variability in the sided dimension of like timbers (Maarleveld et al. 1994:24). Nicolaes Witsen's emphasis on the molded dimension rather than the sided gives credence to this assumption. The fact that he only provides proportions to calculate a frame's molded dimension gives the impression that the sided dimension was an afterthought, an inconsequential dimension meant only to fill gaps. Indeed, when compared to other styles of construction this appears to be the case. Some archaeologists have even suggested the use of this trait for the analysis of unknown archaeological remains. Batchvarov (2002:121) writes "in the archaeological record a Dutch-built vessel is likely to have irregular sided dimensions of its frames". In comparing the sided dimensions for all the floors and futtocks recovered

[140] It is of interest to note that the *Lossen* was constructed in 1686 by a Dutch shipwright indicating that building styles may have been influenced more by the region of construction rather than the shipwright's background.

from the Benya Lagoon, a wide range of variation is evident. In all, six different measurements were represented by just nine timbers: the floors ranged from 14-20 cm (5.51-7.87 in) while the futtocks ranged 16-23 cm (6.3-9.06 in).

5.4.5 Estimating the Vessel's Size: An approximate size for the vessel can be calculated by applying Witsen's formula to the measurements taken from the frame timbers. According to Witsen, the molded dimension of the floor at the point it crosses the keel should be 3/4 the width of the after face of the stempost. The aft side of the stem, derived from a vessel's overall length, was to be 1 Amsterdam inch (2.5 cm) for each 10 ft. (2.83 m) of length. Using an average molded dimension of 24 cm (9.45 in) for the Benya Lagoon ship's floors, the vessel's overall length calculates to 36.22 m (118.84 ft.) or 128 Amsterdam feet. The scantlings, however, with a planking thickness around 6 cm (2.36 in) and futtocks 16-23 cm (6.3-9.06 in) molded, suggest a smaller ship, perhaps 20-25 m (65.62-82.02 ft.) in length.

While this figure provides a sound estimate its limitations should be noted. First, this figure is not valid if the vessel proves to be constructed somewhere other than northern Netherlands. The ratios employed by shipwrights in their craft were not universal; Witsen's formula is only applicable to vessels built in the Dutch northern style in the last half of the century. Secondly, at this time, we are still unsure of the accuracy of Witsen's figures. The discrepancies, minor as they were, encountered by Hoving (1988a, 1988b) in his reconstruction of Witsen's *pinaas* along with a lack of collaborative archaeological examples has left the door open for questions concerning their validity in assessing historical sites. Lastly, Witsen (1671:104) himself commented on the inexactness of shipwright's practice, noting that two shipwrights following the same contract would, in the end, produce two different vessels. This disparity would not exist if the same standardized formulas were employed by all shipwrights. Nevertheless, while these figures may be imperfect, they provide us with a reasonable approximation of the vessel's size.

A variety of shipping activities were employed by the WIC to carry out and maintain its commercial interest in the Africa trade (den Heijer 2003b:143-151).[141] Specialized activities such as coastal trading, the slave trade, carrying bulk commodities between the Dutch Republic and West Africa, and naval operations utilized a variety of vessel types and sizes. Of these, the bilateral bulk commodity trade between the Dutch Republic and West Africa was, economically, the most important. From 1674-1740, the company employed 334 ships to maintain the steady stream of European commodities and African raw materials, vital to its profit margin (den Heijer 2003b:148). The overwhelming majority of this traffic (296) was destined for Elmina. Den Heijer has identified the ship type for almost half of the vessels used to transport the company's bulk commodities. The majority of these were frigates or yachts ranging in length from 70 to 110 ft. (21.34-33.53 m). They carried fifteen to twenty five guns and a crew of thirty to thirty-five sailors. From Elmina, the regional director oversaw the distribution of these imports as well as the exportation of African raw materials collected from the company's various entrepôts. The WIC relied upon several types of vessels to carry on its coastal trade but preferred small fishing vessels like *buizen* (busses), *hoekers*

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[141] Much like international companies today, the organization of the WIC's African trade operated at three levels. The company's highest level was its European headquarters where the board of directors raised capital, dictated policy, and shared in profits. Next in line was the regional headquarters, which, for the WIC, was located in the West African coastal town of Elmina. The company's regional director was responsible for implementing policy for the entire region while receiving, storing, and distributing the bulk of European commodities sent by the company for trade. Elmina, therefore, served as both an administrative center and "central receiving". The last level was composed of localized branches subsidiary to Elmina, through which all trade flowed.

(hookers), and *pinken*, as their shallow drafts made coastal rivers accessible. Hookers typically ranged from eighty to ninety feet in length while the somewhat smaller buss was usually around fifty. Coastal traders were lightly armed vessels, carrying only a few small cannon and a crew of five to fifteen sailors. By number, the company's largest shipping activity was the slave trade, employing 383 vessels between 1674 and 1740. A wide degree of variance is evident amongst known slavers. The largest vessels were *fluytes*, *pinnases*, and frigates ranging in length from 110-120 feet (33.53-36.58 m). Vessels of this size could transport, on average, some 600 slaves. Medium sized vessels like frigates, yachts, and galliots were capable of carrying about 400 slaves and small sized vessels like barques and hookers, 200. Crew and armament varied with size. Large vessels were manned by forty-five to sixty sailors and carried fifteen to twenty cannon; mid-sized, thirty to forty sailors and upwards of ten guns; and small vessels sailed with twenty to thirty sailors and mounted less than ten guns. Lastly to protect all of these enterprises and maintain its overseas interests, the company employed naval patrols. From 1674-1740 the company equipped 33 ships to guard the coast, the most typical type being frigates that ranged in length from 110-125 ft. (33.53-38.1 m). Cruisers carried twenty-five guns and 100 sailors and soldiers.[142]

Currently, den Heijer's work is the most detailed analysis of WIC shipping activities in West African waters during the last quarter of the seventeenth and first half of the eighteenth centuries; however, concerning its utility in interpreting the fragmented remains of the Benya Lagoon vessel, even a work such as this has its limitations. While den Heijer's research is revealing in the many vessel types ascribed to specific activities, ambiguity abounds as to what these types signify as historians have noted both physical

[142] Den Heijer's does not specify whether his figures are in English or Dutch feet.

and nomenclatural transformations in Dutch ship types during this time period (Unger 1978:41-62, Hoving 1992). Take for example the terms jacht, pinas, and frigate. Dependent upon the exact time during den Heijer's 75 year period, these terms either referred to a singular vessel or reflected three distinct vessel types. Nomenclature and physical transitions in ship types often were gradual and overlapped. While some authors made distinctions between terminologies, others saw them as interchangeable. Without having access to den Heijer's complete list of vessels and the primary documents from which it was derived, it is impossible to discern the actual prevalence of such vessel types. To further complicate the matter, many of the defining characteristics that differentiated these types are found above the waterline in the rigging rather than in the hull design below. As our remains consist of only a few fragmented lower hull timbers, ascertaining rigging designs and thus differentiating type is practically impossible. Though imperfect, den Heijer's study provides our only valuable point of reference, a measurable basis from which to draw conclusions.

How does the Benya Lagoon vessel compare to den Heijer's data? Allowing for den Heijer's analysis being based on averages, it would appear that the estimated size of the Benya Lagoon vessel is consistent with the prototypical Dutch vessel plying the waters off West Africa in the first decades of the eighteenth century. Though at 128 Amsterdam feet (118 ft./35.97 m) our vessel comes in slightly above his ranges, its length is not beyond the acceptable variations for slavers, cruisers, or cargo ships. Furthermore, the vessel exceeds the dimensions of an average coaster as these were typically smaller fishing vessels fifty to eighty feet in length, thus narrowing our hypotheses. Ultimately, the interpretation of the site based upon estimates of the vessel's size remains inconclusive. However, by comparing our figures with those of known Dutch vessels active in the African trade, we have proven the validity of our hypothesis.

5.5 Cannon

Four small caliber cannon were raised with the ship timbers; however, one was looted prior the arrival of Central Region Project archaeologists. The three remaining cannon are cast iron and identical in both dimension and manufacture design pattern (Figures 5.19, 5.20).[143] A length of braided hemp cordage was recovered from the touchhole of each gun (Figure 5.21). The wadding, which completely sealed each touchhole, would have prevented moisture from fouling the hole when the gun was not in service. Such intentional preservation of the holes at the time of deposition suggests that the guns were still in service at the time they were lost. The many moldings and their patterns, low trunnion, small muzzle swell, and tapered trunnions indicate that the guns are early models, likely mid seventeenth century (G. de Vries personal communication 2008). Following Roth's (1989) definitions, the guns' dimensions measured:

(L) Length of gun	**1270 mm (50 in)**
(l) Length of bore	**N/A**
(b) Bore Diameter	**55 mm (2.17 in)**
(D) Diameter of Base Ring	**260 mm (10.24 in)**
(d) Diameter start of Muzzle Swell	**150 mm (5.91 in)**

Interestingly, analysis revealed the guns' dimensions are not consistent with accepted conventional standards for caliber and dimension ratios. The typical ratios for iron guns

[143] All indications suggest the fourth cannon was identical to the other three.

Figure 5.19 Photographs of cast iron cannon recovered from the Benya Lagoon. The top view indicates that at least two of the guns were lying side by side. Below shows the cannon after the concretion was removed for analysis (Photos by A. Pietruszka).

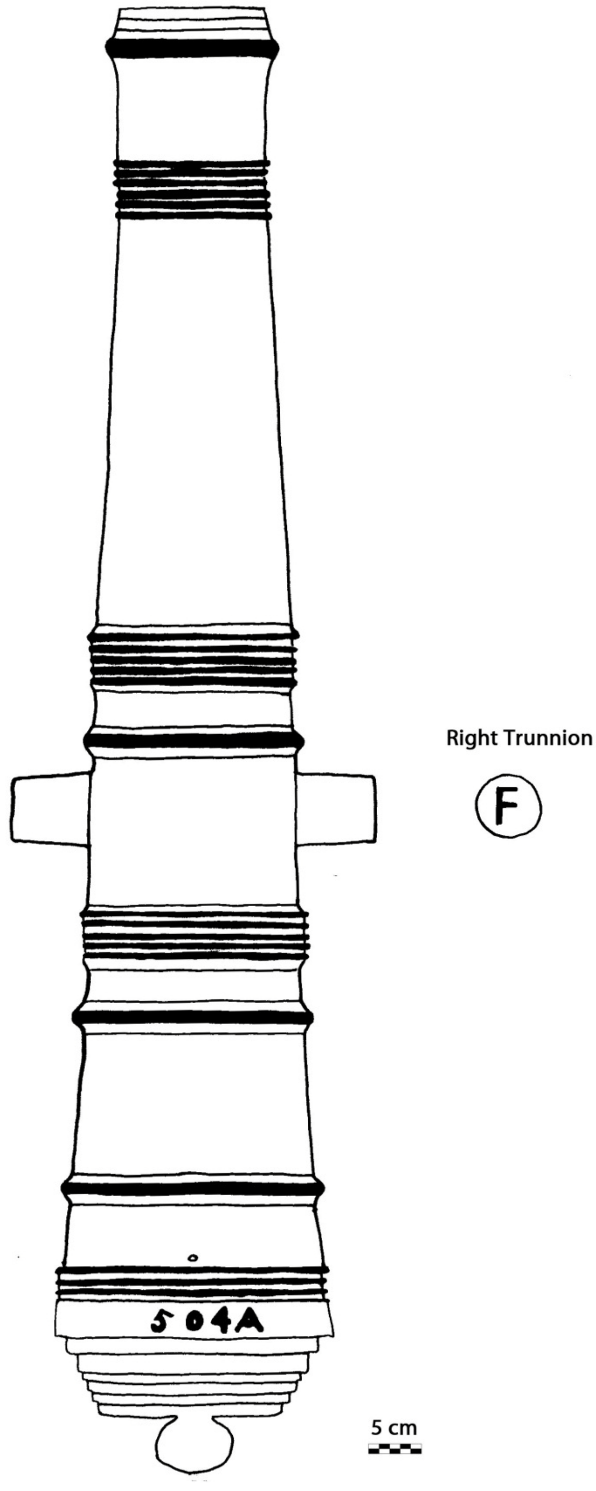

Figure 5.20 Plan view drawing of a cannon recovered from the Benya Lagoon site. All three guns were identical in dimension and style (Drawing by A. Pietruszka).

include: a length of gun to bore ranging from 16 to 22; width at the vent to bore of 2.9 to 3.7; least diameter of the tube behind the muzzle to the diameter of the bore of 2, trunnion length to bore diameter of 1; and trunnion width to bore diameter of 1. In comparison, the ratios for the cannon from the Benya lagoon wreck are 23, 4.54, 2.54, .018, and 1.36 respectively, none of which fall within the range of prescribed expectations. It is possible that the guns may simply represent anomalies in standard design or these dates reveal our incomplete understanding of early artillery design. A third explanation was suggested by de Vries of the Cannon Association of South Africa who, after reviewing our measurements, noted the guns' dimensions were more in line with a Dutch 2-pounder rather than a 1-pounder thus suggesting intentional underboring. In order to test this theory, I recalculated the standard ratios substituting 68 mm (the standard bore diameter of a Dutch 2pdr) for the 55 mm bore observed on our pieces. The recalibrated ratios equaled 18.7, 3.67, 2.05, 1.10, and .88. (Table 5.2) Three fall within the prescribed range while two are significantly close to the conventional ratios. These figures suggest that the cannon were cast using the dimensions of a 2-pounder but bored to a 1-pound diameter. According to de Vries, it was not uncommon for guns to be ordered bored one caliber less than the pattern specified. Underboring allowed a damaged or fouled muzzle to be rebored at a later time, a useful trait for iron guns in constant contact with salty air.[144]

[144] The English began reboring old ordnance by the beginning of the seventeenth century and by the 1620s English guns were being sent to the Netherlands for this service (Brown 1990:20)

	Conventional Ratio	Actual Cannon Ratio (55 mm)	Ratios using Dutch 2pdr bore (68mm)
length of gun to bore	16-22	23	18.7
width at the vent to bore	2.9-3.7	4.54	3.67
least diameter of the tube behind the muzzle to the diameter of the bore	2	2.54	2.05
Trunnion length to bore	1	1.36	1.10
Trunnion width to bore	1	.018	.88

Table 5.2 Comparison showing standard gun ratios, measured ratios, and theoretical ratios.

In addition to suggesting underboring, the guns' small caliber poses an interesting question. What were four identical cannon of such small caliber doing on a vessel of this size? While small caliber light ordinance were frequently employed in the armament of merchant ships, these guns typically fall in the range of 3 to 6 pounds. To the best of my knowledge the guns excavated from the Benya Lagoon site are the only examples of 1-pound iron cannon to be recovered from an historic wreck site.

All three cannon bore similar markings (Figure 5.21). The base ring of each cannon was incised with a series of numbers followed by the letter "A". Cannon 1 and 2 bore the inscriptions 504 A and 500 A respectively. The inscription on cannon 3 was similar to the other two guns; however, the third numeral was indecipherable due to damage. Cannon three's inscription read 50_ A. The alphanumerical markings likely represent the guns weight in Amsterdam pounds. Although no practical method was

Figure 5.21 Photographs of weight stamp and trunnion markings from cannon recovered from the Benya Lagoon. A piece of braided hemp cordage can be seen in the touchhole of the cannon in the top picture (Photos by A. Pietruszka).

available to measure a gun's actual weight while in the field, a reasonable estimate of cannon 1's weight was calculated using the following formula:

Estimated weight of cannon = .275 × [(D × D × D × L/d) - (D × d × L) + (d × d × L) - (b × b × l × .333)] × density of iron[145]

Cannon 1, stamped 504 A, weighs approximately 266.42 kg or 539.31 Amsterdam pounds. This represents a 7% difference between the estimated and stamped weight (504 Amsterdam pounds/ 248.98 kg) and falls within an expected range of variance.

Two of the guns also exhibited markings legible on their trunnions, bearing an embossed "F" on the face of the right trunnion (Figure 5.21). This mark has widely been accepted as denoting ordinance manufactured at the Swedish ironworks at Finspong, pieces commonly referred to as "Finbankers" (Brown 1989:322; de Vries and Hall 1997:9, Frantzen 2001:19, Kennard 1986:74).

The foundry at Finspong began casting iron guns sometime around 1586 and production continued unabated until the middle of the nineteenth century. The foundry's production peaked from the middle of the seventeenth century to the close of the eighteenth. During much of this time the foundry was controlled by the de Geer family of Holland who directed the international export of its guns through Amsterdam. Distributing the guns through Amsterdam not only garnered the family wealth and power at home but also served as a means of circumventing export embargoes utilized by the Swedish crown (Frantzen 2001:8). The portability of cannon combined with the wide-spread international sale of Finbankers makes it difficult to source a wreck based on their

[145] L = Length of gun, l = Length of bore, b = Bore Diameter, D = Diameter of Base Ring, and d = Diameter start of Muzzle Swell

appearance. Indeed, Finbankers have been recovered from a variety of wreck sites. The fact that the stamp of the guns' weight was denoted in Amsterdam pounds, however, suggests that at some point they were intended for Dutch service.

5.6 Conclusion

The waning years of the seventeenth and the waxing decades of the eighteenth marked a rapid transformation of ship design and construction in Northern Europe. During the last quarter of the seventeenth century, English shipwrights introduced the double frame, an innovative framing pattern whose increased stiffness and greater strength allowed vessels to carry a greater number of naval artillery.[146] The impact of the double frame was widespread as it rapidly disseminated from England to shipyards throughout Europe. While other European nations were shifting to double framed ships, shipwrights of the United Dutch Republic were undergoing their own transitions. The once distinctive northern and southern methods characteristic of the seventeenth century gave way to a single style as shipwrights in the north of Holland gradually abandoned Dutch flush construction, opting instead for the techniques practiced by their southern counterparts.[147] And it is here, during this period of rapid innovation in ship design, that we place the Benya Lagoon vessel.

The potential of such an archaeological site adding to our knowledge of this little understood phenomenon is seen in the diminutive archaeological comparisons and the

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[146] A further advantage of the double frame was the ability it gave shipwright to use smaller timbers in the construction of vessels. It is plausible that this effort was driven more by the growing lack of suitable trees (the availability of good compass timber diminishes round cities as they grow and more timber is transformed into charcoal and housing structures) than the increased strength of the ship's structure.

[147] The exact timing of this transition is unknown. References to southern style hulls in the Amsterdam's Admiralty wharves appeared as early as the last decade of the seventeenth century. The arrival of English master shipwrights in Holland around 1724 likely marked the definitive end of building larger vessels plank first; however, we know that smaller vessels continued to be built in this manner through the nineteenth century (Hoving 1988a:216)

porosity of useable data. In examining sites contained within a sixty year time span (plus or minus thirty years of the 1700 felling date ascribed to the timbers), only a handful of published investigations provide any details concerning a vessel's construction.[148] While supplemental parallels can be and have been drawn from historical treatises on ship construction and modern reconstructions, information derived in this manner must be used with caution. Researchers relying on such sources are often faced with discrepancies between contemporaneous texts or even within a single text. For example, in two seventeenth century English texts by Deane and Keltridge, the authors provide conflicting figures concerning scantling size, the degree of room and space, and the number of futtocks required in vessels of various rates even though Keltridge was likely a student of Deane's and the texts were written only five years apart (Deane; Keltridge 1675 cited in Batchvarov 2002: 39-40).

Further discrepancies are found when we move from text to tangible. Consider for example the English warship *Dartmouth* constructed in 1655. Many experts had surmised for the greater part of seventeenth century large, English ships were framed using overlapping futtocks. This conclusion, however, was called into question after the excavation of *Dartmouth* revealed a framing pattern that deviated greatly from the written treatises (Martin 1978; see also Steffy 1994: 156). While Batchvarov's (2007) subsequent analysis appears to rectify this discrepancy—he accounts for the observed pattern as a result of a later refit rather than the original framing pattern. However, the jury is still out and the story of the *Dartmouth* stands as a cautionary tale. In light of such discrepancies, we must proceed with care, for while these sources have provided and will continue to

[148] Batchvarov (2002) lamented this same sentiment concerning his study of seventeenth century framing techniques.

provide insight into the practices of European shipwrights during the seventeenth and eighteenth centuries, only archaeological evidence can validate them. A forced over-reliance on historical, theoretical texts is no substitute for hard evidence gleaned by archaeologists from vessels actually constructed.

Even more significant in terms of the Benya Lagoon site are the many gaps that remain in our understanding of Dutch construction techniques during this time period, especially Dutch-flush construction. We are fortunate in that two detailed accounts written by Nicolaes Witsen and van Yk have survived; however, incongruities found both within a singular text and between texts have led to some confusion (see Hoving 1988a:215).[149] Furthermore, Hoving's reconstruction of Witsen's 134 foot pinnas demonstrates marked differences between the theoretical lines suggested by the text and the actual lines produced (Hoving 1988a). While several archaeological examples of Dutch-flush ships have been investigated, including the *Mauritius, Batavia*, Scheurrak T 24, and Inschot/Zuidoostrak, all of these vessels were constructed in the first half of the seventeenth century, more than fifty years before the Benya Lagoon vessel was built. Researchers continue to debate the defining characteristics of Dutch-flush ships; moreover, their decline, estimated to be sometime in the beginning of the eighteenth century, is poorly understood.

A north German dendroprovenience, cannon stamped with Dutch weights, and timbers exhibiting characteristics of Dutch-flush construction including angular frames, a lack of fore and aft fastening, and a high degree of dimensional variation combined with

[149] One discrepancy lies in both authors' terminology as sometimes the same word refers to two different parts. For example, the term *buikstukken* was used by Witsen to denote a floor, while for Yk, it denoted the first futtock. In Witsen's text he often mentions a specific measurement several times, each time supplying a different number.

a felling date of 1700 for the vessel's timbers are all suggestive of a vessel constructed in the north of Holland in the first quarter of the eighteenth century. In lieu of the historical record, our findings are not surprising. From 1637-1760, Elmina served as the West African administrative center for the Dutch West Indies Company, which relied on a large, steady stream of maritime traffic consisting of traders, slavers, and warships to carryout and maintain its commercial interest in the Africa trade (den Heijer 2003b:143-151). The bilateral movement of bulk commodities between the Dutch Republic and West Africa, alone, accounted for 334 vessels visiting the Coast from 1674-1740—296 of these listed Elmina as their destination (den Heijer 2003b:148). At the same time, the company employed 383 vessels in its pursuit of the slave trade. Factoring in naval patrols, coastal traders, and illegal Dutch interlopers the number of Dutch vessels plying the Gulf of Guinea is well over 1000 ships in a time period spanning less than 70 years.

While my preliminary research has shed light on a few of the questions surrounding the Benya Lagoon site, such as when and where the vessel was constructed, several inexplicable features continue to confound researchers—primarily, how and why the vessel came to its final resting place in the lagoon. Written accounts dating from the seventeenth century detail the careening and caulking of vessels upwards of 120 tons up the river (Barbot1992:374). Barbot and Dapper's accounts confirm the regular passage of ships comparable to the one found into and up the lagoonal system and provide compelling impetus for the maintenance of an unobstructed waterway. Regional studies of ship abandonment sites in North America river systems suggest such sites were often relegated to out of the way unnavigable portions of rivers (Babits and Kjornes 1995; Babits et al. 1995; Shomette1995:7). As no evidence has been put forth suggesting this practice was unique to the North American landscape, it is hard to understand the intentional deposition of an unserviceable ship in a working waterway when the entire Gulf of Guinea was available.

An abandonment hypothesis is further confounded by the presence of the four cannon. Hemp cordage present in the touchhole of each piece suggests that the guns were still in service at the time when they were lost. While old, damaged guns, frequently used to ballast ships, would be a natural choice to weigh down an abandoned hulk, working ordinance, high in monetary value, would not. In fact, useable cannon were of such high value that monarchs and companies alike often went to great lengths to recover pieces lost when ships were wrecked.[150] If such great lengths were taken to recover ordnance from the sea floor, surely they would have been removed from a vessel intentionally discarded in a readily accessible shallow estuary.

Though preliminary in nature, the results of our study of the Benya Lagoon site suggest the materials encountered by Dredging International represent the remains of a medium sized European ship constructed in the Dutch Republic sometime during the first quarter of the eighteenth century. Construction components lead us to believe that it was built in the Dutch-flush manner. The significance of such a discovery is twofold in that it has great potential to add to our knowledge concerning European ship design and construction methods as well as providing a unique window into African-European interactions. Attempting to move beyond the micro-level of site specifics to a macro understanding of cultural processes the Benya Lagoon vessel are further contextualized within the space and place of the Benya Lagoon in Chapter Six.

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[150] For example, in the 1680s 80 guns were recovered from the *Kronan* using a diving bell. This equipment was also used to recover guns from the *Vasa* (Einarsson 1994:46)

CHAPTER SIX: FROM MICRO TO MACRO: SHIFTING THE VANTAGE 180 DEGREES

In the previous two chapters I have demonstrated how a multiscalar approach was used in the identification and interpretation of two very different sets of ship remains from coastal Ghana. Two this point, this application is unidirectional, drawing on large-scale patterns of trade, production, and consumption to identify the small-scale event—in this case the wrecking or abandonment of a particular ship. Yet, as argued earlier, the strength of a multiscalar archaeology is that it enables researchers to work in both directions. Not only can large-scale patterns provide an interpretive context, but, in turn small-scale events represented by these sites can now provide new information regarding the large-scale patterns in which they are entrenched.

The conceptual vantage and methodological approaches afforded by microhistory provides a useful way of conceptualizing the multiple scales of analysis needed to synthesize the results of underwater archaeology. Microhistory emerged in tandem with postcolonial theory during the 1970s and 1980s in reaction to the meta-explanatory frameworks of materialist and structural perspectives, a dissatisfaction born out of the recognition that explanation was to be found in the local. Hence, DeCorse's (2001a; 2008) archaeological and historical study of the African settlement of Elmina in coastal Ghana can be seen as a detailed case study of the African settlement associated with the first and largest European outpost in sub-Saharan Africa. Although the Elmina site is the vantage point, DeCorse's objective is to move beyond the local to the exposition of the wider, global patterns in which Elmina was embedded. This movement across scales can be seen in even more narrowly focused microhistorical studies that have been referred to as “incident analysis” (Darnton 2004). For example, in the *Return of Martin Guerre,* Natalie Zemon Davis (1983) examines the sixteenth century trial revolving around a peasant woman accused of co-habiting with a man masquerading as her long dead husband. Beginning with the in-depth analysis of contemporary court records, she explores peasant society and gender relations in sixteenth century France, eventually leading us through the modern movie version of the event and the creation of historical narrative. These perspectives share vantage; a focus on the local, the specific, and the incident, through which insight into broader implications is obtained. This entrée through the narrowly contextualized case is very appropriate to studies of shipwrecks which have long been recognized for producing what Binford (1981:19-20) has called "fine grained assemblages" in which "all associated characteristics of the deposit are consequences of the same event".

The Elmina Wreck site and the Benya Lagoon vessel represent quite different time periods, historical settings, and local archaeological contexts. Yet, their value to the reconstruction of the West African past derives from both their local and global contexts. On one hand, they represent unique insight into the construction of European ships that traded on the coast and their cargoes. On the other, data on their cargoes and associated artifacts provide information on trade and exchange in a global region that has received little attention from underwater archaeologists.

As both ships are, yet unidentified, their context is informed by the specifics of their construction, shipboard artifacts, and cargoes. The assemblage from the Elmina Wreck is consistent with the seventeenth century. The great quantity of nested brass and pewter basins, brass manillas, and trade beads coupled with the lack of African exports indicate the remains of an inbound trading vessel which I conclude is most likely of Dutch origin.

The Benya Lagoon site likely dates to the first quarter of the eighteenth century and represents the remains of a small (approximately 200 tons) Dutch-built vessel. Dendrochronological analysis of four separate frames has provided a felling date between 1700 and 1701 and an origin ascribed to North Germany. Using the macro-scale cultural processes of production and consumption, in particular the European timber and ship building trades, I have concluded that the vessel was constructed in Holland at the turn of the century. This assessment is further supported by the vessel's construction. The timbers recovered suggest a reliance on treenail fastening, non-inter-connected timbers, and the appearance of a hard chine, all characteristic of Dutch-flush shipbuilding. Lastly, three identical, small-caliber cannon, of the type commonly referred to as finbankers, were recovered along with the timbers. These guns can be dated to the mid seventeenth century, and are thus consistent with my dating of the event as well as being suggestive of a small trading vessel. While it is still premature to definitively claim Dutch ownership of this vessel the Dutch control of Elmina from 1637 to 1872 and the site's location in the Benya Lagoon necessitates a Dutch role in the Benya Lagoon site.

In addition to providing an identifying context for these sites, this particularistic description of artifactual material may offer valuable insight into local history. Materials shipped in the holds of European vessels were integral to the Atlantic trade; any well-preserved assemblages present a new perspective on the early contact period. Although documentary records include manifests of ships trading in West Africa, these are far from complete and the vague descriptions provided often makes it impossible to relate them to specific items found archaeologically. Goods that reached the African brokers on the coast were quickly dispersed into the hinterland, leaving only a fraction to enter the terrestrial archaeological record. Precisely dated European items can be used to date associated objects of African manufacture, such as metal vessels, gold weights, beads, and ceramics. Greater detail concerning the effects of these issues on historical research and the advantages given by the archaeological studies of submerged sites is provided in the first part of this chapter.

In the second part I use the material culture of the event to extrapolate large-scale cultural processes. Recognizing the recursive and self-similar properties of culture and history, materials from the Elmina Wreck site are interpreted as the physical traces of consumption. The abundance of brass basins and manillas on the wreck site tell something of African demand and the use/reuse of imported copper and brass. Trade goods recovered from the site also illustrate the ability of African consumption to drive European production. In manillas we see how Europeans expended significant amounts of capital—labor, financial, and resources—towards the manufacture of goods specific solely to the African market. Likewise, the large cache of spun brass-hollowares shows how African demand may have led to technological innovations in European modes of production. Furthermore, the cross-cultural economics of the Atlantic trade and the power of the African consumer to shape its structure are seen in the comparison of the archaeological remains of contemporary European trading vessels operating in two very different markets. Lastly, I examine the Benya Lagoon site in regards to African and European concepts of space and place.[151]

[151] In the proceeding discussion regarding the movement from micro to macro, the event to structure, I have chosen to focus on African agency and its role in shaping the structure of African-European interactions on

6.1 Shipwreck Sites and the Historical Record: A Case for West Africa

Historical research regarding African/European relations during the period of the Atlantic trade is severely constrained by a dearth of documentary sources and a wealth of inaccuracies. Although, a general problem for all periods, it is particularly true for the period in which these two vessels fall. In examining the historical records for this period, one quickly discovers problems with missing data resulting in a singularity of data sources, with contrasting self-interests of the prevailing authors, and with translations from the original texts.

In researching trade information from this era, one must first contend with a lack of original sources. For example, the records of the Dutch West India Company, which controlled Dutch trade on the Coast from 1621 to 1791, are grossly incomplete. A large part of the company's archives were sold as waste paper in 1821 and a fire in 1844 destroyed most of what remained (Ryder 1969:87; see also Carson 1962). Thus, much of the research undertaken for this time period has relied upon invoices from individual voyages, firsthand accounts by traders, and secondary compilations (Herbert 1984:133). Unfortunately, the value of such works in historical reconstruction is at best variable.[152] Many of the seventeenth century narratives were either plagiarized, or heavily influenced by other previous works (Jones 1983:4). Authors often mixed information from a variety

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the Gold Coast. By this primacy I wish to demonstrate the utility of archaeological assemblages recovered from European ships to inform us as much about the indigenous peoples in which they brought Europeans in contact with as the cultures from which they sailed. As I demonstrate in Chapter Two, this has not been the norm in shipwreck archaeology. Although I have chosen to emphasize African agency here, European market forces, modes of production, consumption, and historical contexts also played a significant role in structuring African-European interactions including trade (for European restrictions on the trade of firearms in West Africa and its effects on indigenous populations see, Rodney 1969, Daaku 1970, Kea 1971, Richards 1980, Inikori 1977).

[152]For reviews and critiques of the documentary source materials see: (Alpern and Fage 2006; Blake 1987; Fage 1980, 1987, 1992, 1994; Hair et al. 1992, Hair 1994a, 1994b:1-2, 46-47 nn. 15, and 16; Heintze and Jones (eds) 1987; Jones 1982, 1986, 1987, 1990; Law 1982; Teixeire da Mota and Hair 1988). For a critique of the use of these sources specific to the Study of African Material Culture see (Jones 1994)

of sources and periods thus making it hard to distinguish true trade continuity. A prime example of this is seen when seventeenth century trade lists—particularly those of de Marees (1987 [1602]), Dapper (1676 [1668]), and Barbot (1992 [1688])—are compared. Barbot's list borrows heavily from Dapper, which in turn is partially derived from de Marees, whose own account was copied still from others (Hair 1992:561; van Dantzig and Jones 1987:xv-xvi). Similarly, it has been suggested that Tilleman, who supplies a list of goods in his 1697 account, plagiarized Müller's 1673 work extensively (Jones 1982, 1983). What at first glance appears to be a century's worth of information detailing specific commodities is actually reducible to a single source from the beginning of the century. Researchers must now guess whether such carry over is simple plagiarism or significant continuity.

Research is further compounded by the contrasting personal agendas of the prevailing authors. The fact that the seminal seventeenth century texts were written by men of different backgrounds—representing multiple generations and unique personal experiences (if not varied personal agendas) makes it difficult to assess change and continuity diachronically.[153] While de Marees made several trips to the West African coast, he neglected to provide details concerning when, where, or under what circumstances he made them. Barbot made two voyages to the coast in 1678-9 and 1681-2 as a commercial agent on a slave ship. Bosman spent 14 years on the coast where he was eventually appointed to the position of chief factor at Elmina, making him the second most important Dutch official on the coast. However, Dapper, whose lengthy 700 page compendium is often cited, never traveled to Africa!

[153] For details of each author's life see Barbot (Hair et al. ed. 1992); de Marees (van Dantzig and Jones ed. 1987); Müller (Jones ed. 1983); Bosman (Willis ed. 1967); Tilleman (Winsnes ed. 1994).

These men and their works stem from different and often opposing trading interests operating on the coast throughout the seventeenth century. De Marees was likely a Flemish immigrant who settled in Holland after the Spanish Duke of Parma captured Antwerp in 1585. He wrote at a time when the Guinea trade was not yet organized under a national charter and competition, even amongst fellow countrymen, was fierce as small companies and individual ship owners vied for a share of the trade. Dapper and Bosman were Dutch; Barbot, French. Müller was German but served the Danish African Company (Glückstadt Company), as did Tilleman. Because of this, each man's station on the coast also varied. Barbot and Phillips were at Cape Coast among the Fetu; Bosman lived and worked at Elmina among the Fante; and Tilleman worked at Christianborg among the Ga and Akwanu (Winsnes 1994:6). Each author's position and location dictated the kinds of information to which they gained access while restricting them from other resources. Although significant overlap occurred, each European nation traded a complement of commodities tailored toward their available resources and economic strategy, both foreign and domestic. Such vital information was often tightly guarded and considered state secrets.[154] Furthermore, the goods desired by the West African market varied regionally and ethnically. Predictably, European supply and African demand transformed over time. Given this complexity, comparing the 1602 Dutch account of de Marees to Tilleman's 1697 Danish perspective may be like comparing apples to oranges.

The documentary record is also problematic in that researchers often must rely on translated texts. As a secondary source, many translations, particularly earlier ones, have

[154] For example, Bosman (1967:91), writing to his employers back in Holland, refused to address any specific commodities he was trading on the coast, fearing his letters might fall in the hands of the WIC's competitors.

been criticized for their inaccuracies and heavy abridgment (Hair et al. 1992; Fage 1980; Van Dantzig 1974, 1975-84; Jones 1994:355). Ambiguities result as scholars often disagree as to the proper translation of words. Even the identity of a particular trade item may be disputed; for example, *taatsen* are described by Ratelband (1953:cii) as brown earthenware kettles, whereas according to Jones (1995:320) they are copper or brass pans.[155] Is this a case of inaccurate translation on the part of Ratelband or Jones, or is this simply demonstrating a transition in the materials used to manufacture *taatsen*? Translation is further hampered by a poor understanding of slang and the historic vernacular. Especially in older texts, this makes them "particularly useless in pinning down the precise meaning of a particular phrase" (Jones 1994:355). Although the term *schape velletjes* appears in several seventeenth century trade accounts including the list of goods recovered from the *Groeningen* at the time of her sinking, it continues to elude identification.[156] Literally translated as "sheep skins" it is unclear as to whether this term refers to a product made from sheep hide or whether it is a seventeenth century colloquialism for something else.[157] Even properly translated sources may remain vague, leaving them open for interpretation and conjecture. For example, it is difficult to accurately account and assess the transition of metal goods imported to the coast because records are imprecise in distinguishing copper from brass, the two terms often being used interchangeably. The same is true for other metals as well. Are the "wite basons" referred to by Towerson in 1556-57 the same as the "pots of tinne" he traded the following year (Blake 1967 vol 2:380; Hakluyt 252 cited in Herbert), or is he referring to

[155] Jones cites late seventeenth century documents as referring to *taatsen* made of brass or copper.
[156] See (Barbot 1992:559; Jones 1995:177, 179, 323; Ratelband 1953)
[157] Jones (1995:323) suggests that they may have been used to clean guns or that it could be referring to blacksmith bellows. Another example of slang is seen in the Danish use of the term "snake skulls" in reference to cowries (*bossies*).

pewter or even heavily tinned brass, as Herbert (1984:136) suggests? Still other words simply defy translations; lost to time, their identities remain a mystery.[158]

In light of these problems it is easy to see the significance of the discovery and archaeology of these two vessels. Obviously, given the paucity of the documentary record the addition of any new data is important. However, the archaeological study of the two shipwrecks associated with European/African trade has not only introduced new data, but a whole new data set and approach to understanding the complexities of the trade. The excavation of these sites has yielded a material record to go along with the documentary one; the "use of different sources allows for a fuller interpretation of specific artifacts, sites, or sociocultural phenomena in a manner impossible using a single source" (DeCorse and Chouin 2004:9). This is particularly true if we wish to formulate a better understanding of the items of trade, associated terms of exchange, and subsequent consequences. Much of the documentary source materials that did survive has already been accounted for, and, while not impossible, the likelihood of new detailed trade accounts capable of clarifying the conflicts in existing documentary materials is low. Meanwhile, assemblages of trade ships do exist and, as evident by the work off Elmina, are discoverable. The study of these cargoes can one day help clarify many of the questions and contradictions apparent in the documents. Regardless of what may have been selectively recorded, they offer the most accurate portrayals of the vessel's real manifest.

[158] For examples of named trade goods for which modern translations are unknown see Jones (1995:312-325).

6.2 Shipwreck Sites and the Archaeological Record: A Case for West Africa

It has been noted that most historical archaeology in sub-Saharan Africa is marked by a propensity for European sites (DeCorse 1996, 2001b. Posnansky and DeCorse 1986); however, the majority of such sites were examined early on in the scholastic pursuit of the African historic period, focused primarily on architectural elements, and rarely included excavations.[159] In Ghana, much of this work emphasized cataloging European monuments and discussing their structural history (Bech and Hyland 1978; Dahmen and van Elteran 1992; Ephson 1970; Fage 1959; Flight 1968; Frapolli et al. 2006; Groll 1968; Jeppesen 1966; Lawrence 1963, 1969; O'Neal 1951; Priddy 1970; Priestley 1956; van Dantzig 1972). As a result only a few European outposts have been the focus of systematic archaeological studies; most notably Posnansky's (Posnansky and van Dantzig 1976) 1976 excavations at Fort Ruÿchaver, a small seventeenth century Dutch outpost on the Ankobra River, Ghana and Calvocoressi's (1977) work at Bontoma near Elmina. Excavations were also conducted by Simmonds (1973) at Cape Coast Castle, but these focused on the slave dungeon and the Africans held within. More recently, researchers from the University of Ghana, Legon have undertaken a systematic survey of Danish forts and plantations as a way of exploring the nature of enslavement in a West African context (Bredwa-Mensah 1996, 2002, 2004; Bredwa-Mensah and Crossland 1997; also see Jeppesen 1966).

A growing emphasis on indigenous sites and African societies has taken hold of historical archaeology in Ghana over the past two decades. The focus of these works includes African settlements associated with European trading posts (DeCorse 1992a; 2001a); transformations in coastal and hinterland sites such as Eguafo, Etfutu, and Banda

[159] The few excavations that were undertaken were minimal.

(Agorsah 1975; Spiers 2007; Cook and Spiers 2004; DeCorse et al. 2009; DeCorse and Spiers 2009; Stahl 1999, 2001a, 201b; Cruz 2003; also see Chouin 2002, 2008, 2010; Carr 2001); and the impact of the slave trade in Northern Ghana (Kankpeyeng 2003; Nunoo 1957; Swanepoel 2004, 2005). These studies are not only significant for emphasizing the indigenous perspective for African/European relations but also for the scale of archaeological work conducted at each site.

The European vessels represented by the Elmina Wreck site and the Benya Lagoon site stand in stark contrast to the archaeological work of the previous decades. As a departure from the recent emphasis on indigenous sites, they provide an alternative perspective to explore West Africa's involvement in the Atlantic trade. The sites are unique because of the scale of archaeological excavations as compared to other European sites examined in the past, as well as being the only ships examined by archaeologists in all of West Africa. The potential of work on European sites to provide important insight into the nature of the European commodities' trade has already been noted (DeCorse 2001b:9); these sites allow researchers an in-depth view of African/European relations. On the one hand, materials recovered from these sites shed new light on how Europeans mitigated complex trade relations a half a world away while, on the other hand, they are the physical manifestations of African consumption patterns.

Although terrestrial sites allow archaeologists to view change and continuity over the *longue durée*, this time depth obscures the archaeological evaluation of the impact of any particular nation or trading interest, and investigations into more specific time periods can be ambiguous (DeCorse 2001a:146-47). In West Africa terrestrial excavations have proven that various trade commodities are difficult to assess due to limited documentation and poor archaeological visibility (DeCorse 2001a). In contrast, shipwrecks were catastrophic events and the resulting archaeological sites often preserve materials absent from terrestrial contexts. While the Elmina Wreck site contains thousands of brass manillas, only a handful have been recovered by archaeologists from terrestrial contexts. For example, despite its close connection to the slave trade, no manillas were discovered by Kelly (2001:94) at Savi, Benin. Likewise, there is no mention of manillas being found by Stahl (2001) during her work in Banda, Ghana; and at Elmina only two small fragments were found in excavations despite the fact that imports for the entire Atlantic trade likely numbered in the billions (DeCorse 2001a:124). A similar pattern is exhibited by brassware. Although indigenous objects manufactured from European sheet brass are often found, the archaeological recovery of unaltered imported European hollowares from terrestrial sites is extremely rare.[160] In contrast, the Elmina Wreck site contains what may prove to be the largest cache of European brass hollowares ever discovered. Still further examples include onion bottles, clay tobacco pipes, brass pins, and lead cloth seals. While each are only infrequently found on terrestrial sites, especially from older contexts, all have been recovered from the shipwreck.

Data based on material recovered from the Elmina Wreck site and the Benya Lagoon sites will also aid in the interpretation and understanding of other archaeological sites. Already, a wide variety of material culture involved in African-European interactions with tight temporal contexts and concrete national identifications has been recovered from these sites. Such material provides unique insight into European trade

[160] For discussions on the indigenous use of imported sheet brass see (DeCorse 2001a: 130-134; Herbert 1984; Garrard; Ratelband 1953:)

goods and their chronology. Similar data have been of critical importance in developing chronologies for terrestrial sites in other world areas (e.g. Avery 1997; Deagan 1987; Goggin 1960; Karklins 1988; Majewski and O'Brien 1987; Marken 1994; Noël Hume 1969) and “closely dated European goods provide a means of dating African sites of the past four or five hundred years which are often difficult to date by other means” (Posnansky and DeCorse 1986:11).

Already several finds from the Elmina Wreck site suggest that we re-examine previously ascribed dates for the manufacture of certain trade items. For example, the Elmina Wreck site demonstrates that the “Popo” style manilla, often attributed to the nineteenth century, was already in use some 150 years earlier.[161] Likewise, the large collection of spun brass hollowares, also previously considered a nineteenth century innovation, shows that the technology, which actually dates as far back as Roman times, was reintroduced for the mass production of these goods as early as the seventeenth century. Several onion bottles, if they can be definitively linked to the site, may also one day push back current conventional dates.[162] Such finds not only provide us with new and more accurate dating sequences, but they also remind us of just how little we really know about the temporality of certain artifact types, even well documented ones.

6.3 Large-Scale Cultural Processes and the Event

Increasingly, historians have begun to understand trade statistics gleaned from European sources as a reflection of West African consumption patterns (Johnson 1990, Metcalf 1987b; Peukert 1978, Richardson 1979, and Thornton 1992, Herbert 1984). This

[161] Similar finds among the remains of the Saint-Quay-Portrieux wreck also seem to support this (Herry 2004).
[162] Pictoral evidence from Dapper and archaeological finds from shipwreck sites in Holland also suggest earlier dates for the development of the onion bottle in Holland.

represents a significant shift in their approach to history, one marked by a rereading of the European documentary record with an emphasis on the indigenous. Such an approach is particularly valuable to the reconstruction of societies which themselves had no written records, as is the case in West Africa. According to Jones (1995:11) this new understanding can "provide indispensable clues towards and 'internal' perspective on pre-colonial West African societies." In the same manner as historians with the documentary record, archaeologists can gain access to the etic by understanding European trade goods as the material traces of African consumption. The goods desired by West African societies that litter the archaeological landscape are not only markers of consumption but also have the ability to tell us about technological shifts, subsistence practices, religious beliefs, status, gender, etc… As such, submerged wreck sites should be of particular interest to those wishing to unveil such information. In terms of the sheer quantity of consumable goods from a singular and definable time period contained within, all other archaeological sites pale in comparison to shipwreck sites. It is here that a multiscalar approach to the archaeological investigation and interpretation of shipwrecks pays dividends.

6.3.1 Copper-Alloy Consumables, Use or Reuse?: A commonly held view is that the vast majority of the brass traded to West Africa was melted down and recast (Vogt 1979:69; DeCorse 2001a:124).[163] As previously noted, the archaeological recovery of even fragmentary remains of European brasswares is extremely rare from African contexts, despite the fact they were imported by the millions. Curiously, declines in indigenous copper production, which in some areas of West Africa resulted in its complete abandonment, appear corollary. It is widely believed that these declines were

[163] For the reuse of sheet brass see Ratelband (1953: vi)

likely a direct result of external competition, first from Arab and then from European competition (Craddock and Hook 1995:182). On the Gold Coast, Garrard (1980a:74) estimates that "more than 96% of the cuprous metal reaching the Akan before 1900 probably came from Europe." He suggests that this virtually unlimited source of brass encouraged the development of brass work along the coast and contributed to a florescence of Akan casting (Garrard 1979:39; 1980a:104-105; 1980b:59-63). Unfortunately, few examples of early Akan casting have survived (Garrard 1980a; Ehrlich 1989). However, one surviving form, the gold weight, does provide some evidence of the craft's proliferation; Garrard (1980b:325) estimates that as many as three million gold weights may have been produced between 1400 and 1900. Further evidence for the source of these castings is suggested by how African traders evaluated imported basins and other metal objects prior to purchase. Often, a buyer would strike two pieces together for quality was determined by their appearance as well as their tone when struck (Vogt 1979:69). One possible explanation for such curious behavior is as an assay; the differences in tone might have provided a useful guide to metallic content, highly valuable information for casters (Herbert 1984:124). The purchase of basins for use as a as a raw material also helps explain their scarcity on the coast, even in historic times. For example, de Marees (1987:52) observed "although these Basins are brought there in such quantities and are not as perishable a commodity as Linen, one does not see much old brass-ware there." Although de Marees assumed they were being traded to some large unknown interior population, a more plausible explanation may be that they were being melted down and recast. Imported brasswares were also used as a raw material through reuse and alteration. Explaining the demand for brass neptunes or basins during his

1693-94 voyage on board the *Hannibal,* Phillips (in Donnan 1930 vol 1:404) described how "after they have bought them they cut them in pieces to make anilias [manillas] or bracelets, and collars for their arms legs and necks."

While a connection between European brass imports and indigenous casting is undeniable, the perception of such items primarily as a source of raw materials is overly simplistic. Foremost, it fails to explain the wide variation of brasswares that were imported at any given time. By some accounts as many as 6 different types of brass hollowares were traded along the coast at any given time (de Marees 1987:51-52 also see Barbot 1992:559-560; Ratelband 1953). Such variation is supported by archaeological evidence; on the Elmina Wreck site seven distinct varieties of hollowares were discovered (Figure 6.1). If these items were intended as raw materials rather

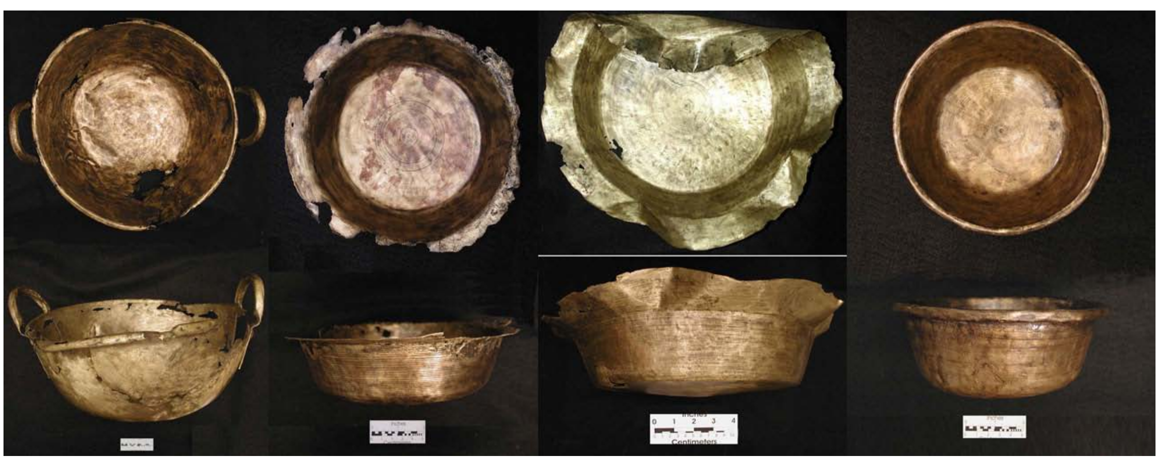

Figure 6.1 Photographs showing four out of the seven types of brass basins observed on the Elmina Wreck site. These photographs were taken after conservation had been completed (Photos by N. Hamann)

than a utilitarian function then why would such variation exist? Europeans could have reduced production costs and increased profits by importing raw copper or brass rather than manufactured goods; while for African traders, ingots would have been easier to transport from their coastal supply to interior markets.

A better explanation for the wide variation in shape and size of brass hollowares discovered at the Elmina Wreck site is that each of these items served its own unique function in the consumer's daily lives. For example, de Marees (1987:51) documented how:

> "they use small Neptunes to store Oil with which they rub themselves; the big Neptunes to immure in Tombs on the graves of the dead, and also to carry something or other in. They use Barbers' basins to wash and shave; Fater-Basins as lids, to cover other basins, so that no dirt may fall into them; on chased Basins they put their ornaments and trinkets; those big Scottish pans they use for slaughtering a Goat or Pig and cleaning it in, instead of tubs, small rimless cups to cook in"

And Barbot (1992:560) noted that "Basins and pewter porringers are used to eat from." In places such as Bonny, New Calabar, and Elmina large brass pans were used to evaporate sea water during the production of salt (Adams 1970 [1822]:122 cited in Hamann 2007:171). Kettles served as fetching devices to carry water, tinned copper pots to store it. Metal basins were also used to pan for gold and even served as percussion instruments (Alpern 1995:15-16). Brasswares also appear to have played an important role in many native religious ceremonies. For the Akan metal basins could be a deity's abode or an altar to the supreme being (de Marees 1987:189); in Benin, copper basins were used to capture the blood of beheaded victims before being ceremoniously sprinkled over the royal tomb (Landolphe 1823:118); and at Fetu divinations were seen in a basin of water (Jones 1983:172).

How brasswares were bought and sold also indicates a broader functional role. All were sold by weight, but, as Herbert (1984:136) points out, "since the specifications of the various sorts are often very precise, it seems doubtful that they were simply bought for their metal content." This is further supported by the demands of the African buyer during the actual purchase. According to de Marees's (1987:55-56) description "they inspect the Basins one by one to see if they have holes or cracks; and if a Basin has the slightest hole, they reject it and want it exchanged for another; furthermore if they are the least bit dirty, they do not want them either." Such stringent attention to quality, especially with regards to cracks and holes, suggests that the basins were intended for use; as a raw material such flaws would be trivial. In fact, with that intent, damaged goods may even have been preferred since they could likely have been purchased at a discounted price. Lastly, there is the purchasing power of the various cupric items traded on the coast. When multiple forms of brassware are compared, it becomes clear that their value depended on form, not metal content. For example, at Calabar a slave bought in exchange for copper rods was slightly cheaper than one bought with brass bracelets, which in turn was considerably cheaper than purchasing one with neptunes, basins, pots, or kettles (Herbert 1984:138 also see Ratelband 1953). These differences are at odds with a recast and reuse model as an item's form is largely inconsequential if intended for recycling.

A similar case can be made for the thousands of manillas discovered among the remains of the Elmina Wreck site. Imported by the billions, manillas would have provided African craftsmen with a vast supply of raw material to be melted down and recast.[164] However, this fails to explain the wide range of variety seen in these objects. Although its exact origin and function remain unknown, the manilla's peculiar shape is believed to have originated in West Africa before being copied and reintroduced by

[164] "In contrast, of the millions of manillas brought to the Gold Coast, few survived. They were never used as currency, and were either melted down to make other objects or were exported northward" (Alpern 1995:13). Only two have been recovered from terrestrial archaeological contexts at Elmina.

Europeans for mass consumption. Both the historical and archaeological records show that the shape and size of manillas varied, depending upon time and space. Generally, it is believed that manillas became lighter and smaller over time (See Alpern1995:13). While the manillas traded by the Portuguese at Elmina in 1529 weighed 600 g by the late eighteenth century, this their average weight had been reduced to about 150 g (Vogt 1979:94; Semans 2008). Contemporary variants also suggest that size and shape fluctuated regionally. For example a 1548 contract specifies that the weight of Mina manillas be 160 per 100 *arates* while that of Guinea manillas are 190 per 100 *aratesi* (Herbert 1984:128). A reuse or recast theory does not explain why regional demand for manillas at times decreased or all together ceased while the demand for other brassware appears to have remained unchanged (e.g. Vogt 1979).

The variation among the brassware recovered from the site suggests a primary function that utilized their original manufactured form as containers. Systemic regional variation and diachronic transfigurations also appear to support this supposition. A secondary function as a source of raw materials for African metal smiths is suggested by a fluorescence of indigenous casting corollary to the introduction of European imports and a concomitant abandonment of domestic copper production. The shapes, styles, and manufacture of brass hollowares are as much of a reflection of African desires as they are of European production. An English factor at Coromintin noted such predilections complaining the large stocks of basins on hand would not sell because they were too heavy. “What brasse you send” he implored “pray let it bee as light as you can procure and well coloured” (in Garrard 1980a:7). These might also explain why Barbot (1992:559) felt it necessary to distinguish hollowares of three distinct manufacture—

chased, hammered, and wrought—in his list of goods, or why Ruÿchaver needed to specify that 8000 lbs. of basins requested for the coast be “hammered” (Jones 1995:175). Similar variation is seen in manillas; they were not a medium by which raw material was purveyed; they were a medium of exchange (Law 1991:49-50; Jones 1995:15; Hair 1989:15; Herbert 1984:200-205). Like European coinage of the same period, they are better understood in terms of their ideological and symbolic values rather than their ability to be melted and recast.

6.3.2 African Agency in Consumption: Artifacts from the Elmina Wreck site have also provided invaluable, new insight into seventeenth century consumerism. According to Majewski and Schiffer (2009:192) “consumerism is the complex of technologies, organizations, and ideologies that facilitate the mass production, mass distribution, and mass consumption of goods.” As seen in the case of the Elmina Wreck, this complex is not always confined to a single nation, society, or culture. Therefore, although singular as a cultural process, consumerism can, and often does, have multiple cultural ties. The ramifications of these cross-cultural connections can be far reaching and significant, yet they may go unnoticed if viewed from only one culture’s perspective. Because of a failure to recognize the cross-cultural milieu consumerism entails, we lack the context to fully and properly understand its mechanism and effects.

One of the effects of the multi-national consumerism of the Atlantic trade is African consumption driving the development of new European manufactured goods specific to that market. A prime example of this are the thousands of brass manillas discovered among the remains of the Elmina Wreck site. Although their exact origin remains a mystery, it is believed that manillas, or at least ring-shaped currencies, had reached West Africa prior to the arrival of Europeans in the fifteenth century.[165] They were used as a medium of exchange in the western Sudan as early as the 11th century A. D., while archaeological findings dating to the 13th century have been discovered at Igbo-Ukwu and Benin (Herbert 1984:200-201; Conah 1975; Shaw 1970). Conversely, in Europe, manillas have no precedent, having never been used as currency or mass produced prior to the Atlantic trade. The manillas produced by Europeans throughout the Atlantic trade, however, stand in stark contrast in both shape and size to their African counterparts. Therefore, the development of the manilla is best understood as an amalgamation of African and European ideas.

Faced with the challenge of establishing an unknown trade with yet-unknown peoples, the first Portuguese venturing south filled their holds with the same goods that had been part of the Moor controlled trans-Saharan trade for centuries. It is to this strategy that the manilla owes its rapid success as a trade item. According to Herbert (1984:201), "it seems reasonable to suspect that peoples on the Gold Coast and at Benin, and perhaps those farther east as well, were eager to accept rings as both a money of account and an actual currency, in the early decades of European trade, precisely because their contacts with the north had already made rings thoroughly familiar." Though figures from this time period can be scarce, those that have survived suggest a degree of demand and immediacy that is astonishing and appear to support Herbert's suspicion. As early as 1494-1495, the Portuguese factor in Flanders supplied as many as 71,000 manillas in a single year (Vogt 1979:76). Between 1504 and 1507, the factor at Elmina accounted for 287,813 manillas received and an additional 67,095 were received at Axim in a seventeen month period from May 1, 1505 to September 30, 1506. Six years later,

[165] Several stories accounting for the origin of the manilla can be found in Talbot (1967:282-283)

302,920 manillas, or approximately 94.5 tons, were inventoried at Elmina (Herbert 1984:126).

At this scale, the import of metal to West Africa would have not only had enormous effects on indigenous economies but also on European production as a whole. In order to maintain a monopoly on the African trade, the Portuguese, who produced neither copper nor finished wares themselves, were forced to depend on imports from other areas (da Mota and Hair 1988:27). This contingency inherently linked the West African gold trade and East Indies spice trade with the expansion of the south German copper industry and the rise of Antwerp. By 1500 Antwerp had already surpassed Venice and Bruges as chief supplier of copper to the Portuguese crown (Herbert 1984:130).

Antwerp's ascension to the premier commercial center of Europe was closely linked to its position as a conduit of copper. Not surprisingly, many of the great merchant princes who dominated the city's political and economic power in the early sixteenth century came from the traditional centers of copper and calamine production in Belgium and the Lower Rhine (Herbert 1984:131). In the sixteenth century, one family in particular, the Fuggers, would become nearly synonymous with the city's control of the south German copper trade, their involvement mirroring Antwerp's rise to prominence. Between 1497 and 1515, the percentage of all Hungarian copper exported by the Fuggers that went to Antwerp rose from 0.5 % to 62% (van der Wee 1963 Vol.III:66-67). It is estimated that by 1527 the Fugger stockpile of cuprous items in Antwerp amounted to roughly 1,850 tons (Herbert 1984:131); in 1548 the Fuggers agreed to supply Portugal with 432 tons, or approximately 1.4 million, cast brass manillas over a 3 year period (Alpern 1995:13; Garrard 1980:105)

The manilla was produced from European raw materials, in European foundries, by European craftsmen. However, its development, long-term production, and effects on European economies cannot be fully explained unless contextualized within its complete cultural milieu, which includes African consumers fully entrenched in the Atlantic trade. The open-ended, flared ringlet design was a European adaptation to an African simulacrum. Though different, the enormous success of the design hinged upon African familiarity rooted in the pre-European northern trade. As a currency, its demand grew rapidly and seemed insatiable—the effects were far reaching. In Europe, complex global trade relations sprang forth from the movement of copper; fortunes were made and cities rose as the economic power and the seat of trade began to reorient north along the Atlantic littoral away from the Mediterranean. While it would border on the preposterous to ascribe such complexity solely to the development of the manilla, it is reasonable to suggest that it did have a significant effect as one of the leading cuprous items traded by Europeans in West Africa during the sixteenth century. In fact, so closely linked was Portugal's African trade to its copper sources in Antwerp that it has been surmised that the closing of its Flanders factory in the middle of the sixteenth century played a major role in her ultimate demise on the Gold Coast (Vogt 1979:211).

The brasswares recovered from the Elmina Wreck site offer another example of African consumption as the driver of European production. It has largely been assumed that the use of the spinning process in the mass production of brass hollowwares was a nineteenth century innovation. (see Day 1991:177). Spinning—the process by which a flat metal disk is forcibly shaped into a hollow form as it is leveraged against a rotating chuck—applied the mechanical advantage of the industrial revolution to the mass production of brasswares. Prior to this innovation, each piece of brass had to be painstakingly hammered into its desired shape, hence the term batteryware. Although mechanized water-driven hammers, like those employed in many of Europe's larger copper houses, increased productivity, the process remained cumbersome. Pieces produced using the battery method were often pock marked, requiring additional time and labor if a smooth finish was desirable. Conversely, a spun brass piece was formed faster, and, since it was not hammered, no additional smoothing was required.

The discovery of a large number of spun brasswares among the remains of the Elmina Wreck now challenges this assumption. Associated materials, including stylistically distinct pewter, brass manillas, clay tobacco pipes, and onion bottles, date the wreck sometime between the seventeenth and early eighteenth centuries, or as much as 200 years prior to the conventional date given to spun wares. Unfortunately, a dearth of both historical and archaeological records does little to explain the presence of such wares on our site. Much remains unknown concerning the manufacture, production, or even use of copper hollowares in seventeenth and eighteenth century Europe. Much of the work by historians has focused either on copper's economic history on a grand scale (e.g. Day 1990) or the technological development of mining and smelting (e.g. Tylecote 1976; Day 1991; Day 1995). Research on the British brass industry far supersedes those focused on the continent (e. g. Day 1973; Day 1991; Day 1995) and no work significantly explores either the use or form of copperwares during this period. The archaeological record is no better and likewise has contributed little. Until recently, the historical period has also suffered from a stigma placed by European archaeologists who view it as superficial in the larger frame of European history (see Johnson 2006:315; Gerrard

2003:170). In addition, as “non-disposable” items, copper goods leave little imprint on the archaeological record. Copper’s value meant that damaged wares were repaired instead of disposed and recycled when no longer mendable.

The erroneous belief that spinning developed in the nineteenth century is likely a product of a historiographical bias towards Britain, where the practice is most often associated with nineteenth century industrialization, particularly the Birmingham brass industry. In actuality, the technology necessary for mass production has existed for centuries. The earliest known examples of spunwares date to Roman times. The earliest evidence for spinning in the modern era can be found in a 1559 decree written by the Nuremberg Council. The decree, which addresses intellectual and technological property rights, makes several references to the guild of “Red-metal turners,” a group of craftsmen who produced turned objects of copper and brass (Klemm 1964:153-159). Sixteenth century woodcuts, seventeenth century Dutch still lifes, and eighteenth century French engraving also give testament to the practice prior to the nineteenth century (see Chapter Five). Even English metalworkers spun or “raised” hollowares as early as the seventeenth century and starting about 1770 it was used prominently in the production of Britannia metal in Sheffield (Day 1991:177).

It is clear then that by the seventeenth century European craftsmen possessed the technological knowhow to produce spun brass hollowares. What was needed was a market to provide the economic driver necessary to progress from small scale innovation to large-scale production. However, the European market for such wares would have still been relatively small as ceramics still ruled the domestic sphere. This market would have been better suited for localized craftsmen whose small markets did not require mass production; their scale of operation typically lacked the capital to invest in technological innovations. Spinning would have been of little use as is advantageous only in mass production where its speed markedly increases productivity. This, as well as other factors like reuse and recycling, are the likely reasons large quantities of brass spunwares do not appear in the European market until the nineteenth century. There was, however, one market available to European merchants in the seventeenth century in which spinning and its ability to rapidly produce large quantities of hollowares would have been very advantageous. This market was the west coast of Africa.

Between the second millennium B. C. and the late nineteenth century it has been estimated that between 50,000 and 100,000 tons of copper and brass were imported to sub-Saharan Africa (Herbert 1984:181). However, the bulk of this material came via Europe during the last 300 years of the Atlantic trade. Although a common trade item since Portuguese contact, the seventeenth century saw a substantial increase of copper imports into West Africa. By one account, this increase was a tenfold increase over peak Portuguese imports of the previous century (Ratelband 1953: xcix; Herbert 1984:133). Brass and copper hollowares were chief among these imports. Unlike the regional demand for manillas, ingots, and rods "pans, basins, and kettles of brass or copper were in almost universal demand from Senegambia to Angola during the seventeenth century" (Herbert 1984:136). Although their profit margins were often small, they were indispensable if trade was to be conducted at all (Herbert 1984:140). In 1610, a typical Dutch ship's cargo is said to have included some 40,000 pounds of copper basins, kettles, and other hardware (Daaku 1970:11; Porter 1974:76).[166] Although quantitative data for much of the seventeenth century is lacking, the few surviving records suggest this

[166] Averaging 20 vessels a year equates to an annual import of 400 tons of copper.

demand was sustained. In 1595, metalwares accounted for nearly half the total value of a vessel's cargo (van Gelder 1916 in Boogaart 1992:383).[167] Fifty years later, they accounted for 61% of Dutch imports used in the Bight/Angola slave trade, 45% of all trade conducted along the Ivory Coast to Cape Lopez, and 40% of a model cargo requested by the Factor at Elmina (Jones 1995:13).

From certain remains of the Elmina Wreck the physical evidence exists, in my view, too link the early use of spinning for the manufacture of hollowares to the expansion of the West African market. The large number of such wares discovered on a seventeenth century wreck provides indisputable evidence that the practice significantly pre-dates the nineteenth century. The large number of spun brassware on the Elmina Wreck suggests this breakthrough came when the technical capabilities of Europe were matched with the voluminous demands of the African copper market in the seventeenth century. In other words, it can be hypothesized that African consumption provided the economic motivation to drive certain kinds of European technical innovation, a hypothesis not without precedence. Especially in regards to the copper/brass industry, there are multiple examples of the effects of African consumption on European production. I discussed previously the links between Africa's demands, Portugal's copper goods supply, and Antwerp's rise as one of Europe's leading commercial centers in the sixteenth century. Likewise, Herbert (1984:146) has demonstrated how the eighteenth century growth of the English copper and brass industry mirrored that of its African trade. [168] Although technological innovations and regulatory changes

[167] This is the earliest known record of a Dutch cargo list.
[168] Like Portugal previously, insufficient domestic sources of copper forced English merchants to rely on foreign supplies, most notably from Amsterdam or Hamburg. A large percentage of these wares were purchased for reexport to the African market. However, by 1730 English domestic production was already

contributed to the coming worldwide dominance of British brass and copper, it was the growing African market, fueled by the intensified English slave trade that ensured demand and provided the necessary influx of capital needed for growth.[169] It is no surprise then that in the eighteenth century Bristol became both a major producer of English brass and one of England's leading slave ports (Herbert 1984:149; Craddock and Hook 1995:186; Williams 1961:83-84). It is not entirely fortuitous either that, Nantes, France's foremost slaving port, also became a center of brass manufacture (Sundström 1974:235).

6.3.3 The Structure of Trade: Through the development of the manilla and manufacture of spun brasswares, we have seen how African consumption helped shape European trade, nascent industry, and technology. West Africans also shaped the trade's entire structure. In contrast to the New World, where natural resources were forcibly extracted under colonial rule, West Africans participated in a free and equable exchange with Europeans. Regardless of European perceptions at the time, they were equal participants, fully capable of dictating its terms. From the beginning, Europeans were required by powerful African chiefs to pay rents on the land on which they built their forts and outposts. Such chiefs demanded large sums of tribute in return for trading rights and military alliances (Daaku 1970:33; de Marees 1987:57-58). African values, beliefs, and desires were as much responsible in determining both the items and terms of exchange as their European counterparts. Neither Portugal, Holland, or England

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well on its way to supremacy. Domestic exports continued to rise in response to Africa's growing demand while for the first time ever a steep decline can be seen in British reexports. And as the century wore on the industry continued in its deviation away from its established patterns. Although traces of the reexport trade lasted into the century's waning years, by 1750 it already was reduced to such levels that it was of little to no significance. All the while, domestic trade continued to grow and flourish.

[169] By the later decades, in terms of value, copper and brass were second only to textiles as constituents of slaving cargoes (Herbert 1984:303; Harris 1964:9-10; Richardson 1979:312-315).

possessed the capabilities to produce their own copper or copperwares when they entered into the African trade, yet each of these great European powers was forced to acquiesce to African demands rather than dictate their own terms more favorable to domestic staples. Often, Europeans had to face compromises in profit if they wished to conduct trade at all. In his account of the trade at Whydah, Phillips (in Donnan 1930 Vol 1: 404-405), prescribes that nearly half a vessel's cargo must be made up of cowries and brass basins even though their profit margins were quite low. For "without the cowries and brass they will take none of the [other] goods.[170] Far from being passive consumers, African buyers were both fastidious and fickle. "Clever and subtle in trading" it was said that "one can hardly supply or give them any commodity they want to buy without them wanting it to be changed two or even three times before they are pleased and satisfied with it." (de Marees 1987:55). Buyers were known to dump the contents of an entire barrel of manillas out, chose a single one, and reject the rest (Barbot cited in Herbert 1984:124). They also counted every bead in every string "and even if only one Bead is missing, one has to give it to them" (de Marees 1987:56). European merchants were also faced with frequent changes in local tastes. Ships' captains frequently complained of the "fanciful and various Humours of the Negroes, who make great demands one voyage for a Commodity, that perhaps they reject the next" (Atkins 1735:159 cited in Herbert 124). For example, while in 1645 linen, knives, beads, and iron bars were in great demand along the Gold Coast, just two years later these were replaced with manillas (Daaku 1970:38). Europeans also had to cater to regional peculiarities, as tastes differed from between tribes and locales. Thus according to Tilleman, (1994:9, 10, 18) "*perpetuaner,*

[170] A slave in cowries cost more than four pounds whereas a slave in coral rangoes, or iron cost less than fifty shillings (Phillips in Donnan 1930 Vol 1 404)

or *rask*, coarse canvas, iron, worked pewter or *manggolds*, brass pans and cauldrons, bracelets of metal, and Portuguese tobacco" were traded at the Gambia River, but on the Tusk Coast "one uses iron rods, basins, bracelets of metal, knives, course cloth, white glass beads, small casks made of poor quality *manggods*, and large fish hooks." Meanwhile, the Salve Coast peoples required "*Bossies* or *Snogepanders* [cowries], *Fufu* or very coarse Schleswig [Silesian] canvas, light iron rods, brass basins of a good one or one and one-half foots' width, pewter plates and pots of poor *manggods*, metal bracelets, large fish hooks, white beads or glass beads, and other large black dito [ditto] with white stripes on them, which are called *Conte Crebe*, stoneware mugs with lids of poor *manggods*, and quantities of ordinary cloth of low value" (Tilleman 1994:33-34).[171] On the Gold Coast, while the Asante favored red perpetuans, the Akyen preferred yellowish green, the Akwamu deep green, and the Aowin both red and green (Daaku 1970:39). Given such specificities, one captain warned that merchants who did not heed "might starve in one place with bales of goods that would purchase kingdoms in another" (Johnston, cited in Herbert 1984:124).[172]

Africans also openly rejected European attempts at monopolizing the trade. By 1500 several voyages to Guinea by Flemish, Spanish, and possibly Genoese merchants had already been undertaken despite Portugal's claim to monopoly (Blake 1977:37-39; Vogt 1979:12-18). In the sixteenth century, further pressure on Portuguese trade was exerted first by the French, and later by the Dutch and the English (Blake 1977:106). By

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[171] For a comparison of the Dutch trade and various goods required for trade in different parts of West Africa, see (Jones 1995:15). For a list of goods esteemed on Gold Coast not useful for trade in Whydah, see (Phillips in Donnan 1930 Vol 1:405). For a general discussion about regional variation, see (Herbert 1984:136-137; Daaku 1970:39-40).

[172] Although Johnston was referring to the Congo in the mid-nineteenth century, his comments might be said of any region or moment during the Atlantic trade (Herbert 1984:124)

the seventeenth century Dutch and French trade posts had been established in the Senegambia (Thilmans 1968:18; Wood 1967) and in 1612 the Dutch erected a fort on the Gold Coast at Mori (Mouri, Moure) just 16 km (10 miles) east of Elmina (Vogt 1979: 164-165; de Marees 1987:81-84; Feinberg 1989:30). In the seventeenth century, the competing European nations vested exclusive trading rights to newly-formed chartered mercantile companies. Like their predecessors, their attempts to monopolize trade were met with limited success and a brisk trade between African merchants and interlopers continued. Outmanned and in a foreign land, factors could do little more than complain. Willem Bosman (1967:57), who became chief factor at Elmina in 1698, recalled how "the *Negroes* of *Fantyn* drive a very great Trade with all sorts of Interlopers, and that freely and boldly in the sight of both Nations [English and Dutch]; neither of them daring to hinder it: For if they should attempt it, 'twould ruine them there, we not having the least Power over this Nation." In the eighteenth century, over 30 European forts, castles, and plantations representing seven different European nations could be found along the Gold Coast (Lawrence 1963; van Dantzig 1980).

The material remains of contemporary European merchant ships provide tangible evidence of Africa's capacity to dictate trade. In regards to the Elmina Wreck site six VOC ships—the *Campen* (1627), *Batavia* (1629), *Vergulde Draeck* (1656), *Lastdrager* (1653), *Kennemerland* (1664), *Adelar* (1728)—offer a means of comparison. All seven vessels were Dutch merchantmen, each was lost outward bound—the six VOC ships in transit to the East Indies, the Elmina Wreck site vessel as it neared the Guinea coast—and all sunk within a 100 year span of time between 1627 and 1728. Yet, in other ways, these vessels represented networks that were worlds apart. Physically separated by some 8000 miles, West Africa and Asia represented two very different global markets with two very different systems of exchange. In Africa, commodities were purchased through a complex system of exchange where European manufactured wares were bartered for Africa's natural resources. Understanding the need to have a diversity of imports and the fluid desires of the African merchants were key factors to successful trade. Although over 100 different items were said to have been traded along the coast in the seventeenth century, the majority of these can be lumped into seven or so main categories that account for an overwhelming majority of the trade. These include textiles, metalwares, alcohol, firearms, gunpowder, beads, and cowries. In contrast, the Asian trade was predicated on one thing and one thing only—silver. The Euro-Asian trade was a unilateral monetary exchange whereby luxury items from Asia such as spices, tea, coffee, drugs, and dye-woods were exchanged almost exclusively for European bullion. So great was "the necessity of Europeans to pay for Asian goods overwhelmingly in precious metals" that it has been described as the trade's "central defining characteristic feature" (Prakash 1987:84). By one estimate, "Dutch exports of precious metals to Asia accounted for between a half to two-thirds of the value of Asian products imported into Europe by the Dutch East India Company" (O'Rourke and Williamson 2002:27). However, even this may be too conservative. For example data from the eighteenth century, wherein records are more complete, suggests that non-bullion trade goods only accounted for 10-20% of total Dutch exports to Asia (Prakash 1987:85-86). An important implication of this unilateral exchange of money for luxury goods, or the "bullion for goods" model, as its been called, was that "as far as the Europeans were concerned, the profit from the trade was derived almost entirely from the sale of Asian goods in Europe rather than from the sale of European goods in Asia." (Prakash 1987:85)

Given the structural difference between the two trades it is not surprising that the archaeological records of the six East Indiamen stand in stark contrast to the Elmina Wreck site. From a functional standpoint, the largest component of the Elmina Wreck site's artifact assemblage can be classified as cargo. The site is littered with thousands of manillas, beads, and cowries while large stacks of concreted brass basins and pewter plates form the site's most prominent feature. In contrast, the assemblages of East Indiamen are largely composed of ship remains, stores, armaments, and personal items. Evidence of cargos is often confined to the recovery of a few domestic and utilitarian items—such as nails, brass pots and pans, and tobacco pipes—as well as coins, mercury, and pottery.[173] Only paying ballast such as lead, iron, or bricks are found in any great numbers.

The difference between the archaeological record of the Elmina Wreck site and those of the six VOC vessels is a manifestation of two very different systems of exchange. The large cache of European manufactured wares that characterizes the Elmina Wreck Site also characterizes the region's broader economic pattern. The barter of European-manufactured wares for African resources necessitated outbound captains to fill their holds, as profit was driven as much by the sale of European wares in Africa as it was by African resources in Europe or the New World. So too, the scant remnants of cargo on VOC sites characterizes the bullion for goods model of the Euro-Asian trade. As a result of the incessant demand of Asian merchants for specie, markets for European-

[173] Because of their low frequency it is often difficult for archaeologists to definitively assign such items a single functional category. As many of these items had multiple uses it is unclear as to whether they represent cargo, the ship's stores, or personal items.

manufactured goods never fully developed in the East. As a result, few manufactured goods were shipped east, and most of these were equipment and consumables to supply European outposts. This explains the relatively (especially in comparison to African traders) small number of such goods recovered by archaeologists working on VOC sites. It also explains the prevalence of large loads of "paying ballasts".[174] The high volume of silver shipped east actually took up very little of a ship's physical space. To minimize losses, consignments were divided amongst the many ships that sailed each year and a typical consignment of silver worth 25,000 guilders could be shipped in as little as 6 to 7 chests. Lacking a demand for manufactured wares, and unable to sail with an empty cargo hold, outward-bound East Indiamen were often laden with bulk freight used in the construction and operation of European outposts. For, in the East, a vessel's outward cargo was "incidental to the main purpose of the venture..for the most important commodity [she] carried was specie to purchase her return load" (Martin 2005:179).

The discrepancy between the two archaeological records is a visible result of European merchants meeting demands of two different markets. Each ship can be understood as a microcosm of the broader economic, political, and cultural processes in which it operated. Although all seven vessels were European, the processes that shaped these sites were cross cultural. By maintaining Dutch overseas trade as a constant and manipulating the cross-cultural influence, we can observe the degree to which these contacts influenced these processes. The fact that the wreck assemblages differ greatly suggests that the terms of exchange and items of trade were not imposed by, but rather upon, Europeans by their Asian and African counterparts. The assemblage of cargo from

[174] Difference between African bulk and Asian and misnomer of paying ballast/commodities Although bulk freight such as iron, copper, or lead were frequently shipped it would be wrong to characterize them as paying ballast as they are referred to in the Euro-Asian trade.

the Elmina Wreck site is the material expression of African agency. Equal and willing participants in the Atlantic trade, it is as much a reflection of European desire to mitigate a profitable and sustainable trade as it is a reflection of African values and desires.

6.3.4 Space and Place of the Benya Lagoon: Recently, archaeological and historical studies have added to our understanding of the development of the town of Elmina. The archaeological research by DeCorse (2001a) at Elmina has shed new light on a diverse range of topics including the pre-contact settlement, the founding of the *Castelo São Jorge da Mina*, changes in the town's demography, ethnic and cultural divisions, and its spatial boundaries. Yet, much remains to be discovered about the town, particularly with regards to the settlement's margins, associated shores, and the Benya Lagoon. Except for a few historical snippets, almost nothing is known about the Benya's history, use, and relationship to the town.

DeCorse (2001a:47) notes that, prior to the twentieth century, much of the interior of the Benya was choked with a tangle of mangroves and brush making it largely inaccessible and of little use to the local population. Unlike the city's current form—it sprawls along both sides of the Lagoon—for the majority of its past Elmina was confined to the peninsula on the Lagoon's south side. The town initially began as a small settlement adjacent to the fort and slowly expanded westward along the peninsula. Most of the land, including the peninsula's undeveloped western end and that north of the Benya, was covered with transitional forest while poorly drained areas and much of the Benya Lagoon were taken up with mangroves and thick brush (DeCorse 2001a:47). Mangroves and brush can be seen covering the western end of the peninsula in a depiction of the 1873 bombardment of the town by the *Illustrated London News* (reproduced in DeCorse 2001a:47, Figure 1.12). After the Old-town was bombarded and then razed, the area in front of the Castle was filled in with rubble and leveled for use as a parade ground. After 1873, British officials did not permit rebuilding on the peninsula and the settlement was relocated on the lagoon's northern side. Today's Benya is likely an outcome of this relocation. Nineteenth century plans of Elmina depict only narrow watercourses within the Benya, not the unimpeded, defoliated channel and large open saltpans visible today.

While much of the Benya may have been undisturbed, at least some portions were utilized and played a significant role in the town's early function as a marine entrepôt. The initial use of the Benya by Europeans may date back to 1478 to the capture of a fleet of eleven Castilian ships. According to one chronicler, their Portuguese attackers arrived at "the narrow entrance through which the ships of Seville had to emerge in order to enter the narrow sea" (Palencia 1970, cited in Hair 1994b:4). Although the location of this port remains unclear, it is possible that the narrow entrance may be an early reference to the mouth of the river Benya (see Hair 1994b:4-5, fn 53) and historical accounts do tell of its use by ocean-going vessels.[175] Its ability to provide a safe and sheltered place where vessels could be careened and repaired is cited as a primary advantage in why Elmina was chosen for the building of Fort St George (Feinberg 1989:27; Lawrence 1964:103; Vogt 1979:25). It was said to be "so deep that it serves as a harbor in which they [Portuguese] moor their Barks and used to unload their trade-goods" (de Marees

[175] Spanish and Portuguese ships sailing to and from Elmina in the fifteenth century were tiny by 17th century standards. *Caravelas, caravelões,* and *chalupas de San Vicente* were all probably around 50 tons or less.

1987:218-219).[176] After their capture of Elmina from the Portuguese in 1637, the Dutch used the river as a place to refit vessels. Being “10-11 feet deep at its mouth,” it was capable of receiving vessels of 100-120 tons (Barbot1992:374; also see Report of Jan Valkenburg Sept 1659, cited in Porter 1974:14).[177] This must have been an important function, for when the Dutch finally decided to span the river in the middle of the seventeenth century, they built a drawbridge so as to “let ships pass further up the river in order to refit” (Barbot 1992:380).[178]

The drawbridge marks the beginning of a series of modifications made to the course of the Benya during the Dutch period. By the late seventeenth century, construction was underway on a series of quays along the river’s southern bank near its mouth. In both a 1704 engraving and a 1780 plan, the riverbank appears artificially straightened, indicating a retaining wall stretching from the bridge to the river’s mouth.[179] At century’s end, the retaining wall was extended into the bay, forming a jetty, and the north shore was straightened and retained up to the bridge (Lawrence 1964:164, plate 13a; also see DeCorse 2001a:Figure 2.7).

The recent discovery of the Benya Lagoon vessel is both an affirmation of how little is understood about the function of the waterway in the town’s political, social, and

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[176] de Marees is actually describing what he calls a moat here but it is believed that he is referring to the Benya (see de Marees 1987:219 nn 4)

[177] Dapper wrote “Some years ago this river used to be 10 or 11 feet deep at its mouth; but now it is…almost dry and cannot be navigated by yachts which draw more then 4 feet” (Dapper cited in de Marees 1987:374 nn 7) this suggests that throughout history the level of the Benya was changing. It could have been silting up like it does today.

[178] The exact date built is unknown but it was likely between 1646 and 1682. Hammerson’s account—which was published in 1663 by his wife but likely written considerably earlier (probably 1645-1646)—of ferrying across states that “If one want to cross over it, one must be feried across an arm of the sea in a canoe placed there for that purpose by the moors” (in Jones 1983:131; also see Lawrence 1964:133). Barbot writes of bridge so it must have been erected between the two. Also 1664 drawing in Lawrence shows no bridge

[179] On his voyage in 1726 Smith remarked “Here [Elmina] they land upon a fine Key, which is built at the Entrance of a small River near the Castle” (Smith 1967:131)

economic structure and evidence for its role in this. Its discovery warrants a moment of reflection upon our historical epistemology. How does something as large and significant as a ship go seemingly undocumented in the town's history…especially given the site's close proximity? What else has been lost? How reliable is the surviving documentary evidence? Clearly, we have much to learn, not only about the Benya Lagoon, but also about how to study it. The archaeological study of the Benya Lagoon vessel affords us an opportunity to explore both. The wreck represents the first material remains of the Lagoon's role in the local political economy. By analyzing the ship's timbers we have begun to identify key attributes of this event. Dendrochronological analysis dates the wood to the first quarter of the eighteenth century with a north German provenience. The timbers suggest a reliance on treenail fastening, non-interconnected timbers, and the appearance of a hard chine. Taken together with contextualizing historical data, the evidence is very characteristic of a small, Dutch-built vessel of the early eighteenth century. Its presence, however, is evidence of the macro cultural processes that shaped this event. Thus, understanding how this vessel fits into both the maritime landscape and the broader and more encompassing cultural landscape is essential. Currently, there are three hypotheses as to the vessel's function and subsequent deposition—trade, discard, and defense.

The remains of the vessel discovered in the Benya Lagoon may represent those of an early hulk used for trade.[180] Although, most commonly associated with the palm oil trade and the Niger Delta in the nineteenth century (see Cowan 1935; Davies 1976:38;

[180] Hulk here refers to any old sailing ship permanently moored in a river and used as a base of trade. Often times these vessels, which had their masts dismantled and were roofed, were simply left to rot in place once they were no longer needed. It should not be confused with the large, round-bottomed European ship type commonly used to carry bulk freight in the sixteenth and seventeenth century.

Lynn 1981:333; 1989:230), it is possible that hulks may have been employed elsewhere on the coast much earlier. Alongside that conducted at the various European forts dotting the coast, shipboard trade was commonly practiced throughout West Africa from the time of European arrival onwards. The early use of hulks may have been an attempt to combine the advantages afforded by both forms of trade. A worn vessel placed upriver could have provided a safe, secure, and permanent trading presence without the costs incurred and time lost to building a land-based trade outpost or fort.

A second hypothesis is that the Benya Lagoon vessel functioned as a temporary defensive redoubt that was either destroyed during an attack, deserted in favor of a more practical and permanent land-based defensive position, or simply abandoned. The defense of the town has been an important factor in the development of Elmina from its founding with the construction of the *Castelo de São Jorge da Mina* by the Portuguese in 1482. Spurred by the increased level of trade afforded by a permanent European presence, a small town grew within the shadow of the castle. To further protect the settlement, the Portuguese erected a wall across the western end of the peninsula (Figure 6.2). This wall, visible on town plans from 1637 and 1647, may date to the second half of the sixteenth century. Atop Fort St. Jago Hill the Portuguese also constructed defensive earthenworks in anticipation of the Dutch attack of 1637. These, however, did little to prevent the town's capture. In that year the Dutch captured the hill, forcing the town's surrender.

The buildup of the town's defenses continued during the Dutch period. Sometime after the middle of the seventeenth century, the Dutch built the first bridge built across the Benya Lagoon. It was described as having "a large guard-house" on one end and "a break in the middle both for security of the place and to let ships pass" (Barbot

1992:380).[181] Around the same time, the Dutch also decided to replace the low earthenworks atop Fort St. Jago Hill with a stone garrison, christened Fort Coenraadsburg. Initially built in 1666, it was expanded in 1671. In the late eighteenth century, as the town continued to expand, a series of minor defensive redoubts were constructed in the outlying areas to protect its sprawling population. For the most part, these were small gun emplacements, mounted with only a few cannon and sparsely manned. The first of these, Fort Beekestein, was constructed in 1792-93 near the edge of Benya Lagoon, west of St. Jago Hill. On the settlement's northern fringe, the Dutch

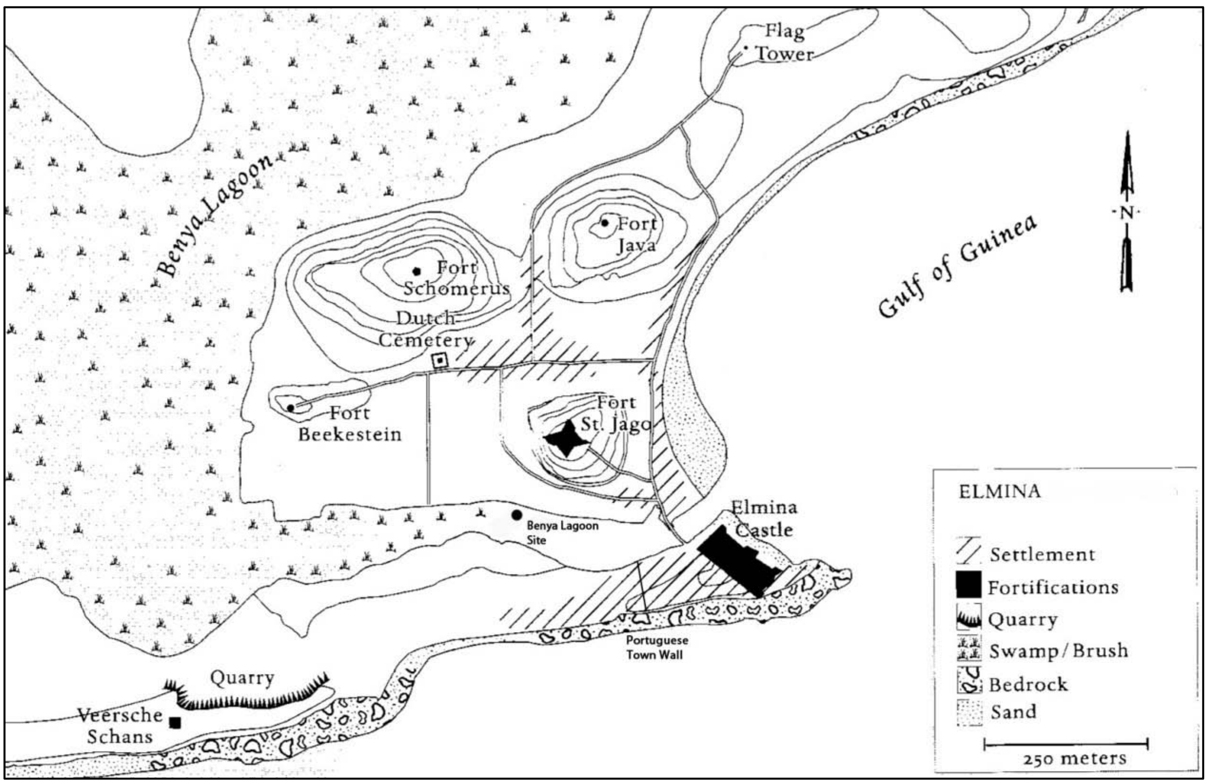

Figure 6.2 Map showing the location of the Benya Lagoon site in relation to fortifications (adapted by A. Pietruszka 2010 from DeCorse 2001:53, Figure 2.6)

181 It appears that the security aspect of bridge remained into nineteenth century when J.A. de Marees (1818, translated in Feinberg 1969:117) noted "a bridge with a gate, serving for a sort of barrier, so that no foreign negroes can come into the village"

constructed a watch tower. Standing on a low rise it commanded a sweeping view of the settlement's northern approach. Just west of the Old-Town beyond the Portuguese wall, a tower called *Waakzaamheid* was erected during the Fante siege in 1811. Perhaps erected hastily, it quickly fell in to disrepair and had to be replaced sometime between 1817 and 1829. Two more defensive strongholds, Fort *Schomerus* and Fort *Nagtglas*, were built in the 1820s on the two hills north and northwest of St. Jago.

Given this longstanding history of the Europeans' investment for the town's defense, the possibility of the Benya Lagoon vessel functioning as a more permanent defensive redoubt does not seem farfetched. Positioned west of St. Jago Hill on the river's north bank, the vessel would have commanded a strategic perspective advantageous in the defense of several key Dutch holdings. At the beginning of the eighteenth century, the settlement slowly began to expand into the lands north of the Benya River. Cultivated lands here included the Dutch West India Company's gardens, in addition to tracts belonging to private individuals. At the foot of St. Jago Hill lay the garden of the Director General complete with "walks lined with orange and lemon trees, palms…It produc[ed] a large quantity of vegetables, herbs, roots, salads and grains from Europe." (Barbot 1992:380-381). In this period, the settlement's first houses outside of the peninsula also began to be erected. Clustered along the coastal road (present day Liverpool Street), several of these were impressive buildings of stone and bricks constructed by wealthy Dutch and Mulatto merchants. Nearby was the company's shipyard, its sheds of maritime stores, and vessels undergoing refit, hauled over and lying prone on the Benya's north shore. Although likely too impractical to be a long-term solution, in the first quarter of the eighteenth century a ship moored upriver may have provided the extra measure of safety needed as settlers slowly expanded north of the river. Atop tall masts, its crow's nest would have afforded lookouts commanding views of the surrounding area while its guns could be sounded as a warning or, if need be, used to fire upon an advancing threat.

A third hypothesis is that the remains are those of an abandoned ship. Often vessels that have outlived their utility or become economically impossible to maintain or field are either broken up or abandoned. This is a long-standing, cross-cultural, and common practice and for the overwhelming majority of watercraft, their most likely fate.[182] In order to avoid navigational hazards, derelict vessels were often disposed of in areas peripheral to shipping such as backbays, feeder streams, and 'abandoned' waterways in inner harbors (Babits et al. 1995; Babits and Kjorness 1995; Shomette 1995:7). Ship graveyards are often associated with ports that have a high concentration of watercraft-based commercial activities, "major areas of discard tend to congregate adjacent to main or premier ports", and historic examples suggest a link between areas of ship breaking and shipbuilding (Richards and Staniforth 2006:90; also see Pastron and Delgado 1991; Richards 2008; Rodgers et al. 2006).

The area of the Benya Lagoon where the vessel's remains were found fits this model perfectly. Historically considered a bywater, prior to the twentieth century, much of the Benya remained choked. Overgrown with mangroves and brush it was largely unnavigable and the site's location upriver posed no hazard to navigation. At the beginning of the eighteenth century, the adjacent town of Elmina was the preeminent Dutch port in West Africa. As the administrative center for the Dutch West India

[182] The prevalence of this practice is best demonstrated in regional surveys. For example "abandonment of old or useless vessels provided the largest category of historic vessel resources in Chesapeake Tidewater" (Shomette 1995:7).

Company's entire West African trade, it enjoyed a steady stream of vessels. Between 1701 and 1725 at least 275 company ships visited the coast, and most, if not all, would have called at Elmina (den Heijer 2003b:144). In addition to being a seat of trade and governance, Elmina was also the company's only functioning shipyard on the coast and a principal location for refitting (see Barbot 1992:380).

In addition to the hundreds of WIC vessels that visited the coast came an even greater number of Dutch interlopers.[183] It is estimated that between 1674 and 1730 some 800 to 850 interlopers sailed to West Africa (Paesie 2008:412).[184] The influx of contraband goods carried by these vessels had a ruinous effect on the profitability of the company's trade and the WIC fought hard to suppress them. During the last charter period (1700-1730), cruisers were stationed almost permanently on the coast and skirmishes between the two were frequent—e.g. between 1698 and 1724, nineteen sea battles between company ships and interlopers cost the lives of 150 WIC sailors (Paesie 2008:413). In 1718, two interlopers attacked and sunk the frigate *Faam* of the coast of Angola (den Heijer 2003b:147). Not all patrols, however, were fraught with such peril and many were met with great success. Between 1674 and 1730, 98 interlopers were seized by company cruisers (den Heijer 2003b:148).[185] Once captured, vessels suspected of illegal trading were taken to Elmina for trial. If found guilty the vessel and cargo were confiscated by the WIC. While most of these vessels were either commandeered for company service or sent home to be auctioned, a small number were deemed unfit and incapable of a return voyage. For example, the *Swarte Arent Galeij*, captured on the Rio

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[183] The illegal trade was at its peak from 1685 to 1720 (Paesie 2008).

[184] In the eighteenth century interlopers outnumbered company ships nearly two to one; Paesie (2008) has traced 725 of these runs.

[185] Between 1700 and 1730, they also accounted for the capture of 90 illegal Portuguese traders (Paesie 2008:414).

Gabon by the WIC cruiser *Jacoba Galeij,* arrived in the Elmina roadstead on January 29, 1715. Having been found guilty, the cargo including twenty slaves, was confiscated and the ship, described in court trial papers as ‘old’, was demolished. While no further details as to the exact location of the vessel’s final resting place are mentioned, it was certainly not far from Elmina (Paesie personal communication 2010). Although it is premature to conclude that the Benya Lagoon site is in fact the remains of the *Swarte Arent Galeij*, its story nonetheless corroborates a plausible explanation for the presence of the vessel in the lagoon.

The vessel’s discovery definitively proves that Europeans were utilizing the Benya Lagoon at this time and it suggests that the waterway had a significant role in the town’s function as the premier Dutch maritime trade entrepôt on the coast. The site proves that large ocean-going vessels could and did enter the Benya; moreover, its position, approximately half a mile upriver, likely delineates the extent of the river’s navigation in the first quarter of the eighteenth century.

EPILOGUE

Using a multiscalar approach I have investigated two historic shipwrecks associated with the leading European trading entrepôt located at Elmina, Ghana. As both sites were unidentified, I sought an explanatory model in large-scale cultural processes as the basis of my site interpretation. In the case of the Elmina Wreck site, individual artifacts were contextualized in our understanding of the manufacture and consumption of European trade goods over the last 600 years. Notably, stylistic trends in pewter production provided a definitive date range for the vessel. This is supported by the manufacture process evident in the large number of brass hollowares recovered and the range of production for other associated artifacts. Several items recovered from the site including—pewter basins, tobacco pipes, and yellow bricks—are of Dutch origin while the composition of the entire assemblage is consistent with surviving seventeenth century trade lists for West Africa. Taken together with the vessel's close proximity to Elmina, the seat of Dutch trade in the region from 1637-1871, these determinations suggest that the vessel was Dutch. Coincidently, the only vessel known to have been lost in the immediate vicinity of Elmina matches this profile precisely. In 1647, the WIC vessel *Neuw Groeningen*, newly arrived to the coast, caught fire and sunk in the Elmina roadstead. The blaze began when a cannon, fired in salute of her arrival, exploded. Although a positive identification of the site remains impossible, a mounting degree of circumstantial evidence points to the *Neuw Groeningen* as the most likely candidate for the identity of the Elmina Wreck site.

Similarly, the Benya Lagoon site was interpreted with regards to the European timber trade, regional shipbuilding techniques, and an emerging European international arms trade. Dendrochronological analysis of the ship's timbers recovered from the site revealed that the vessel was constructed sometime during the first decade of the eighteenth century from North German oak. An examination of the lumber imports and shipbuilding policies of France, England, and the United Provinces demonstrates how each maritime tradition developed a strategy for procuring the wood needed to construct its ships. The combination of a complex array of factors including access to natural resources, political policies, trade relations, and cultural prejudices made each strategy distinctive. This information leads me to conclude the vessel was constructed in the Netherlands. This conclusion is supported by specific characteristics of the vessel's construction. A reliance on treenail fastening, non-interconnected framing timbers, and a hard chine are all characteristic of the Dutch-flush shipbuilding technique (Batchvarov 2002:121; Hocker 2004:83; Hoving 1988a:217, 1991:79, 1992:37, Maarleveld et al. 1994:24; van Yk 1697:70; Green 1991:70; Oosting 1991:73). Lastly, the three guns recovered alongside the timbers were cast at the Swedish foundry in Finspong and date to the middle of the seventeenth century. Amsterdam being this foundry's central distribution point, "finbankers" were commonly used in the arming of Dutch vessels. The gun's weight, marked in Amsterdam pounds found on the basal ring of each cannon, further suggests they were for use on a Dutch ship.

The validity of using such an approach to contextualize unidentified events preserved in the archaeological record is supported by the most recent data from the Elmina Wreck site. At the end of 2010, five samples of wood discovered in cores taken at the wreck site (see DeCorse et al. 2009:89-91; Horlings 2009, in progress) were radiocarbon dated using AMS.[186] Using a two-sigma calendar calibration (the most conservative figure that shows a 95% probability of the date within these ranges), a date range of 1642-1664 was calculated for the samples. These results are congruent with my previous interpretation of the site based solely on artifact analysis contextualized with large-scale cultural processes of production and consumption. Additionally, this narrow date range further suggests that the Elmina Wreck site is likely the remains of the *Neuw Groeningen* lost in 1647.

Conversely, the specificity of the event affords a detailed vantage point for the examination of large-scale social processes. For example, the many varieties of brass hollowares discovered at the Elmina Wreck site suggest that a recast model to account for the use of these items in the West African trade is overly simplistic. Alternatively, it indicates a primary function relating to their forms as containers and tells something of the purposes that drove African demand and consumption. The manillas recovered from the site were both the product of European manufacture and the outcome of African demand. Made by the billions hundreds of years before the conception of the assembly line and modern mass production, they undoubtedly required significant capital investments. Manufactured solely for the West African market, they poignantly demonstrate the West African consumer's influence in shaping Europe's social, political, and economic processes. A similar case can be made for the spun brass hollowares. Hitherto, largely viewed as the product of a nineteenth century technique, such hollowares manufactured by a spinning process can now be dated to the seventeenth century. The presence of such a large cache among the remains of a seventeenth century West African trader suggests African demand may have been the driving force behind the

[186] Radiocarbon dating was carried out by Beta Analytic Radiocarbon Dating Laboratory

development of this technical innovation. The cross-cultural milieu of consumerism and the role West African agency played in shaping the structure of African/European relations during the Atlantic trade is further demonstrated when the artifact assemblage of the Elmina Wreck site is compared to those recovered from contemporary Dutch wrecks involved in the Asian trade. The stark contrasts between the two are the result of European merchants having to accommodate the demands exerted by two very different economic systems. Finally, the accidental discovery of the Benya Lagoon site highlights just how little is understood about the Lagoon's role in the town of Elmina's function. Although its use for the careening and refitting of vessels is noted in historical accounts, their validity was unproven. It had been assumed that until the twentieth century most of the lagoon was overgrown with mangroves and brush. Consequently, maritime activity was confined to the river's mouth adjacent to the castle. The presence of a relatively large eighteenth century vessel upriver now suggests otherwise. Although the intent behind the abandonment of this vessel remains a mystery, its placement in an area of restricted access must have been intentional and sanctioned.

In the future, two factors will greatly enhance the ability of these two sites to further our understanding of the large-scale social processes entangled within African/European relations on the Gold Coast during the Age of the Atlantic. The first is further excavations. It is estimated that less than ten percent of the Elmina Wreck site has been excavated and many of the artifacts so far recovered have proven to be intrusive. This is likely due to the concentration of finds recovered from surface collection and our inability as yet to penetrate into the site's lower strata. In many of the units excavated in 2007, a hard layer of concretion was encountered within the first half meter that prevented further digging. In other units, especially those on the site's eastern side, cultural remains were recovered as deep as two meters. These units were not excavated further for fear of collapse; a sterile layer was never encountered suggesting still deeper cultural deposits remain. Core samples taken at the site in 2007 and 2009 also suggest deeper cultural deposits, including remains of the ship's timbers, lie protected under this layer (DeCorse et al. 2009: 89-91; Horlings 2009, 2011). Although excavations indicate the site's boundaries along the north/south axis, its east/west extent remains unclear.[187]

Even less is known about the Benya Lagoon site. Discovered accidently, no excavations have been undertaken at this time. The entirety of information regarding the site has been gleaned from fourteen fragmented timbers and three cannon recovered from a trash pile. However, due to the small amount of timbers contained within the dredge spoil I believe that only a small portion of the vessel's remains may have been disturbed by the excavator. The channel was only dredged to a depth of twelve feet and any cultural deposits below this level are likely to have survived. Furthermore, the site was discovered along the northern flank of the dredge channel, meaning that a large portion of the vessel may still be buried under a thick layer of protective sediment near shore. Additional excavations at both sites will likely yield a wealth of information that can further contextualize our interpretations while allowing for greater extrapolations about the cross-cultural milieu of the Atlantic trade.

The second factor is establishing a positive identification for either site. The material record of the *Groeningen*, a fully laden inbound WIC trade ship dating from the middle of the seventeenth century, would contribute immensely to our understanding of a

[187] An approximate boundary can be established based on cores taken in 2007 and 2009, but these have yet to be tested with excavations.

time period where similar appraisals by historians have been thwarted by the irregularity of documentation concerning European merchandise (Postma 1990:103; Boogart 1992:373). The material record potentially contained in this site is a potentially rich complement to the trade accounts contained within the Elmina day registers published by Ratelband. [188] Personal items found among the remains may reveal how company employees mitigated the stresses of distant enterprise in a foreign and unforgiving land. Similarly, connecting the remains of the vessel discovered in the Benya Lagoon can be connected with the *Swarte Arent Galeij*, this could provide a wealth of information regarding the little understood interloping trade. Being illegal, the accounts of interlopers operating on the coast largely went unrecorded in the documentary record; shipwreck sites therefore offer one of the best avenues into understanding such illicit trade (see Lenihan 1983:58; Murphy 1983; Schmidt and Mrozowski 1983). The *Swarte Arent Galeij* was fitted out by Robert Pantoune, a Scottish merchant who lived in Verre, Zeeland; yet the remains in the Benya Lagoon appear to have been constructed in the Dutch-flush style of northern Netherlands. The implication of this discovery would suggest a highly reticulate trade intermixed between shadow and formal economies. While interloping has usually been associated with Netherland's southern provinces, they may have operated with the sanction of Northern shipwrights. Many other sectors of the formal economy were also likely involved with illicit traders. Captains and crews moved unencumbered between parallel economies as freely as they did ships, while merchants would have profited from the sale of goods exported and imported.

To a large extent the questions that confront studies of shipwrecks are problems of scale: how do we move from the minutia of cargoes and the specificity of an event to

[188] Coincidently, the last entry in the registers tells of the *Groeningen's* sinking.

wider social processes? Methodologically, how do we decide what data are to be collected and evaluated? Conceptually, we must decide what we seek to understand from our studies. My answers to these questions have led me to adopt a multiscalar epistemological framework for my research. A multiscalar approach to the archaeological study of historic shipwreck sites provides first, a detailed analysis, secondly a wider interpretation, finally extrapolation to macro-scale economic and cultural processes operating over space and time. This is accomplished by recognizing the recursive and self-similar properties inherent in culture and history. No event takes place in isolation; rather, they occur in a cultural milieu where social action is linked dialectically to encompassing large-scale cultural processes through an iterative feedback loop. These processes are the long-term and large-scale combination of actions, objects, and space, which themselves are created and defined by the normative property of these processes. Each event is the product of its environment; each environment, the sum of its events.

Shipwreck sites afford archaeologists with unique access to the specificity of the event. Due to their synchronic nature, they are often viewed as time capsules and items rarely discovered in terrestrial contexts can be found, well preserved and even abundant, on maritime sites. In the past, efforts to document such sites often resulted in studies aptly criticized for being overly particularistic. Using a multiscalar approach, however, can provide the mechanism by which we can move beyond the particulars of the event and the minutia of the site to the study of the cultural processes in which these events were embedded and of which they are revealing markers.

APPENDIX A: SELECTED FINDS FROM THE ELMINA WRECK SITE, 2007

Unit level	Cowries	Manillas	Ceramic (sherds)	Glass sherds (min vessel count)	Pipe bowl	Pipe Stem	Pewter caps	Brick (yellow) fragments	Brick (red) fragments	Faunal	Misc Small Finds
F11-1	0	0	0	1 (1)	0	0	0	0	0	0	0
F11-2	48	0	0	0	0	0	0	0	0	1	0
G11-1	0	0	0	0	0	0	0	0	0	0	0
G11-2	42	0	0	5 (5)	0	0	0	0	0	0	0
G11-3	337	0	2	12 (9)	1	1	0	0	0	1	0
G11-4	31	0	0	2 (2)	0	0	0	0	0	0	0
G11-5	0	0	0	0	0	0	0	0	0	0	0
H11-1	0	0	0	0	0	0	0	0	0	0	0
H11-2	2	0	0	1 (1)	0	0	0	0	0	0	0
H11-3	5	1	1	4 (3)	0	0	0	0	0	0	2 lead sheathed wood
H11-4	189	0	2	18 (9)	0	1	0	0	0	1	0
H11-5	259	1	0	28 (4)	1	2	0	1	0	0	0
H11-6	274	7	3	10 (6)	1	2	0	1	0	1	0
I11-1	1	0	0	0	0	0	0	0	0	0	0
J11-1	100	4	0	3 (2)	0	0	0	3	0	0	0
J11-2	65	35	0	12 (5)	0	0	1	0	0	1	0
K11-1	94	105	0	3 (2)	0	1	1	0	0	1	0
K11-2	44	70	0	0	0	0	0	0	0	0	0
L11-1	71	16	0	52 (3)	0	0	0	0	0	1	0
M11-1	30	9	0	0	0	0	0	1	0	1	0
M11-2	61	100	1	2 (2)	0	0	0	3	0	0	0
N11-1	68	44	0	1 (1)	0	0	0	0	0	0	0
N11-2	31	120	0	1 (1)	0	0	1	0	0	0	0
O11-1	98	34	1	4 (2)	0	0	2	0	0	0	0
O11-2	128	38	0	5 (4)	0	0	0	1	1	1	0
P11-0	0	0	0	0	0	0	0	0	0	0	0
Q11-0	0	0	0	0	0	0	0	0	0	0	0
R11-1	32	12	2	2 (2)	0	0	0	9	0	0	0
R11-2	127	33	0	7 (4)	0	2	0	0	0	0	0
S11-1	1	0	0	0	0	0	0	1	0	0	0
S11-2	0	0	0	0	0	0	0	2	0	0	0
T11-1	0	0	0	0	0	0	0	0	0	0	0
U11-1	0	0	1	1 (1)	0	0	0	1	0	0	0
U11-2	1	0	0	0	0	0	0	0	0	0	0
U12-1	0	0	0	0	0	0	0	0	0	0	0
U12-2	4	0	0	0	0	0	0	0	0	0	1 lead cloth seal
U13-1	0	0	0	0	0	0	0	0	0	0	0
U13-2	20	0	1	1 (1)	1	0	0	0	0	0	0
U14-1	0	0	0	0	0	0	0	0	0	0	0
U14-2	5	0	0	0	0	0	0	0	0	1	0
U14-3	0	0	0	0	0	0	0	0	0	0	0
U14-4	0	0	0	0	0	0	0	0	0	0	0
U14-5	468	4	0	5 (5)	0	0	0	0	1	1	1 grey slate
U14-6	198	1	0	1 (1)	1	0	0	0	0	0	1 fish hook
U14-7	632	2	0	1 (1)	0	0	0	0	0	0	1 wound wire head brass pin
U15-1	0	0	0	0	0	0	0	0	0	0	0
V11-1	1	0	0	0	0	0	0	0	0	0	0
W11-1	0	0	0	0	0	0	0	0	0	0	1 lead cloth seal
W11-2	5	0	0	1 (1)	0	0	0	0	0	0	0
X11-1	0	0	0	0	0	0	0	0	0	0	0
X11-2	0	0	0	0	0	0	0	0	0	0	0
Y11-1	0	0	0	0	0	0	0	0	0	0	0
Y11-2	0	0	0	0	0	0	0	0	0	0	1 iron grapple hook
Y11-3	0	0	0	0	0	0	0	0	0	0	0
Z11-1	0	0	0	0	0	0	0	0	0	0	0
Z11-2	0	0	0	0	0	0	0	0	0	0	0
AA11-1	0	0	0	0	0	0	0	0	0	0	0
AA11-2	0	0	0	0	0	0	0	0	0	0	0
AA11-3	21	0	0	0	0	0	0	2	0	1	0

APPENDIX B: MODERN INTRUSIVE ITEMS ENCOUNTERED DURING EXCAVATION, ELMINA WRECK SITE, 2007

UNIT/LEVEL	IINTRUSIVE MODERN ITEM
F11-1	nothing recorded
F11-2	nothing recorded
G11-1	nothing recorded
G11-2	rubber hose piece
G11-3	fluorescent light bulb fragment
G11-4	nothing recorded
H11-1	nothing recorded
H11-2	nothing recorded
H11-3	cloth/string/plastic wrapper
H11-4	plastic button/plastic wrapper/ 7-up bottle frag
H11-5	string/cloth/plastic wrapper
H11-6	fabric/plastic fragment
I11-1	lead fishing weight/PVC pipe
J11-1	nothing recorded
J11-2	nothing recorded
K11-1	rubber gasket/plastic/fishing weights
K11-2	tin pot/fishing weights
L11-1	tin pot lid
M11-1	fishing weights
M11-2	rubber seal/fishing weights
N11-1	battery/fishing net
N11-2	fishing weights
O11-1	Jordache Button/fishing weight
O11-2	fishing weight
P11-0	nothing recorded
Q11-0	nothing recorded
R11-1	plastic gasket/fishing weight
R11-2	rubber/glass tumbler
S11-1	nothing recorded
T11-1	nothing recorded
U11-1	nothing recorded
U11-2	nothing recorded
U12-1	nothing recorded
U12-2	nothing recorded
U13-1	nothing recorded
U13-2	fishing weight
U14-1	nothing recorded
U14-2	nothing recorded
U14-3	nothing recorded

U14-4	nothing recorded
U14-5	piece of plastic bag/plastic/plastic clip/fishing weight/fishing net
U14-6	nothing recorded
U14-7	nothing recorded
U15-1	nothing recorded
V11-1	plastic wrapper
W11-1	nothing recorded
W11-2	shirt
X11-1	nothing recorded
X11-2	2 plastic wrappers
Y11-1	nothing recorded
Y11-2	elastic band/plastic spoon
Y11-3	nothing recorded
Z11-1	nothing recorded
Z11-2	nothing recorded
AA11-1	nothing recorded
AA11-2	large iron staple
AA11-3	plastic razor top

APPENDIX C: DATE RANGES FOR SELECTED FINDS FROM THE ELMINA WRECK SITE, 2007

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2004 *'Een bedroefd, en beclaaglijck ongeval:' De wrakken van de VOCschepen Oosterland en Waddinxveen (1697) in de Tafelbaai.* Walberg Pers, Zutphen.

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1974 *Oriental Ceramics at the Cape of Good Hope, 1652-1795.* Balkema, Rotterdam.

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1967 An Archaeological Appraisal of Early European Settlements in the Senegambia. *Journal of African History* 8:39-64.

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1996 Sexual differentiation of *Crassostrea tulipa* in two contrasting brackishwater environments. *Journal of Molluscan Studies* 62:135-137.

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1986 Elmina and Greater Asante in the Nineteenth Century. *Africa* 56:33-52.
1990 *Asante and the Dutch 1744-1873*. Clarendon Press, Oxford.

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1990 An Interpretive Study of the Use of Land and Space on Lot 83, Annapolis, Md. *Maryland Archaeology* 26:21-53.

Curriculum Vitae

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Education:

2011 Doctoral Candidate, Department of Anthropology, Syracuse University (expected graduation 2011).

2005 M.A. Maritime Studies/Nautical Archaeology, East Carolina University. Thesis “Magnetometers, Maps, and Manuscripts: A Comparative Analysis of the Potential for Locating Submerged Cultural Resources in Bath Creek.”

2001 B.S. Biology, minor in Environmental Studies, University of Central Florida.

Professional Experience:

2007-Present Principle Investigator, The Central Region Project, Elmina, Ghana

For over twenty years the Central Region Project has investigated African-European contact during the Atlantic trade and its subsequent impacts on Ghana’s Central Region. As a principle investigator I was charged with planning and implementing the maritime phase for the 2007 field season. I developed the project’s research design, supervised all international logistics, led a team of ten international and local researchers, oversaw all excavations, coordinated research and permitting with our partners at the University of Ghana, Legon Department of Archaeology, Ghanaian Museums and Monuments Board, and local chiefs and elders, analyzed remote sensing data, groundtruthed targets, and established and supervised a conservation laboratory. The archaeological work focused on two shipwreck sites, a previously known wreck lying offshore and the remains of an early 18th century shipwreck we discovered in a nearby lagoonal system. The latter is the oldest shipwreck discovered in West Africa, and the first to be found in a lagoonal system. Post-excavation/current duties include cataloguing, conserving, and analyzing the artifacts recovered during fieldwork and the publication of my results.

2009-2010 Analyst, Spring Street Presbyterian Church Project (1810-1840), Syracuse New York

After completing five months of intensive training in the identification of fragmentary human remains, I assisted in ossuary coding and analysis of the skeletal remains exhumed from the Spring Street Presbyterian Church burial vaults. The Smithsonian system was used for metrics and pathology.

2004-2007 Researcher, The Central Region Project, Elmina, Ghana

I expanded the project's maritime research by establishing a series of focused research questions, developing our research design, and securing funding. My plan was implemented in 2007 coinciding with my promotion to principle investigator. I also coordinated logistics for both maritime and terrestrial phases of the Central Region Project and I was a contributor on two National Science Foundation grants awarded to the project during this time.

2006 Field Technician, Bunce Island Cultural Resource Assessment Project, Bunce Island, Sierra Leone

Supported by the United States Embassy Ambassadors Fund Grant, the Bunce Island Project provided a cultural resource assessment of standing structures and surface materials of the island, one of West Africa's major European slave forts. I recorded and documented standing structures using detailed measurements to produce archaeological plans for each structure and supervised the topographical mapping of the island. My data was used to develop a cultural resource management plan for the preservation of the site presented to the government of Sierra Leone.

2005 Crew Chief, Elmina Shipwreck Project, Elmina, Ghana

The Elmina Shipwreck Project was the first phase of the Central Region Project's maritime research. I managed the field crew ensuring proper implementation of the research design and the completion of tasks assigned to us. My team relocated the wreck site, recorded a comprehensive site plan, and recovered diagnostic artifacts for further analytical study.

2004 Crew Chief, Harriet Tubman Home, Auburn, New York

The 2004 field school is part of Syracuse University's ongoing archaeological research into the social reform of upstate New York. I supervised fifteen undergraduate students overseeing their excavations, recording, recovery, and cataloging of artifacts.

2001-2003 Project Director, Bath Creek Submerged Cultural Resource Survey, Bath, North Carolina.

The project combined historical research with a phase I remote sensing survey of Bath Creek in order to establish the potential of submerged cultural resources in the area. The focus of my master's thesis, I developed and implemented all stages of the project. Utilizing primary sources to demarcate areas likely to contain cultural resources I developed a research design that systematically tested my hypotheses using remote sensing. I surveyed the areas using magnetometer and side-scan sonar, established a series of targets based on my interpretation of the remote sensing data, and led a team of divers to investigate these targets. My work resulted in the discovery of several new cultural sites.

2002 Research Assistant, Water Creek Survey Project, St. John, U.S. Virgin Islands.

The Water Creek survey defined submerged cultural resources interfering with the National Park's proposed mooring system in Water Creek Inlet. I edited, analyzed, and interpreted the magnetometer and side-scan sonar data from two phase I remote sensing surveys of Water Creek Inlet and I was co-author on East Carolina University Maritime Studies Program's report to the National Park Service.

2002 Archaeological Crew, *Montana* Wreck Site, St. Charles, Missouri.

Fieldwork on of the *Montana* wreck site consisted of a phase II survey and excavation focused on assessing the extent of the ship's remains and the recording its construction details. I mapped and oriented the wreck's remaining hull structure, carried out excavations, collected and catalogued threatened material culture, and worked on the conservation of the artifacts recovered. The archaeological work on the *Montana* was featured on the History Channel's *Deep Sea Detectives* episode "Skeleton in the Sand: The *Montana*".

2002 Archaeological Crew, Birmingham's Jetty Site, Sturgeon Bay, Wisconsin.

The Birmingham site was a phase I non-intrusive investigation of several vessels used in the construction of a local quarries jetty system. My duties included the mapping of three vessels associated with the site and incorporating these into the project's large-scale, ongoing site map.

2002 Archaeological Crew, St. John Field School, St John, U.S. Virgin Islands.

The work in St. John focused on three areas of the island: Leinster Bay, Water Creek, and the *Santa Monica* wreck site. My work included mapping the Leinster bay and *Santa Monica* wreck sites, a remote sensing survey of Leinster bay and Water Creek using side-scan sonar and a magnetometer, shoreline mapping and site orientation for all three sites, and producing a site map of the *Santa Monica* wreck site.

Teaching Experience:

2010 Teaching Assistant, Department of Anthropology, Syracuse University ANT 131: *Introduction to Biological Anthropology*

2009 Teaching Assistant, Department of Anthropology, Syracuse University ANT 185: *Global Encounters: Comparing Values and Worldviews Cross-Culturally*

2009 Teaching Assistant, Department of Anthropology, Syracuse University ANT 145: *Introduction to Historical Archaeology*

2008 Teaching Assistant, Department of Anthropology, Syracuse University ANT 141: *Introduction to Archaeology and Prehistory*

2008 Co-lecturer, Department of Anthropology, Syracuse University ANT 300: *Archaeology Under the Sea: An Introduction to Underwater Archaeology*
2008 Part-time Instructor, Department of Anthropology, Syracuse University ANT 121: *People and Cultures of the World*

2005 Teaching Associate, Future Professorate Program, Department of Anthropology, Syracuse University

2005 Graduate Assistant, Christopher DeCorse, Ph.D. Chair and Professor of Anthropology, Syracuse University
2005 Teaching Assistant, Department of Anthropology, Syracuse University ANT 131: *Introduction to Biological Anthropology*

2004 Teaching Assistant, Department of Anthropology, Syracuse University ANT 111: *Introduction to Cultural Anthropology*

2004 Teaching Assistant, Department of Anthropology, Syracuse University ANT 145: *Introduction to Historical Archaeology*

2003 Teaching Assistant, Department of Anthropology, Syracuse University ANT 141: *Introduction to Archaeology and Prehistory*

Awards/Honors:

2010 Outstanding TA Award, The Graduate School, Syracuse University

2008 Roscoe Martin Scholarship, Maxwell School of Citizenship and Public Affairs, Syracuse University

2008 Dean’s Summer Research Award, Maxwell School of Citizenship and Public Affairs, Syracuse University

2006 Roscoe Martin Scholarship, Maxwell School of Citizenship and Public Affairs, Syracuse University

2002 Graduate Assistantship, Department of History, East Carolina University

2001 Graduate Assistantship, Department of History, East Carolina University

Publications

2009 Christopher R. DeCorse, Greg Cook, Rachel Horlings, Andrew Pietruszka, and Samuel Spiers,
Transformation in the Era of the Atlantic World: The Central Region Project, Coastal Ghana 2007. *Nyame Akuma*. No. 72:85-93.

Reports, Conference Papers, Posters, and Presentations:

2008 *Underwater Archaeology as Microhistory: Problems and Prospects from Central Ghana*. Coauthored with Christopher R. DeCorse. Paper presented at the 109th Annual Meeting of the American Anthropological Association, San Francisco, California.

2006 Bradley A. Rogers, James D. Moore III, Annalies Corbin, Jacqueline D. Piero, and Andrew Pietruszka
From Quarry to Quay: Shipwrecks of McCracken's Cove: The 2001-2002 Sturgeon Bay Wreck and Wharf Investigation at the Birmingham Site. ECU Research Report No. 17, Program in Maritime Studies, East Carolina University. Greenville, NC

2006 Bradley A. Rogers, Frank Cantelas, Nathan Richards, Annalies Corbin, Erica Seltzer, Andrew Pietruszka, Keith Meverden, Sami Seeb, and Andrew Weir
Shipwrecks of St. John: ECU Investigations of Submerged Cultural Resources in the U.S. Virgin Islands National Park, 2002. ECU Research Report No. 16, Program in Maritime Studies, East Carolina University. Greenville, NC

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The Castle Island Ships' Graveyard: The History and Archaeology of Eleven Wrecked and Abandoned Watercraft. ECU Research Report No. 14, Program in Maritime Studies, East Carolina University. Greenville, NC

2006 *Underwater Archaeology in West Africa: The Elmina Shipwreck Project*. Maxwell African Caucus, Maxwell School of Citizenship and Public Affairs, Syracuse University.

2005 *Elmina Shipwreck Project: 2005 Field Season*. Brown Bag Lecture Series, Department of Anthropology, Syracuse University.

2003 *Sugar, Slaves, and Ships: The Maritime History of Annaberg Plantation*. Paper presented at the Annual Meeting of the Society for Historical Archaeology Conference on Historical and Underwater Archaeology, Providence, Rhode Island.

2003 *Rubber Duckies or Shipwrecks: A Submerged Cultural Resource Survey of Bath, North Carolina*. Poster at 22nd Annual Scientific Diving Symposium, American Academy of Underwater Sciences, Greenville, North Carolina.

2003 Cantelas, Frank J., Keith Meverden and Andrew Pietruszka. *Virgin Islands National Park Remote Sensing Report, 2002*. Report submitted to Virgin Islands National Park, St John, U.S. Virgin Islands by Program in Maritime Studies, East Carolina University.

2003 The Bath Survey Expedition. *Stem to Stern* Vol 18