

Trade Secrets:

A Historical, Archaeological, and Archaeometric Study of Greek Colonization
in the Dalmatian Islands

by

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This thesis examines the Dalmatian islands and their relationship with the surrounding Adriatic region during the late Greek colonization period in the 4th century B.C. by using colonization models, archaeometric ceramic analysis, and coinage dispersion, in addition to the network theory set forth by Irad Malkin. The timeline for colonization in the Dalmatian islands allows a strong comparison to be made with colonization in the Black Sea region, especially the southern coastline around Sinope.

This study uses primary and secondary historical documents to inventory the cultural and geological factors influencing Greek colonization during the Archaic period 800 to 500 B.C in the Black Sea. The Black Sea data will then be used for the basis of comparison with Dalmatia. Archaeological research and survey data on the islands of Vis, Korčula, and Hvar, off the coast of Croatia, has then been compiled along with the archaeometric data to identify a network of colonization based on technological differences within Dalmatia. This proposed network has then been tested against current network theories in order to determine if the Greek colonists employed a predetermined and standardized practice during their colonization efforts of the 4th century B.C.

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A Thesis

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DEDICATION

I would like to dedicate this thesis and all the work involved to my family. Thank you for putting up with this long and arduous process that I have made you all suffer through.

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I would like to thank the many people who made this thesis possible. First and foremost, it could not have been possible without the patience and guidance of my advisor, Dr. Frank Romer. A special thanks to Dr. Jeffrey Royal and RPM Nautical Foundation without whom I never would have settled on the topic of Adriatic colonization. I would also like to thank my classmates Danny Bera, Saxon Bisbee, Dan Brown, John Bright, Katie Cooper, Nat Howe, Jeff O'Neill, and Josh Marano who were always there for advice or help throughout the years. Thanks also go out to Dr. Maja Miše, who kindly spoke with me about the upcoming database for Adriatic ceramics. Final thanks go out to Allison Chaffo, who put up with my grumpiness and managed to calm my nerves when the times were tough, in addition to editing my first drafts.

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CHAPTER 1: INTRODUCTION

The purpose of this thesis is to determine if there is a unique model for colonization in the Adriatic during the 4th century BC. The data contained in this thesis will also provide understanding for how the colonists interacted with local (Dalmatia), regional (the Adriatic Sea), and international (Mediterranean) trade networks. I will argue that while at times hostilities erupted between the colonists and indigenous, an amiable network of trade developed between the Greek colonists and their coastal neighbors. This trade consisted of culture and goods but I will argue that technology was guarded by the Greeks in an effort to maximize profits. This thesis will provide insight into Greek colonial intentions and add to our knowledge of colonial Greek practices and how colonies such as these provided an avenue for the dissemination of Greek goods and culture. To achieve these goals, the Greeks had to have a level of cooperation with the native peoples, especially on islands with limited resources.

This study will look at four sites of Greek origin in the Adriatic. These sites are all located within the Dalmatian coastal islands. The Greek sites analyzed for purposes of this study are Pharos, Issa, Vela Luka, and Korčula. These sites and the internal relationships between them will then be compared to a number of surrounding mainland sites in order to determine the extent of the proposed Dalmatian network. This network is then evaluated against the Greek network in the Pontus, focusing on the coastal colonies of Sinope, Trapezus, and Heraclea. It will be argued that these sites are different, both geologically and culturally, from the island sites in Dalmatia. These differences play an important role in the spread of technology and how each of these regions fits into the overall Greek trade network. This thesis will show that the Dalmatian network is unique in the way it fit into the Greek trade network, as the dissemination of goods and culture in the region is much more unidirectional than in other parts of the Greek world.

Ceramic and coinage finds will be evaluated at each site to determine the strength of connectivity, both within the colonies and with the indigenous populations on the mainland. Based on these factors, as well as set models for Greek colonization, the Adriatic sites will be evaluated for their network viability. Geological aspects of these sites and archaeological data from shipwrecks and coinage finds are analyzed to evaluate the relationship of these sites to each other as well as the rest of the Mediterranean network.

The Adriatic, while not as active as the Aegean, Black, or Tyrrhenian Seas, has a long history of trade within the Mediterranean basin. Its most notable export, amber, originates in the area of the Baltic Sea. Fossilized resin for jewelry and other decorative items attests to a dedicated trade route known as the Amber Road. Before 1200 B.C., the Mycenaeans had penetrated to the headwaters of the Adriatic, where the Amber Road meets the Mediterranean to exploit this resource. However, with the dissolution of the Mycenaean world after 1200 B.C., the Adriatic began a period of isolation from outside influence (Bengtson 1971). This thesis aims to ascertain how the Adriatic fitted into the overall Greek network within the Mediterranean as well as how this region compares to the other regions of Greek colonization during the 4th century.

The methodology behind the study comes mainly from the growing field of Network Theory. Irad Malkin (2003, 2009, 2011) has been extremely active in the field with special focus on the ancient Greek networks and on how distance influences the functionality and viability of these networks. Malkin postulates that the distance of Greek colonies from the homeland underlay their Greek identity because all Greeks had more in common with each other than with the indigenous populations. The rise of panhellenism, the spread and unification of Greek practices throughout the known world, established centers of Greek culture and influence around the Mediterranean, and these centers in turn founded subcolonies that created networks based on

local and regional environments. In addition to network theory, archaeometric data from sites on and around the Dalmatian islands are used to ascertain the involvement of the Greek colonists in the region with regards to pottery exchange and technology.

Greek colonization has been a well-researched topic over the past hundred years, but comparatively few studies have focused on the presence or absence of early Greek colonies in the Adriatic. Even Mario Jurišić (2000:4) acknowledges the lack of knowledge available on the Adriatic during the period in question, citing only two known shipwrecks, apparently of local origin. He emphasizes that in what is considered the pre-colonial period, the 12th through the 7th centuries, there are almost no known shipwrecks. The work of Branko Kirigin (1990, 1994, 1997, 1999, 2001, and 2009) and his colleagues in the Adriatic Islands Project provide a base of information from the 4th century that highlights the changes occurring in the region during the initial colonization efforts of the Greeks. Finally, Maja Miše and her work with the ceramics of the region and the archaeometric database of *Gnathia* ware provide powerful insight into the spread of technology and trade in the region.

In any study dealing with the antiquity, incomplete histories or incomplete excavations beget mistakes, and arguments over the dates are bound to occur. For the purpose of this thesis the most recent accepted foundation dates have been used. Archaeological research in the Adriatic has also been hampered by political strife in the region, especially during the past one hundred years, with the independence movements of the Balkan countries and the fall of the USSR in 1989. In fact, archaeological research in some areas is still prevented by mine fields (Kirigin 1999:156). Until very recently, much of the information obtained in the Adriatic has dealt with the Roman period as there are many more sites and historical accounts available.

Organization

This thesis has seven chapters. Following this introductory chapter, chapter two will focus on the methodology of the study and the reasoning behind site selection for the research. The first section discusses the various models used to explain the reasons behind colonization, with a particular focus on island colonization. The first model to be described will be the Push-Pull variables associated with colonization. These variables inherently lead into the Ideal Free Distribution theory (Fretwell & Lucas 1970), followed by the Ideal Despotism Distribution theory (Fretwell 1972). Next, Birdsell's (1957) model for early colonization of islands in the South Pacific is adapted for the situation of Adriatic colonization. Alan Small (1969) and his work in the Faroe and Shetland Islands also offers insight for understanding Adriatic colonization. Finally, the works of Irad Malkin (2001, 2003, 2009, and 2011) and Branko Kirigin provide a generous amount of information and theory concerning the ancient Adriatic. The second section of this chapter discusses archaeometric analysis and the advantages of including this type of information in a network theory study.

Chapter three delves into the history of Greek overseas colonization. There are close to four centuries between the first overseas Greek colonies and the colonial settlements in the Adriatic. A detailed history of Adriatic colonization will be constructed to the extent possible. However, in some cases, it is still necessary for scholars to accept approximate dates, since the data is still incomplete.

Chapter four discusses the geology, geography, and bathymetry of the Adriatic and Black Seas. The topographic data of the region and the locations of agricultural plains on the islands are an important aspect of Kirigin's methodology and research in the region. This chapter also

includes the mineral and chemical makeup of local soils which provides important information for the archaeometric analysis and the determination of pottery provenience.

In chapter five, network relationship data based on coinage and pottery are detailed. The second part of this chapter entails the archaeometric data obtained from several articles, sites, and databases. These compiled data will be used for the comparison process in the subsequent chapter. Archaeological collection data from published excavations and surveys can also be found in this section.

The analysis of this thesis can be found in chapter six, which will discuss the network findings for the Dalmatian islands and how much this region fits the theories outlined in chapter two. Here the sites will be compared with one another and with each of their respective networks in total. Of particular importance will be the relationship of the Greek colonies to the indigenous population in terms of pottery and coinage. This comparison will explain the rationale for site choices and network creation within each sphere of influence, and answer the research questions outlined in this chapter. Any correlation between resource availability and the timeline of Greek colonization will be discussed in the analysis given there.

Lastly, the seventh chapter will summarize the important results and propose further avenues to explore. The author's reflections on the project and other possible motivation for the Greek absence in the Adriatic during the early years of the colonization movement can also be found here. Finally, any further research recommendations or areas where information is missing will be identified and explained.

Research Questions

Primary-

- How do the Dalmatian islands fit into the greater Greek network?

Secondary-

- How did the Greeks deal with the indigenous population during the establishment of colonies in the Dalmatian islands?
- How do the Dalmatian islands compare to other regions of the Greek world?
- Can the spread of technology be traced through the archaeological record of the Dalmatian islands?
- Were these sites chosen as long term colonization or short term trading outposts?

These questions will be evaluated and addressed based on the results of the network comparison and published archaeological findings. A small sample size, especially in Black Sea coinage, may not produce definitive results, but this question and others will be evaluated and addressed.

CHAPTER 2: METHODOLOGY

Introduction

Colonization is rarely just the random biological movement of organisms from one location to another. Even the actions of animals that humans define as colony forming, such as ants, honey bees, birds, or rodents, choose the colonial site with great care, whether it be for genetic diversity in breeding, food resources, or protection from predators. Colonization for early humans was likely very similar to the biological migration of other life forms. However, as human society emerged, agriculture and trade became key driving forces in colonization efforts. These factors became more prevalent over time, reaching their height during the Age of Imperialism, the early 18th through the early 20th centuries.

As the Greek people spread around the Mediterranean, they brought with them their culture and technology. One of the most distinctive technological advancements of humans is the development of pottery and ceramics. Pottery plays an important role in most aspects of ancient life, being present in the home, marketplace, and religious practices. Whether symbolic or utilitarian in nature, ceramics could be produced to fit nearly any need (Roth 2007:5). Almost unique to pottery is the wide range of forms and styles that have been crucial to the classification of ceramics. Until recently, stylistic analysis was central to archaeological enquiry (Šegvić 2011:63). In the last few decades, archaeometric analysis has enabled researchers to examine archaeological ceramics in new ways that have helped identify provenience of materials and construction, as well as the technology used in their creation. These new data have helped to identify patterns of migration and trade throughout the ancient world, and have provided a greater understanding of cultural and economic relations during the Greek colonial period.

Theory

Greek colonization is subject to a more diverse number of factors, according to Lee (1966). Lee's *Theory of Migration* describes four main criterion (1966:50):

1. Factors associated with the area of origin.
2. Factors associated with the area of destination.
3. Intervening obstacles.
4. Personal factors.

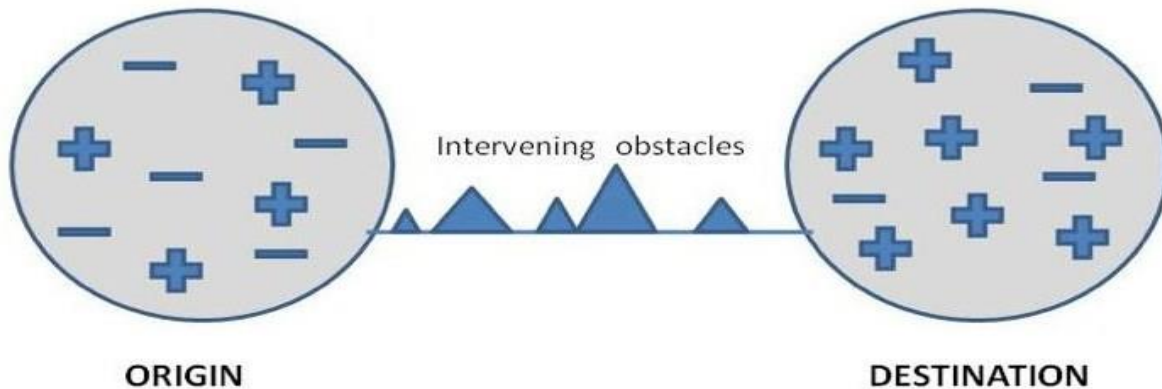


Figure 1: Lee's Push Pull Theory (Lee 1966:50).

These factors have recently been redefined as the Push-Pull variables. Push variables drive an organism away from the point of origin; pull variables, on the other hand, attract that organism to one site in preference of another. Push variables include overpopulation at home, drought, famine, lack of genetic diversity, natural resource depletion, and political persecution. In contrast, pull factors include greater land availability, genetic diversity, economic opportunities, valuable natural resources, and political or religious freedom. These variables not only influence the migration and colonization of the colonists, but they also influence their destination. Lee has also listed the characteristics of migrants (1966:56):

1. Migrants are selective
2. Migrants responding primarily to pull factors at destination tend to be positively selected.

3. Migrants responding primarily to push factors at origin tend to be negatively selected; or, where the push factors are overwhelming to entire population groups, they may not be selected at all.
4. Taking all migrants together, selection tends to be bimodal.
5. The degree of positive selection increases with the difficulty of the intervening obstacles.
6. The heightened propensity to migrate at certain stages of the life cycle is important in the selection of migrants.
7. The characteristics of migrants tend to be intermediate between the characteristics of the population at origin and the population at destination.

Following these characteristics, one can begin to track the character of Greek colonization. As Gwynn (1918:89) states, “Greek colonization was due, above all else, to the need for land.” However, Gwynn was quick to mention that Greece is also a small region with a low percentage of cultivable land. Of the leaders in the colonization movement, Corinth, Eretria, Chalcis, Phocaea, Megara, and Miletus are each located at a viable seaport with geologically limited surrounding arable lands (Gwynn 1918:89). Under the circumstances, when the rising populations outpaced the growing capacity of the local lands, the Greeks expanded overseas (Scheidel 2003:123). Contrary to the Malthusian theory that excess population will starve when the resources run out, Boserup (1965:6) believed that human ingenuity would find a way to combat starvation. In this case, it was not fertilizers or machinery but boats that allowed the Greeks to prevent starvation. Land availability became both a push factor at home and a pull factor abroad. Traditional pull factors, with regards to early human migration, include bird migrations, fires, and smoke. Each of these indicates the location of previously undiscovered land. During antiquity, these pull factors are less impactful, since colonization sites were likely well known to the Greek traders and colonists and in many cases had local or nearby inhabitants. If we accept that land availability is the primary factor in colonization during antiquity, secondary pull factors are sure to include natural resource exploitation and the chance of

economic growth, factors more commonly attributed to imperialism than colonization or exploration.

Overseas colonization models are quite different from land-based models. In most cases, all water routes have the same restrictions whereas land routes are defined by the geography of the region. For example, when leaving an island, each compass direction has a nearly equal ease of egress, discounting shifting wind conditions. On land, mountain ranges, deserts, swamps, rivers, dense forests, and similar obstacles make some directions more difficult than others, which recalls back to the intervening obstacles aspect of the Push-Pull theory (Simmons 2007). Overseas migrations seek to minimize these obstacles in most regards, with the noted exception being distance, defined either by the true distance from the origin or the time required to reach the destination along safe maritime routes.

Building upon the push and pull variables, in 1957, Birdsell published a model for estimating colonization rates for the Australian interior. His model uses several constants concerning population behavior, including a standard initial population size, generational life span, and reproductive rates. Using estimates for regional carrying capacities, Birdsell developed his model for intrinsic growth. However, Birdsell assumed a biological dispersion more similar to osmosis than colonization. He postulated that both coastal and inland regions would be colonized nearly simultaneously and that outward growth from the insertion point would be equal in all directions (Horton 1981:21). This reorientation of the theory means that the arid interior would be more rapidly colonized than the coastal and riverine regions based on a small carrying capacity. While this relationship may work in theory, it is extremely unlikely that a less hospitable region would predate settlement of a coastal or riverine region.

Similar to the Birdsell model, and more wide-reaching, is the Ideal Free Distribution model (Fretwell & Lucas 1970). This theory states that individuals will distribute themselves in such a way that they will establish equilibrium with the available resources in any given area. This distribution minimizes resource competition and allows for the greatest amount of individual growth. Aligning this dimension with the Birdsell models allows for the conclusions reached by Birdsell. However, Fretwell (1972) revised his theory and published the Ideal Despotism Distribution theory. According to Fretwell's revision, the strongest individuals will occupy the most desirable patches of land and the weaker individuals will be relegated to the leftover patches. Environments, especially in human colonization, must be taken into account, since colonizing populations will tend to move into familiar regions first (Bowdler 1977). This model also predicts that coastal and riverine regions will be inhabited prior to inland sites, as freshwater resources are more easily accessible in coastal and riverine environments and can support a larger population before resources are exhausted. In this regard, human population will reach equilibrium in accordance with the above biogeographical theories (Losos 2010). While these theories generally deal with less advanced cultures, as a civilization advances they still require the basic necessities for supporting a population. With this advancing technology, other resources such as metals become an increasingly important part of the puzzle.

Land is by far the most important resource in a primarily agrarian society, such as in antiquity. Secondary to arable land are viable grazing areas. These colonization needs did not change until more recent times and were still obvious during the Norse colonization period. Alan Small's results in the Faroe and Shetland Islands show a number of similarities with Adriatic island colonization. Small states that each colony has clear and definitive needs. His model for Nordic colonization asserts three principles "that are needed for ideal settlements: (1) that each

site must have access to the sea and [a safe harbor or] reasonable place to pull up a boat, (2) a patch of fairly flat, reasonably well drained land suitable for the construction of a farmstead and with the potential for some grain cultivation; and (3) extensive grazing areas (1969:149).” Using these data from Small’s Model, MacGregor (1984:3) found that only 7% of the total area of the Faroe Islands was suitable for colonization, as seen in Figure 2.

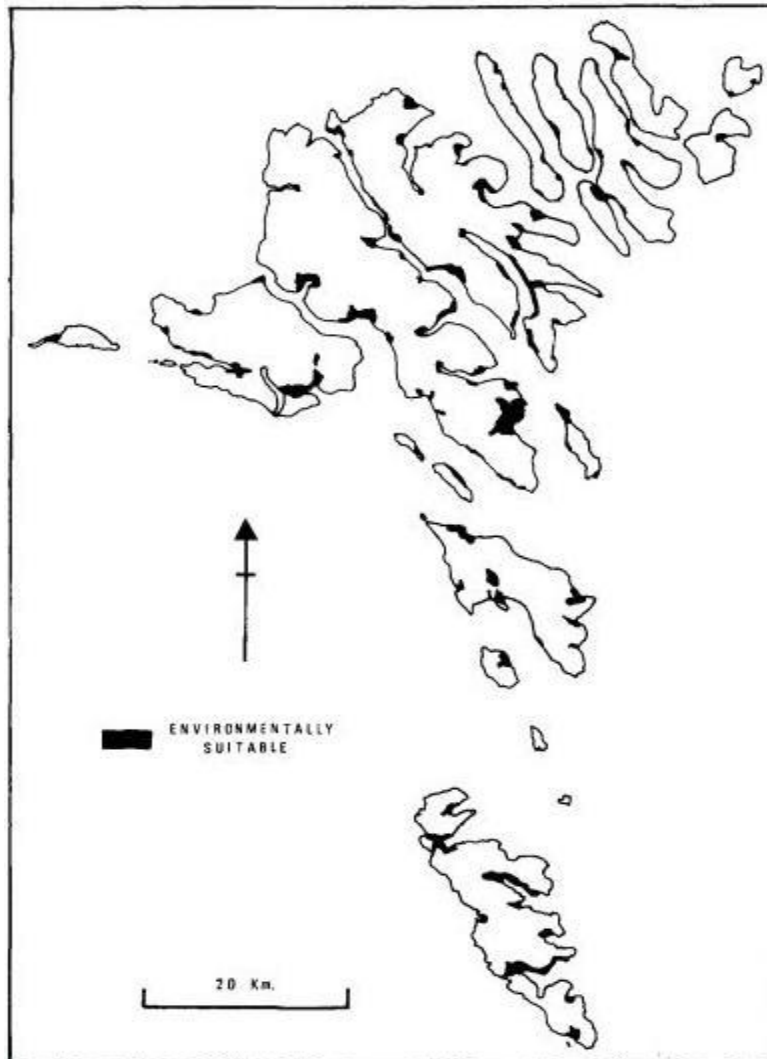


Figure 2: Environmentally Suitable Areas in the Faroe Islands (Small 1969:150).

Areas with such a low percentage of arable land would generally have been regarded as incapable of supporting a colony, but archaeological research has shown that the Faroes were an important aspect of the overwintering process for Scandinavian sheep (Small 1969:147). Similar

results were also found in Shetland (Figure 3), and when these maps were used with an overlay of current settlements the results corresponded positively with the highlighted suitable areas.

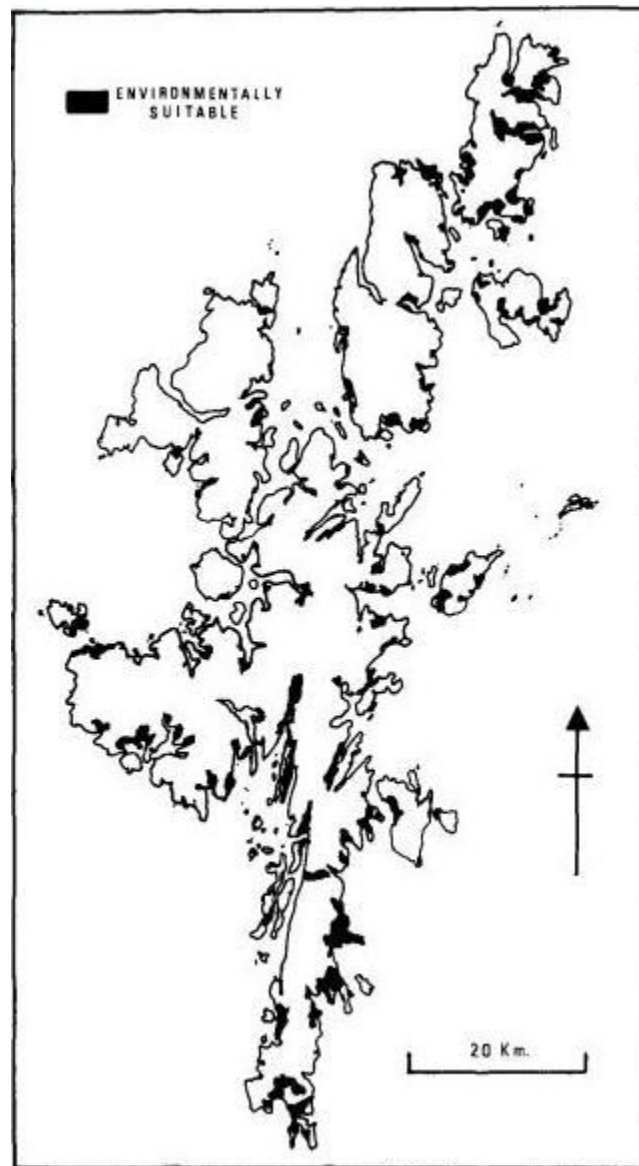


Figure 3. Environmentally suitable areas of Shetland (Small 1969:148).

It is important to note that, although both island chains had relatively low percentages of viable agricultural land, they were still colonized. With extreme push factors in the homeland, even sites that might be considered undesirable were still valuable in one form or another. In the case of Shetland and the Faroe islands, it was the outwintering of sheep, sea shells, and fishing, which eventually led to the larger sites becoming maritime ports and safe harbors for mariners on

the way to the British Isles, Iceland, and beyond (Deckers 2006:3). Based on Small's model, the Adriatic islands and their karst landscape offer a unique similarity that has yet to be explored. Because of the karst landscape of the Adriatic, very few locations provide the necessary elements even for his settlement outline.

The Greek settlers colonized a number of the few viable locations in the Dalmatian islands. The most notable sites are those included in this study, Pharos, Vela Luka, Korčula, and Issa. Prior to colonization, each of these sites had an indigenous population as well as population centers on the nearby mainland. Malkin (2003:57) states that it is interactions with these populations that creates micro-regions and leads to Greek identity within both the local network and the Mediterranean network. For this study, the networks in question are the Dalmatian island network defined by the above listed sites and the Southern Black Sea network defined by Heraclea, Sinope, and Trapezus. Prior to current network theory, colonization models were typically described as arboreal, that is, as branching out in a linear fashion defined by the mother city. However according to Paul Baran (1964), modern network theory has defined networks as three types: Centralized, Decentralized, and Distributed (Figure 4).

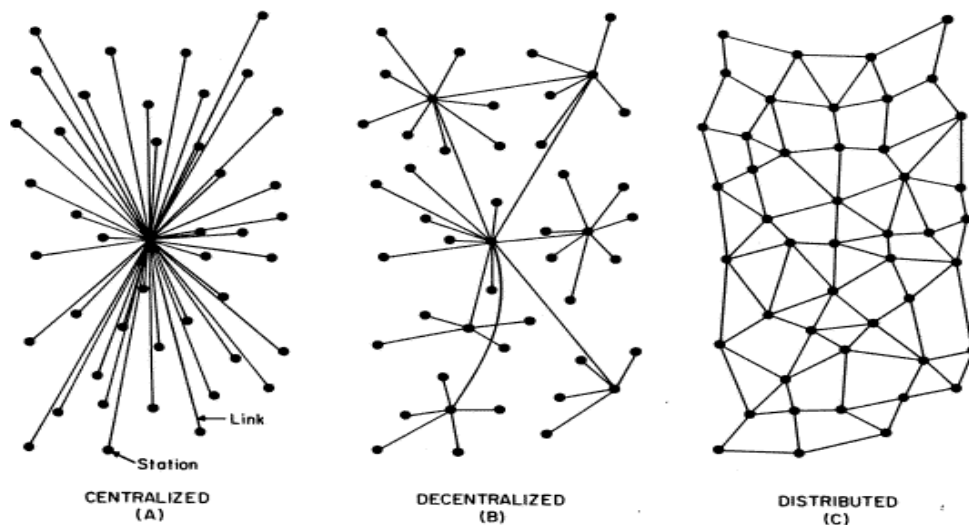


Figure 4. Network theory models for the possible internet structures (Baran 1964).

The majority of people will know the saying that “all roads lead to Rome”. This sentiment defines the Centralized network. In a centralized network, everything must run through the central node in order to reach its final destination; whether its cargo is information, goods, or people does not matter. In terms of colonization, then, everything would run through the mother city which is extremely unlikely under any circumstance. A Decentralized network is closer to the previously defined “arborism” theory. In this model, the mother city sends out colonies which then create local subcolonies, but these colonies mainly interact with their own subcolonies or the mother city, rarely creating links between other places based on colonial interests. In a distributed network, each colony and subcolony is free to establish links to other nodes without regard to “parental” colony influence. In reality, maritime trade in the Archaic period is likely to fall somewhere between the decentralized and distributed models. Plato (*Phaedo* 109b) famously describes the Greek colonists as frogs living around a pond. This pond then represents the maritime linkage among the Greek colonies, commonly known as the small world network (Figure 5). With advancements in shipbuilding and navigation, the addition of overseas links enables the degree of separation to be drastically reduced. According to Malkin (2011:33), these factors embrace precisely what was happening during the Archaic period around the Mediterranean.

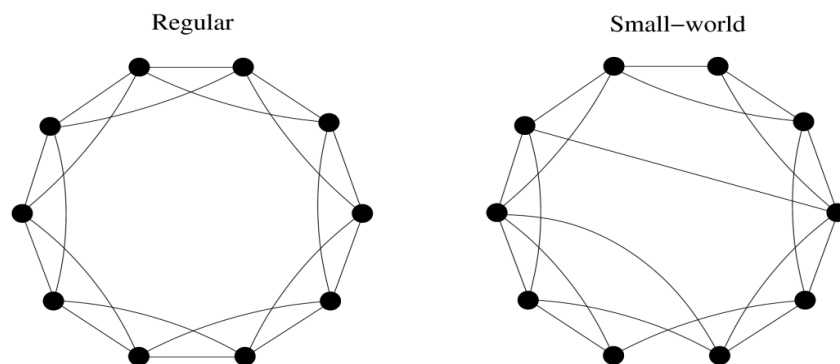


Figure 5. Regular and Small World networks (Malkin 2011:28).

Watts (2004:89) states, “Roughly speaking, this is how the small world phenomenon works. In a large network, every random link is likely to connect individuals [or colonies in this case] who were previously widely separated. And in so doing, not only are they brought together but also large chunks of the rest of the network are made much closer.” The emergence of Greek culture around the Mediterranean is dependent on overseas links.

Historical Research

The first stage of research for this thesis occurred in libraries and journal archives. A sound base for Greek colonization and the push factors associated with migrating Greek populations was needed to evaluate Greek colonial practices. Once sites around the Mediterranean were considered, it was then possible to distinguish the environmental pull factors that attracted the Greeks to these sites. With research in a foreign country, there exists an inherent language barrier. However, much of the historical research was conducted by English speaking archaeologists and historians, but recent and ongoing research and site reports by non-English speaking scholars may not yet have been translated at this time.

Initial research involved map analysis of Greek colonies on the Dalmatian Islands and around the Black Sea. This research showed a distinct absence of colonial settlements in the Adriatic Sea, as can be seen in Figure 3. The Greeks spread far and wide, from the river Don, in the northeastern Black Sea to Saguntum on the eastern coast of Spain, yet the Adriatic remains relatively overlooked during the early years of Greek expansion.



Figure 6: Greek and Phoenician colonies in the Mediterranean and Black seas from the 8th to 6th cent. B.C. (Benowar et al 2005).

The information gained from the maps focused the research on the best-known and earliest colonial efforts undertaken by the Greeks. Primary sources for Greek colonization efforts no longer exist, and the accounts written centuries after the colony was founded were often based on myth or legend. Thucydides, Herodotus, Plutarch, and even Homer have been used in the quest for information concerning the early Greek colonies. Thucydides' work plays the largest role, as his history of the Peloponnesian War also includes much about the state of the Greek world before the war as well as some history of naval warfare and island colonization.

Aubrey Gwynn, one of the early researchers of Greek colonization, published *The Character of Greek Colonisation* in 1918. This work provides an overview of Greek colonization and its most important sites. Gwynn's examination of the driving forces behind Greek colonization highlights agricultural concerns as the main force but admits that commercial enterprise also played a role, especially in the later years. Lacking archaeological data, Gwynn

uses historical data from Thucydides, Strabo, and Herodotus. A growing population, and limited land availability in the homeland, encouraged the Greek people to seek refuge elsewhere in the Mediterranean. In addition to population growth, John Camp (1979:398) also postulates that a drought in the 8th century may have been a contributing factor for the colonization efforts of the time period.

The Greeks spread quickly beginning in the 8th century, settling first off the western coast of Italy and Sicily at Ischia and Cumae, before venturing into the Black Sea during the 7th century (Cook 1962). At the same time, other Greeks were also moving west, past Italy, and into southern France and Spain (Ridgway 1900:15). The Adriatic was mostly bypassed during this period and it would not be until the late 5th century that Greek colonists would venture up the Adriatic to the Dalmatian coast.

The *Periplus*, written around 350 B.C. and falsely attributed to Scylax, will be discussed in the following chapter. While late in the era of Greek colonization, it is during this time that the Greek colonies in the Adriatic were being established. This specific work has a number of inconsistencies and geographical problems, but from this document a rough political map can be reconstructed, as Wilkes (1992:96) has done. In *The Illyrians*, Wilkes uses current geographical markers and historical sources to identify the Illyrian homelands. Wilkes then lists a number of sites where artifacts with possible Greek origins have been found. These finds generally occur near the end of the 6th century and show a connection between the Greek world and the Adriatic peoples.

Irad Malkin (2011) analyzes the networks of trade in the ancient Mediterranean. Using network theory, he proposes the Greek rise to power can be attributed to a collective Greek identity established across the Mediterranean and Black Seas. According to Malkin, emerging

technology and long distance trade routes controlled by the Greeks enabled more frequent interactions between Greeks, and these interactions allowed them to avoid assimilation to the local cultures as never before. He postulates that the Greeks looked inward (Figure 5) to the sea and, in doing so, they maintained a middle ground across cultural divides. Malkin apparently left out the Adriatic deliberately; this omission appears to be common in visual representations of Greek expansion, as Malkin and Wilkes (1992:109) point out.

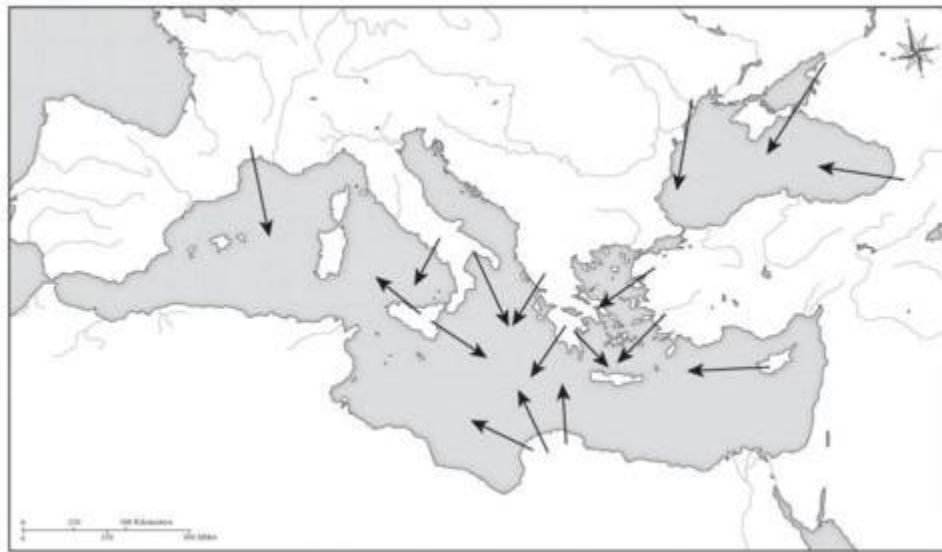


Figure 7: “Our Sea,” a Greek Perspective (Malkin 2001:6).

A number of other secondary sources have attempted to fill in the holes associated with the history of colonization in the Archaic period. Albright’s work (1941) on the early history of Phoenician colonization provides a baseline for comparison with the Greek models for colonization, as well as approximate dates and reasons for the spread of the Phoenicians. Research by Aubet (1993:351), however, shows distinct differences between the Phoenician and Greek colonization models. It appears that in many cases Phoenician colonies arose from successful trading posts while the Greek counterparts were state sponsored migrations in search of agricultural lands in addition to mercantile aspirations. Phoenician settlements can generally be characterized by and exploitation of resources while the Greeks, especially in the Adriatic,

created self-sustaining cities that contributed positively to the surrounding regions. Blakeway (1933) uses pottery and art, especially imitated art, to discuss proto-colonial contacts in the region. As Blakeway states, imitated art is more direct evidence of contact than 4th century historians. This interconnectivity of culture, art, and technology is an important aspect for network identification and classification. Most recently, Cyprian (2013) provides an excellent source for the history of the Mediterranean and the interactions between the expanding civilizations during antiquity.

Archaeological Research

The archaeological fieldwork used for this study has, for the most part, already been completed elsewhere. The Adriatic Island Project (AIP) has recorded over 2000 archeological sites in the Adriatic. While not every site examined in this project has been published, each site was subject to aerial survey analysis, via GIS software, in order to obtain the values provided in chapter five. The AIP conducted a large number of surveys beginning in the early 1990s. The project was expansive, and at the time of writing this thesis, only three of the five proposed volumes have been published. Surveys were conducted by systematically walking each island in teams with a separation of 10 m between surveyors. Finds were analyzed and GPS marked for future excavations. In the later stages of the project, trenches were opened at sites identified with a high likelihood of archaeological material. The island of Hvar is covered in the first volume (1997), followed by Brač in the second volume (1999). The third volume, dedicated to Vis, Biševo, Svetac, and Palagruža, was published in 2006. On the island of Korčula, Vela Luka has been subject to extensive archaeological surveys. Of the four sites, Korčula on the north-eastern part of the island has the fewest resources. These surveys, especially those conducted by the AIP, also contain a fair amount of geological data, which plays an important role in the present study.

In most Greek colonization, the first colonies were established on islands for two main reasons: first, islands were generally less populated than the mainland, and second, the separation from the mainland provided a form of protection (Bucher 1966:6). Pithecusa is the best example. Other examples include Cyzicus, Thasos, and Corcyra (Tsirkin 1991:348). If this model is applied to the Adriatic, there are a number of islands that fit it.

Stari Grad, the site of ancient Pharos, was colonized by the Parians in 385/84 B.C. The colony is located at the head of a long bay, and behind the bay to the east lies the largest and most fertile plain on the Dalmatian coast (Kirigin 1990:296). This plain is uncharacteristic of the area, as the majority of the islands are subject to the karst landscape that dominates the surrounding region. To the south, separating the plain from the rest of the island, is a high mountain range that falls steeply into the Adriatic on the southern coast (Figure 6). The soil of the plain is quite rocky at the edges, especially to the north and east, but is still suitable for olives. Olives also dominate the southern edge of the plain on the lower slopes of the mountain range, while vineyards are predominant in the central plain (Kirigin 1990:296). The plain has an estimated growing area of over 1,000 hectares (Figure 7). The plain is also defensible from two hillforts, at Tor and Vrbanj, which overlook the plain, as well as via the channel between Hvar and Brač. The agricultural layout of the fields is still largely intact from antiquity, and it appears that the Greek *stadion* is still the unit of measure for the plain (Kirigin 1999:153). In 2008, the Stari Grad plain became a UNESCO world heritage site.

While the settlement date appears to be firm in the eyes of the majority of archaeologists, a number of finds have been discovered that date to the 6th century. Nikolanci (1989:51) believes that the Greeks were familiar enough with the island to have formed a colony named Anchiala on Hvar during the Archaic period. However, he also admits that no evidence on the

island supports this claim. The arrival of the Greeks on Hvar in 384 BC was met with hostility according to ancient and archaeological sources. One year after the foundation of Pharos, the native people appealed to the mainland Illyrians to help evict the Parians. However, a Syracusan fleet then stationed at Issa was dispatched in time, and the small craft of the Illyrians were no match for the Greek triremes. All told, the battle claimed the lives of 5000 Illyrians and another 2000 were taken captive (Kirigin 1999:155).

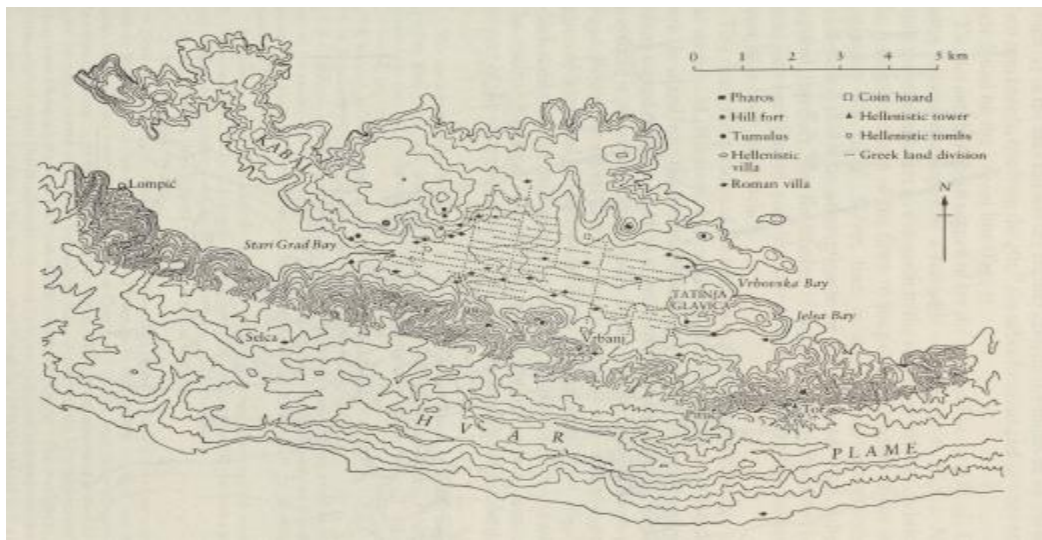


Figure 8: Topographic Map of Stari Grad plain with Archaeological sites (Kirigin 1990:297).

The island of Vis, ancient Issa, differs from Hvar in many ways. The main bays on the island are on the northern and western coasts, at Viška Luka Bay and Komiža Bay respectively. A preliminary survey and topographic map were produced by Kirigin (1990) during the island survey (Figure 8). The majority of shipwrecks are located at the northern bay, which should indicate greater usage than Komiža Bay. The northern site also has a less extreme slope rising from the coast to the interior. Unlike Pharos, the fertile lands are not contiguous with the coastline. They are located in the central interior at elevations of over 100 m, but do cover an area over 700 hectares (Kirigin 1990:303). However, according to Kirigin (1999:152), the topographical evidence indicates that the island was not heavily populated prior to the arrival of

the Greeks. This conclusion comes from the size of the hill-forts, which were relatively small and could not have supported a large population. A colony did exist on the island, but a firm foundation date has been difficult to assign. Kirigin states that a settlement did exist in the Archaic period. Corinthian and Etruscan grave goods dating to the 6th century and red-figured vases from the 5th century B.C. have been excavated. However, apart from these finds, no material exists that would indicate a Greek settlement before 330 B.C. In fact, there appears to be a complete lack of archaeological data for the hundred years prior to that date (Kirigin 1990:310).

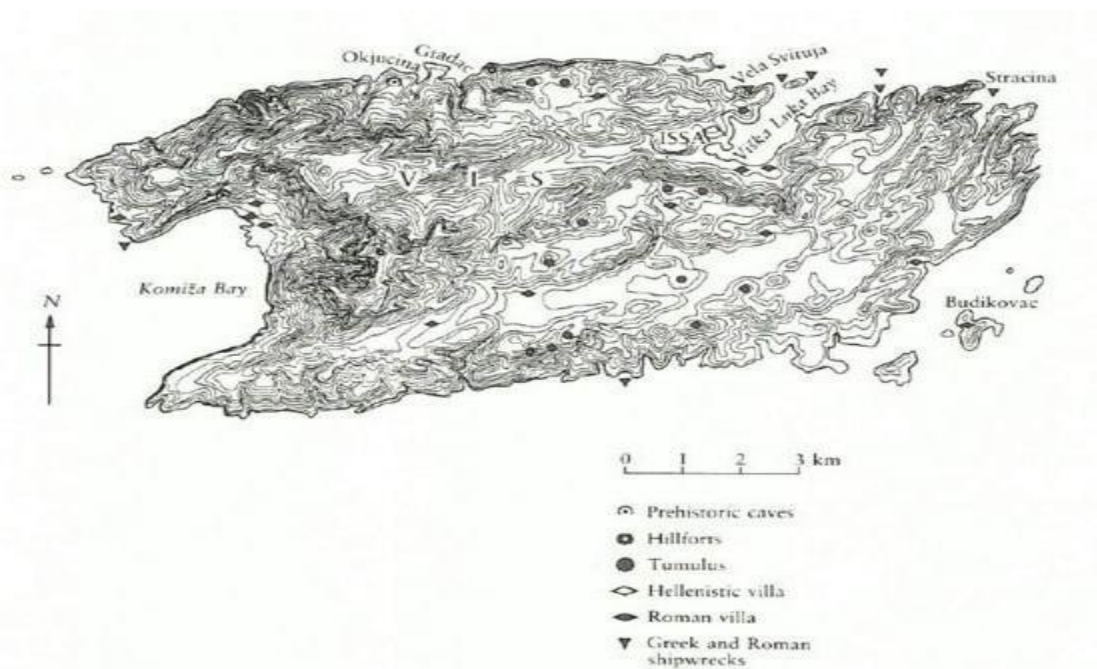


Figure 9: Topographical Map of Vis, Ancient Issa, with preliminary survey results (Kirigin 1990:304).

Despite the survey conducted here in 1993 and 1994, some areas of the island remain unexplored because of land mines. Previously unknown was the site of Talež, on the south-central plateau. This site is unique to the region. During survey, large amounts of naturally occurring ironstone and slag were found at the site. According to Kirigin (1999:158), this is the only exploitable source of iron in the Dalmatian region. Artifacts found at the site date to the 5th

century, but discontinued after the foundation of the urban settlement at Issa in the 4th century, and abandonment is suspected.

The island of Korčula is the third site of investigation in this study. Korčula was long believed to have been founded by Issaeian expansion, because of a now famous inscription, the “*Lumbarda psephisma*”. Archaeological evidence at Issa shows a nearly complete occupation of the island during the Hellenistic period. Under these conditions, it is entirely possible that population pressure forced the Issaeians to colonize other islands (Kirigin 1999:157). This cascade occupation was likely common in Dalmatia, as the majority of the islands could not support large scale populations. Two sites on the island are considered in this thesis. The first is located at modern day Vela Luka; the site is similar to that of Pharos and is located at the head of a long bay with a large plain behind the town. The plain is similar in size to the one located on Hvar. This site is particularly illustrative in that less than 2.5 km to the southwest there is the potential for a hill-fort that could guard the plain and the harbor as well as the maritime route that passed by the southern coastline. A nearby cave system to the north has been in use since Neolithic times (Radić 1999:362). The site is currently under excavation, and a site report is yet to be published. However, early finds indicate that the site was in use mainly from the Hellenistic period to the first century B.C. (Farbstein 2012:1).



Figure 10: Vela Luka and the contiguous plain (Image by author, 2016).

According to a survey begun in 1993 and completed in 1995, the island was densely populated during the Bronze and Iron Ages (Kirigin 1999:148). Greek finds have been discovered at Vela Luka and other sites, but there are still not enough data to support the theory of a Cnidian colony on the island. The same survey found that the fertile area north of Lumbarda only covers 50 hectares, an amount insufficient for supporting a Greek colony. Kirigin (1999:148) does mention, however, that it could have supported a military outpost.

The second site on Korčula is that of Lumbarda (Figure 11), located on the east side of the island on the northern shore at Sutivan Bay. Recent studies put the founding of the site to the first half of the 3rd century; however, other studies attribute the founding to the early 4th century (Rendić-Miočević 1965:310-313). The new date corresponds well with grave goods found at several poorly excavated tombs in the valley. To date, there have not been any field surveys conducted at Lumbarda, but according to the *psephisma*, close to 200 colonists from Issa

received 4.5 *plethra* of arable land as well as land within the city walls for the construction of a house.

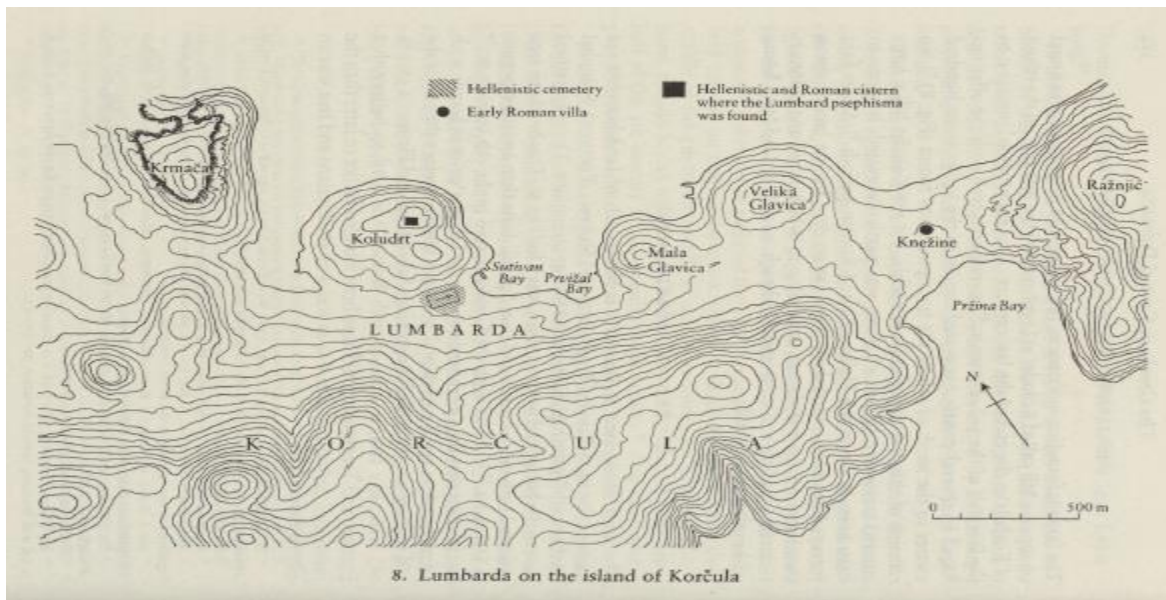


Figure 11: Topographical Map of Lumbarda with noted archaeological sites (Kirigin 1990:312).

Each of the above sites holds distinct advantages for colonization. With the topographic maps and other geological data, these sites will be quantitatively analyzed in terms of arable land availability, harbor size and orientation, slope, distance from local nodes, and distance from the mother city (when applicable). These sites will then be analyzed subjectively for economic value and strategic placement locations along known maritime routes. Archaeologically, coinage from these sites should provide insight into the amount of trade occurring within the network as well as potential trade occurring outside of the micro-region. This analysis will allow this network of sites to be compared to the network of sites in the Black Sea.

Archaeometric Analysis

Archaeometric analysis can tell us whether pottery was locally produced or imported, help us define the technology used in pottery production, identify the production center and the source of raw materials, and reconstruct patterns of exchange and trade (Šegvić 2011:63).

Utilizing archaeometric analysis previously conducted on materials in and around Dalmatia, this thesis aims to determine the interconnectivity of Greek settlements in the area. The most important aspect is the technology associated with firing temperatures between the indigenous population and the Greek colonists. During the colonial period, the native population is known to have used both native styles and imported Hellenistic ware. Many of the vessels were used in the storage or drinking of wine and include kraters, jugs, bowls, and cups. Prior to this period very few examples of fine ware have been discovered in the area, indicating that ritual wine drinking was limited only to the elite. However, by the 5th century, fine ware has been found in such quantities and variety that wine drinking must have permeated into all of the social groups.

Ceramic analysis for the samples within this study were subjected to microscopy, inductively coupled plasma mass spectrometry (ICP-MS), X-ray diffraction (XRD), scanning electron microscopy (SEM), and electron microprobe analysis (EMPA) by archaeological researchers. Not all samples underwent each form of analysis because of sample instability. The microstructure and phase mineralogy was examined by removing thin sections perpendicular to the surface. This process also enables archaeologists to discover the degree of vitrification. Conventional point counting procedures were also used to identify inclusions consisting of quartz, calcite, rock fragments, and grog particles (old ceramic waste). Intentional human additives known as temper materials are also identifiable by this process (Stoltman 1991:105).

XRD analysis was performed to determine the mineral phases of samples. Powdered samples were scanned at a rate of 2° min^{-1} over the range of $2\text{-}120^\circ 2\Theta$ with a $\text{CuK}\alpha$ radiation, graphite monochromator (PANalytical B.V., Almelo, The Netherlands) ($U = 40 \text{ kV}$, $I = 20 \text{ mA}$). The amounts of quartz, pyroxene, and calcite were measured by means of semi-quantitative XRD analysis (Šegvić 2011:68).

SEM imaging was performed under a high vacuum, with back scatter detector and an acceleration voltage of 20 kV. Measurements were taken on both fractured and carbon-coated samples, as well as on thin polished section samples that were also used for the microprobe testing (Šegvić 2011:69).

The chemical composition of the mineral phases was measured using five wavelength-dispersive spectrometers. Testing parameters were 15 kV accelerating voltage, 20 nA beam current, ~1 μm beam size, and ten seconds counting time for all elements (Šegvić 2011:69).

Whole-rock analysis was performed on 0.2g samples which followed a lithium metaborate/tetraborate fusion and diluted nitric digestion. Loss on ignition (LOI) was acquired by weight difference after ignition at 1000°C. Larger, 0.5 samples were digested in Aqua Regia and analyzed by ICP-MS. Repeated sampling indicated a relative standard deviation of $\pm 5\%$ (Šegvić 2011:70).

CHAPTER 3: HISTORY

Introduction

In order to understand the great expanse of the Greek peoples in post dark-age Greece, one must look at the familial protocols and inheritance practices prior to the 8th century (Snodgrass 1971). Traditional social organization in the Greek communities dictated a specific transfer of land ownership based on familial and generational requirements. Land ownership was typically passed down along hereditary lines (Gwynn, 1918:121). Entrenched in this social system, and with an explosion in population beginning in the 9th century, the density of population in an already sparse mainland Greek countryside generated the need for expansion. These factors are important, and while non-Greek areas around the Mediterranean may not have experienced the same population growth, those areas were not uninhabited. It is therefore most widely accepted that the departure of Greeks from the homeland was the result of the push caused by overpopulation at home rather than the pull of undiscovered lands or wealth. However, while land and the search for wealth may not have been the driving forces behind Greek colonization, the prospect of riches and new lands to settle clearly factored into their decision making process.

The most notable and well-researched regions of colonization are Massilia, Sicily, Etruria, and the Black Sea. Notably absent prior to the 5th century is the Adriatic, an area dotted with viable ports and the terminus to the lucrative amber trade from the Baltic region. Maritime trade has been traced back to the Mycenaeans as far north in the Adriatic Sea as the modern day Venetian lagoon. In Frattensina, a settlement lying on the southern edge of the lagoon near modern day Adria, archaeologists have unearthed Mycenaean pottery fragments dating to the end of the second millennium. Trade in metals and Baltic amber appears to have continued until the

9th century (Braccisi 2003:351). Exports were not the only goods found at the site; imports such as ostrich eggs and exotic horn artifacts of mixed Mycenaean and Italic styles were also found. The Mycenaeans chose this site strategically in an effort to create an *empóron* at the intersection point of the maritime and overland trade routes.

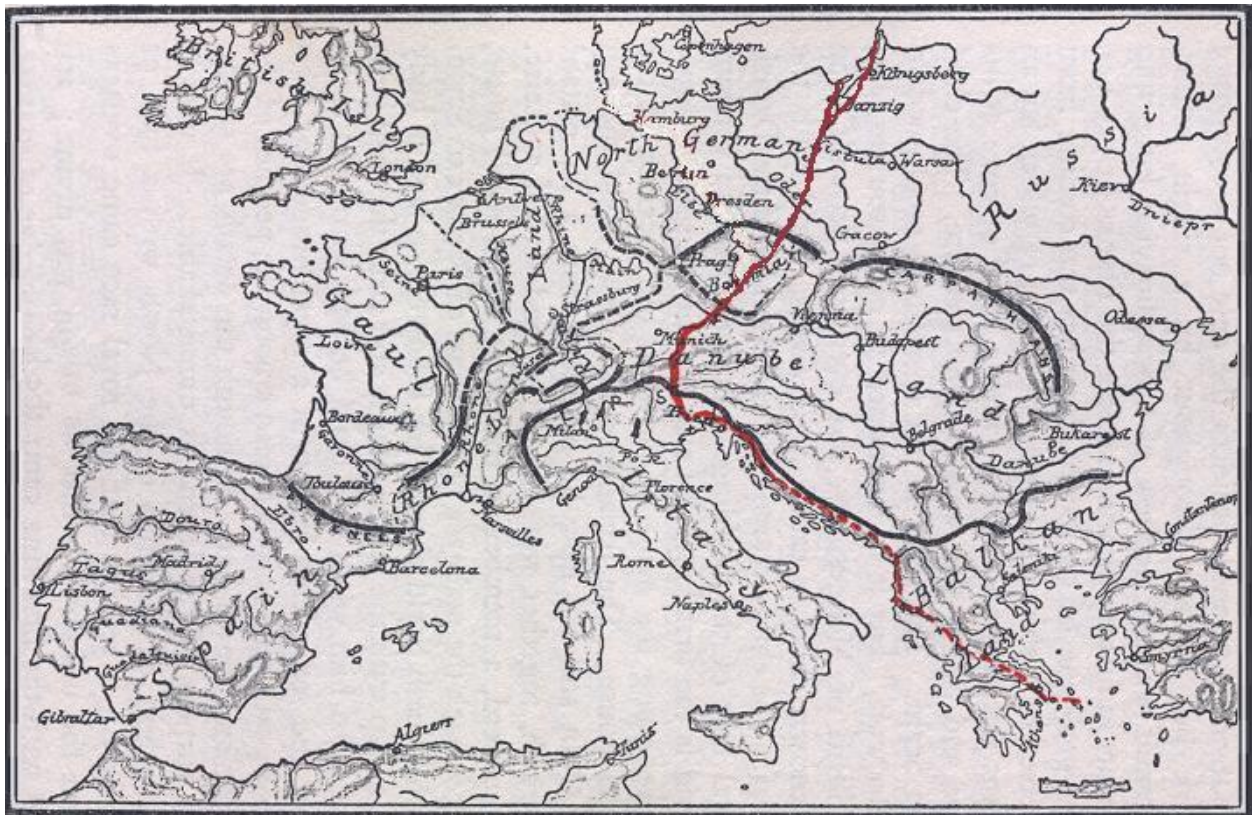


Figure 12: Amber Road (Rugg-Gunn 1940).

These routes, primarily identified for the amber trade, begin along the eastern coastline of the Baltic sea in Estonia, Latvia, Lithuania, and Poland, then proceed south through modern day Poland, sometimes Germany, Czech Republic, Austria, Slovakia, Hungary, and terminate in either Croatia or Italy (Figure 12). Typically referred to as the Amber Road, the path then taken by the fossilized resin trade was both overland and riverine along the Danube, Oder, Morava, Isonza, and Timavo rivers. A postulated alternate route follows the Elbe, Moldava, Danube, Brennero, Resia, and Adige. Both routes terminate in the Electrides islands, long considered a

place of mysticism and intrigue by the ancient Greeks as can be read in the *De mirabilibus auscultationibus* (Aristotelian *Corpus* § 81: 836a-b):

They say that in the Electrides islands, which are located deep in the gulf of the Adriatic Sea, there are two consecrated statues, one made of tin, the other of bronze, both realized according to the archaic style. It is said that these are Daedalus' works [...]. They say that the river Eridanus silted up these islands. There is a lake apparently near the river containing hot water. A heavy and unpleasant smell comes from it, nor do birds fly over it without falling and dying [...]. The local inhabitants say that Phaethon fell into this lake when he was struck by a thunderbolt. There are many poplars in it, from which oozes the so-called electron. They say that it is like gum, and hardens like a stone; it is collected by the inhabitants and brought to the Greeks. They say that Daedalus came to these islands, and putting in there set up in one of them his own image, and on the other that of his son Icarus [...].

These shifting shoals in the Venetian lagoon were the locale at which the Greek traders obtained the amber that then made its way to the Aegean. The Eridanus river has been linked by Herodotus (III:115) to the Po River. However, according to Braccesi, (2003), it appears that mysticism played an important role in the trade of amber, being highly sought for jewelry, statuary, and incense. In this way amber and its associated trade network infiltrated the historical record as well. It may also be of importance to note that, after the fall of the Mycenaean empire around 1200 B.C., the area around the Venetian lagoon and Adria remained neglected by the Greeks until the Syracusans recolonized Adria during the reign of the two Dionysii, in approximately 400 B.C. (Braccesi 2003: 357). There is also the possibility of an overland route that terminated on the Peloponnese, although the extra time involved makes this unlikely. The route outlined in Figure 12 is not detailed enough to show the actual route taken via each mountain pass and river, but it provides a cursory overview of one possible route for the amber trader. The other viable option terminated in the Black Sea at the mouth of the Danube River, but much less evidence for amber has been found in that area.

While we know that trade in many regions declined after the fall of the Mycenaean empire, it would be presumptuous to assume that it halted altogether. As stated by Braccisi, amber played a not insignificant role in Greek jewelry. It is, then, an enigma as to why the northern Adriatic was left uncolonized for close to 800 years.

If the Greeks passed over the Adriatic, they must have done so in favor of what they believed to be more lucrative locales. It will be easiest to look at the sites in chronological order of their foundation, starting with Pithecusa and Etruria, followed by the Black sea colonies and finally coming to the Rhone delta and southern France. Many scholars, including A.J Graham, believe that these are the three areas where archaeological evidence enables significant study (2001:27). While there has been much debate over the exact foundation dates for each of the following colonies, established estimates will serve our purpose adequately.

Sicily and Italy

Pithecusa, generally accepted as the first overseas Greek colony, has long been used as model for how the Greeks acted in their efforts at colonization. An island off the coast of Istria, it provided a strategic location in the iron trade from the west to the eastern Mediterranean. With a fairly firm foundation date in the first half of the 8th century, many consider it to be the first Greek attempt in establishing an *emporion* (Morgan 1988:313). However, according to Buchner, recent evidence and the abundance of Late Geometric (LG) I finds points to Pithecusa as active in the pre-colonial trade since finds consist of material culture from Greek, Egyptian, and Oriental origins (Bucher 1971). The Phoenicians had an active trade already in place at the time dealing with mainly luxury goods aimed at the ruling class (Aubert 1997:137). The Egyptian objects are assumed to be of Egyptian provenance but to have been carried by Phoenicians along the previously established trade routes. Nowhere else in the east have Greek artifacts been found

earlier (Graham 2001:47). It is entirely possible that, through interactions with traders at Pithecusa, the Greeks created the model for their colonies. These early colonies seem to be in close proximity to those established by the Phoenicians during the late 9th century and are possibly due to the waning power of the Phoenicians during the 7th century (Albright 1941:21).

Closely following the Greek habitation of Pithecusa, Cumae was the second Greek colony to be founded. It was originally dated to 1050 BC, but that date has been disproven. According to Strabo (*Geography*, Book V 4.4), Cumae was the first Greek colony on the Italian mainland. Blakeway (1933:201) states that, “Cumae was not the parthenogenic daughter of one Greek state but the bastard offspring of at least three, Chalcis, Eretria, and Aeolian Cyme.” Conversely, according to Livy (8.22), it was founded by the Chalcidians alone, who had originally settled at Pithecusa before crossing the straits to the Italian peninsula c. 750-725 (Woodhead 1962:14). There is some debate on this point, as the earliest material dates to LG II c. 725-700 despite finds dating to LGI being discovered on Sicily (Graham 2001:48). However, Thucydides (6.4) states that Zancle was first settled from Cumae, negating the possibility of the Sicilian colony predating Cumae (Morakis 2011:462).

As the Greeks began to settle in Sicily a more firm date of 734 can be set for the colonization of Naxos and Syracuse. Syracuse appears to be the first solo venture in Greek colonization, and the colonists chose the location of the settlement with great care. The site has a large natural harbor with nearby defensible hills and rural areas for grazing and some grain cultivation. This choice starts a trend since many sites then follow this pattern. Contrary to Greek practice, most of the Phoenician sites, as stated by Niemeyer (1990:473), are located at deltas or in the nearby alluvial plains and are usually more of an *emporion* than a colony. The strategic placement of Phoenician settlements for trade is clear from their overall position in the

Mediterranean basin and within a more localized geographical environment. As the Corinthians, led by Archias, crossed the southern Adriatic to found Syracuse, they chose a site with a well-defined harbor, fresh water springs, and a fertile countryside. Each of these aspects corresponds to Alan Small's criteria for colonization (1969). Early archaeological theories stipulated that the Greeks were in greater need of land than economic opportunities abroad (Gwynn 1918:90). While the need for land may have motivated a significant portion of the population to leave Greece, it would seem that, based on the sites chosen, trade and wealth was also on the mind of the colonizers.

While Pithecusa is commonly thought to be the first site associated with early Greek colonization, recent evidence has shown that it was in existence prior to Greek contact and was likely one of the first "melting pots" in the Mediterranean with Etruscans, Phoenicians, and Greeks all taking part in the lucrative iron ore trade (Graham 2001:50). Morel (1984:134) even postulates that Greek settlers were commonly taking Etruscan wives. The Phoenicians were already established in the area by the eighth century, and, according to Thucydides (6.2), had settlements on the headlands and offshore islands all around the island of Sicily, which traded mainly with the locals on the western half of the island. These islands and promontories are important to consider because of colonial hybridization. This enabled the Greeks to protect themselves while still interacting with an indigenous population without domination (Van Dommelen 1997:319).

The Black Sea

At the same time, Greeks were also making excursions to the east and the Black Sea. For decades, it was thought that early exploration into the Black Sea was impossible for the Greeks because of wind conditions, tides, and currents in the Bosphorus. Rhys Carpenter (1948) states

that, until the invention of the penteconter, sailing into the Black sea was impossible. Carpenter states that, even with a penteconter, it was still not possible to sail easily up the straits because of its formidable current, common adverse wind conditions, and the available technology and sailing capabilities of a single rigged square sail. Less than a decade later, Benjamin Labaree (1957) refuted Carpenter’s assertion of impossibility, claiming that sailing into the Black Sea was not only possible, but was likely accomplished earlier and with more regularity than previously thought. The pentekonteres that Carpenter states were needed for a Bosphorus run are not merchant ships and are ill suited for trade and especially for colonization. That is not to say that they were never used; but for everyday trade, the bulkier merchantmen were widely preferred. Labaree analyzed the currents and winds on a monthly basis and discovered that the actual current of the Bosphorus is between 2.5 and 3 knots and that only the southwesterly winds can push it closer to 6 knots. However, on an average of eight days a month, these winds will blow in a northeasterly direction and not only retard the rate of flow through the Bosphorus but also provide a following wind enabling even a square rigged vessel to sail up the slower waters. Based on wind conditions both in the straits and over the Black Sea, Labaree has compiled the following chart for sailing conditions throughout the summer months.

Sailing Conditions	Winds	April	May	June	July	August	September
Ideal	<i>Bosp.:</i> southerly <i>Bl. Sea:</i> southerly	7.4	7.5	5.4	3.0	2.6	3.5
Probable	<i>Bosp.:</i> southerly <i>Bl. Sea:</i> northerly	5.6	4.7	3.6	2.0	2.4	3.5
Impossible	<i>Bosp.:</i> northerly	17	19	21	26	26	23

Table 1: Bosphorus Sailing Days. (Labaree 1957:61)

Once he established that sailing through the Bosphorus was possible, Labaree estimated that, under favorable conditions, it could have been accomplished under sail alone in less than

ten hours. While the summer months are the traditional sailing times in the ancient world, grains are generally a spring harvest and sailing up the Bosphorus was easier early in the year. Under these circumstances, vessels on their way to the spring harvest would only be waylaid at the straits for a few days at most before continuing on to the fertile lands of the Pontus and the colonies of Sinope, Trapezus, Heraclea, and later, the economic centers of Chalcedon and Byzantium.

Sinope is generally considered the first and most influential of the Black Sea colonies. Sinope is unique when compared to the western Greek colonies. Subject to a dual colonization, first in the 8th century, and again in 633 B.C., the Greeks showed persistence in colonizing a site that would be advantageous for agriculture and trade. The dual colonization is recognized from the two colonization dates set by Ps.-Skymnos (986-995) and Eusebius (*Chronographia* 01 37.2) in 757 and 633 respectively. By the time the first Greek arrived, Sinope was already a Leuko-Syrian city. It is still unclear whether the Greeks tried to establish their own colony or if they assimilated themselves into the local culture. The latter is more in line with the typical Greek colonization process. However, despite the local population, the first attempt was likely razed by the Cimmerians at an unknown point in time. A second attempt at colonization was then undertaken in 633 B.C., although this time the colony flourished because of a more powerful Greek force and a lessened Cimmerian presence. The other possibility is that, during the first attempt at colonization, the Phrygian and Lydian kingdoms did not welcome the Greeks in the way other local populations tolerated their presence. It is unlikely that the Greeks were able by themselves to fend off enemies in the Pontus, since the number of Greeks in the area would not have been able to hold off a well-armed force. Because of their low colonizing population, the Greeks allied themselves with the local populace through tributes, taxes, and bribes (de Boer

2015:76). De Boer also states that it is entirely possible that, for most of the Archaic period, these sites were not even colonies, but were more similar to the early days at the *emporion* of Pithecusa, where the Greeks were more likely renters than owners of the land.

Sinope also differs from the aforementioned sites in that it is located on a peninsula at the northern most point along the Pontus and lacks a well-defined harbor. However, less than 10 kilometers to the west there is a viable harbor. This harbor, though, is easily bypassed while Sinope, located on a promontory, provides a significant obstacle for sailors along the coastline and is an ideal stopping location for vessels practicing cabotage, since it protrudes into the Euxine in a northwesterly direction before the coastline turns back sharply to the south.

Trapezus, modern Trabzon, located 400 kilometers to the east of Sinope at the delta of the river Piksidis, was set up by colonists from Sinope. It was another important waypoint along the Pontus and a safe harbor from storms in the Black Sea. Trapezus was also founded by settlers from Miletus, and apparently the earliest form of wealth came from the sea, in fish, and the land, in grain (Gwynn 1918:96). While the mountains that run close to the coast limit large scale agricultural endeavors in the area, a number of passes cross through the Paryadres mountains and a number of rivers provide access to the interior of the Pontus. There are also plenty of fish in the local waters. The point of entry to the hinterlands may have been an important initial motive for colonization, but the port was also one of the last safe harbors before reaching the northern Colchis.

Finally, Heraclea Pontica, situated at the mouth of the Lycus river, is believed to have been established between 588 and 560 (Pausanias 5.26.7). Founded by the city state of Megara, Heraclea became one of the most important cities in the Pontus, controlling the region as far west as Cide, and setting up multiple subcolonies of its own. Heraclea has a large natural harbor and

abundant access via the Lycus River to the fertile inland regions. In addition to trading in the natural resources from the interior, Heraclea was extremely active in the fishing industry.

The Western Mediterranean

The final stage of the Greek colonization movement was expansion to the extreme western Mediterranean. It began with Massilia in southern France at the delta of the Rhône by the Phocaeans around 600 B.C. (Busolt 1926:452). According to legend, the land Massilia lies on was gifted to the *oikistês*, Euxenus, as a wedding gift to his son, Protis (Aristotle XIII: 576a). The first known archaeological finds are three cups of the Corinthian type, dating back to the last quarter of the 7th century (Graham, 2001:56). These cups seem to have been made in Southern Italy, and could also be a strong indication of pre-colonial contact between the Greeks and the local inhabitants. However, the first imports appear to be of Etruscan make, predating even the earliest Greek imports. Situated in the hills surrounding a secure harbor and at the termination of one of the larger riverine networks of Europe, Massilia quickly became a leader in the western Mediterranean; with minimal influence from its mother city Massilia's economy differed significantly from that of Phoea. Massilia's economy consisted chiefly of agricultural goods in the valleys and lowlands and pastoral farming at the higher elevations. Of particular note was the abundance of harvestable salt in the surrounding lakes, which provided an excellent export in return for wine, fine pottery, and metalware. Other major exports of the region were metals in the form of copper, tin, silver, and gold, followed by medicinal herbs and fish products. Graham (2001:58) hesitates to consider the raw metals as a lucrative export, as it is doubtful that the tin road, originating in Cornwall and following the Seine and Rhône to the Mediterranean, was in existence prior to the founding of Massilia.

From Massilia, the Greeks penetrated even further west, creating a number of colonies in Spain, including Rhode and Emporia. However, in this area, they were largely in competition with the Phoenician commercial empire. Many Greeks regarded these lands as the barbaric west and felt they were of little consequence to the homeland (Malkin 2011:156). Cyrene, in modern day Libya, founded around the middle of the 7th century, appears to be one of the few forays into North Africa for the Greeks, in large part because nearby Egypt was the one place in the whole of the Mediterranean where they encountered a civilization more advanced than their own. Cyrene certainly began as a trading outpost before growing into a regional power. In Cyrene, as well as other North African colonies, it was the local Egyptians that dictated Greek activity in the area and in some cases relocated Greeks when necessary (Malkin 2011:89). The original colonists from the island of Thera arrived during a particularly bad drought that nearly killed all the plant life on Thera; and the African region was well known for its production of silphium, a medicinal herb prized in the ancient world but now extinct.

The Adriatic Sea

The Adriatic is one of the last archaeologically unexplored regions of the Mediterranean. Both Malkin (2011) and Jurišić (2000) note the significant absence of the early colonists in the Adriatic, while also acknowledging that the Adriatic and the Black Seas regions have the fewest published sites. This is most likely due to the lack of funding and access in the region, but in the last few decades, work has greatly increased, especially in Croatia, while the Albanian and Montenegrin coastlines lag behind. As in the Black Sea, some early archaeologists believed that sailing north into the Adriatic was nearly impossible, given ancient technology and typical wind conditions. In regard to the Bosphorus, that issue has been resolved, but that of the Adriatic has not. As Braccesi (2003:351) stated above, the Mycenaean sailed to the Venetian lagoon prior to

1200 BC; but after their fall, the Liburnians took up the mantle of trade in the Adriatic under their own thalassocracy until late in the 8th century, when they were forced from Corcyra by the Corinthians. After the island of Corcyra, modern Corfu, was seized by the Corinthians, it became a staging point for Corinthian colonial endeavors to the west (Wilkes 1992:110). Thucydides notes that Corfu was afterwards typically a Greek city state but the region of the mainland was controlled by the natives. Thucydides (1.24-25) notes that the Greeks on Corcyra colonized the city of Epidamnus which stands on the right of the entrance of the Ionic gulf. Its vicinity is inhabited by the Taulantians, an Illyrian people. The colonists were joined by some Corinthians, and others of the Dorian race and, as time went on, the city became populous and represented to some degree a mixed culture. Eventually, the Illyrians resented the growth of the city and went to war with Epidamnus, triggering a civil war in the city. The democratic party in the city expelled the nobles who joined forces with the non-Greeks, the barbarians as they were called.

Thucydides describes both the cooperative and competitive relationship of the Greeks with the Illyrians. This trend continues through the initial stages of colonization in Dalmatia, as can be seen when the Greeks displaced the indigenous people of Pharos, but after a battle were able to maintain a relatively peaceful relationship that enabled a period of cooperation and prosperity for the region. Thus, while the weather conditions in the Adriatic could be volatile at times, they were by no means always perilous, as traders from the Mediterranean had been plying northern reaches of the Adriatic for hundreds of years prior to the main era of Greek colonization.

In order, however, to understand the dynamics of the ancient Adriatic we must turn not to Thucydides, Herodotus, or other Greek writers of the 5th century BC who make *obiter dicta* reference to the region, but rather, to later writers. The most authoritative and most complete report of those that dwelt in the Adriatic is the *Periplus* or *Coastal Passage*, mistakenly

attributed to Scylax of Caryanda. While the true author is unknown, the clockwise account of a sailor's voyage along the coast of the Adriatic Sea was likely written around the middle of the 4th century B.C. (Wilkes 1992:94). The nature of this version makes it entirely possible that cabotage was still very much the typical trading pattern in the Adriatic. The chronicle in Wilkes' translation begins in southern Italy and follows northward:

- 14 After Lucania the people of the Japyges extend as far as mount Orion, which lies in the Adriatic. The voyage along the coast of Japygia lasts six days and six nights. There are in fact Greeks dwelling in Japygia and their cities are Heraclea, Metapontum, Tarentum and the port Hydruntum on the coast within the Ionian or Adriatic sea.
- 15 Next after mount Orion and the Japyges comes the people of the Samnites, who extend from the Tyrrhenian sea to the Adriatic. The voyage along the Samnite country lasts two days and one night.
- 16 After the Samnites come the people of the Umbri, where lies the city of Ancona. This people worships Diomede, as a result of the benefits received from him, and they maintain a shrine of Diomede. The voyage along Umbria lasts two days and one night.
- 17 After the Umbrian people come the Tyrrheni: they extend from the Tyrrhenian seas on the far side to the Adriatic. In their country lies the Greek city Spina and the river Spines, and the voyage upstream to the city is around twenty stades. The journey from the city Pisa to that same place lasts three days.
- 18 Next of the Tyrrheni is the Celtic people, who were left behind from the Celtic expedition and who occupy a small territory extending to the Adriatic. At this point comes the innermost recess of the Adriatic.
- 19 After the Celts come the people of the Veneti, in whose land is the river Eridanus. Here the passage lasts one day.
- 20 After the Veneti the Ister. This river flows also into the Pontus Euxinus, facing in the direction of Egypt. The coastal voyage along the Istrian region lasts a day and a night.
- 21 After the Istri is the people of the Liburni. In the territory of that people are the following coastal cities: Lias, Idassa, Attienites, Dyyrta, Ampsi, Osi, Pedetae, Hemiono [= Alos, Tarsatica, Senites, Dyyrta, Lopse, Ortopeletae, Hegini]. These people are ruled by women, who are the wives of freeborn men, but they cohabit with their own slaves and with the men of the neighboring regions. Before the coast lie islands, of which I can record the following names (for there are many others which have no name): the island Istris 310 stades long and 120 stades wide, the Elektrides, and the Mentorides are the large islands. Then comes the (river) Catarbates. The voyage along the coast of the Liburni lasts two days.
- 22 After the Liburni there come the Illyrian people. The Illyrii dwell by the sea as far as Chaonia, which lies opposite Corcyra, the island of Alcinous. There is situated the Greek city called Heraclea, with a harbor. There dwell the Lotus-eater,

barbarian peoples with the names Hierastamnae, Bulini, and Hylli who are neighbors of the Bulini. This people tell that Hyllus the son of Hercules had his dwelling among them. They are a barbarian people occupying a peninsula a little smaller than the Pelopennese. The Bulini are also an Illyrian people. They voyage along the land of the Bulini as far as the river Nestus takes one day.

23 The Nesti. After the river Nestus the voyage follows a course around a bay which is called the Manius bay and which takes one day. Within the bay lie the islands Proterius, Crataiae and Olynta. The distance between them is [?8 or 12] stades or less and they lie in the direction of Pharos and Issa. The former is now Pharos the Greek island and the latter Issa, on both of which there are Greek cities.

Before one reaches the river Naron a broad strip of land extends far out into the sea.

There is an island close to the coastal region name Melite, and another close to it is named Black Corcyra, where the land extends out from the coast in a second promontory but the other faces in the direction of the river Naron. Corcyra lies twenty stades from Melite and eight from the mainland coast.

24 Manii. After the Nesti is the river Naron. The passage into the narrows of the river is unimpeded. Indeed, triremes and cargo vessels sail as far as the trading settlement which lies upwards of eighty stades from the sea. The people living there are the Manii, who are by race Illyrians.

Beyond is a huge lake, extending from the inland side of the trading settlement as far as the Autariate, an Illyrian people. In the lake is an island of one hundred and twenty stades, that is especially favorable for agriculture. The river Naro flows on out of this lake. From the Naron to the river Arion is a day's voyage.

Then from the river Arion (to the river Rhizon) the voyage is a half-day. There are the rocks of Cadmus and Harmonia and a shrine not far from the river Rhizon.

From the river Rhizon to Bouthoe is (a half-day voyage, as it is close to the Rhizon) trading settlement.

25 Enchelei. The Enchelei are an Illyrian people, who inhabit the land after Rhizon. From Bouthoe to Epidamnus, a Greek city, the voyage takes a day and a night, by land three days.

26 Taulantii. The Taulantii are an Illyrian people, in whose land is the city Epidamnus. A river flows by the city, by the name the Palamnus. Then from Epidamnus to Apollonia, a Greek city, the journey on foot takes two days. Apollonia lies fifty stades from the sea and the river Aias flows by the city. From Apollonia to Amantia the distance is 320 stades. From Amantia more within the Ionian Gulf is the city Oricus.

The journey to the sea of Oricus is eighty stades, of Amantia sixty. Bounding all these on the south are the Atintanes, below Oricus and Chaonia as far as Dodona. Around this area are the Ceraunian mountains in Epirus, and nearby is a small island named Sason. From there to Oricus the voyage is one third of a day.

27 These are the Illyrian peoples, extending from the Bulini up to this point. The opening of the Ionian gulf extends between the Ceraunian mountains and the Japygian peninsula. And to the city of Hydruntum from the Ceraunian mountains the crossing is around five hundred stades. This is the entrance to the gulf, and

that which lies within is called the Ionian gulf. There are many harbors in the Adriatic: the Adriatic and the Ionian gulf are one and the same (Scylax 14-27).

Although this text contains a number of inconsistencies and errors, it provides a basic profile of the lands and peoples encountered along the coastlines as well as approximate distances and travel times between the major cities and harbors. There were a number of small tribes that made up the whole of the Illyrian population whom pseudo-Scylax describes as being of a completely different race. He also uses the term “barbarian” a number of times when describing the people of the Adriatic, which indicates that even in the middle of the 4th century there were a number of undeveloped areas. However, they were apparently not so wild that they attacked his vessel. Also to be noted, there is no mention of piracy, an aspect which would usually resonate with interested readers and be of importance to other sailors.

Of great importance to this study are passages referencing the Greek cities of Pharos, Issa, and Heraclea (with a port), the location of which has been debated for decades. Wilkes (1992) mentions that the Adriatic offered little in terms of economic gains and even less in terms of agricultural value, while other regions of the Mediterranean were much more lucrative, yet the Dalmatian islands and other locations had established Greek cities by the time of authorship. Of particular note is that reference to Pharos now being a Greek island as opposed to an island with a Greek city, in the way Issa is mentioned. There is also no mention of Greek cities or colonies on Black Corcyra (Korčula).

Despite the issues many archaeologists have with this text, mainly the date of publication and original author, much can be gleaned from the text. The references to Greek cities in Dalmatia and the still undiscovered Heraclea, instead of just an allusion to Greeks living abroad among the locals, are important. These statements aid establishing nodes within the Adriatic

trade network and help determine how pervasive Greek colonization was in the upper reaches of the Adriatic.

In the southern Adriatic, Corcyra was by far the most important of the southern Adriatic colonies. When the Corinthians obtained control of the island at the end of the 8th century, their overseas endeavors rapidly expanded. In the beginning, Corinthian control over the island was a symbiotic relationship that paid dividends in the joint colonization of both Epidamnus and Apollonia. Nevertheless, Corcyra would rebel against its mother-city in 660 as would some of its other colonies, since a few even surpassed the mother city in power and influence in the Adriatic region. This situation was likely a backlash against the tight leash that Corinth kept on some of its colonies in addition to conflicts with Corinthian political system and the expulsion of the Bacciads (Plutarch, *Greek Questions* 17, 18, 59). Still, not until the 4th century did Syracuse, then under the rule of Dionysius the Elder, found colonies in the northern Adriatic. Dionysius apparently did so to facilitate trade. So, if there were economic gains from natural resources to be had in the 4th century, why were those resources not being exploited earlier by the Greeks, as the Mycenaean had done before them? Were the resources of the Adriatic not as important as those in other regions? Is it simply due to the lack of research conducted in the area? Or was the Dalmatian island network already flourishing as a micro region that was simply unconnected to the rest of Magna Graecia?

CHAPTER 4: GEOLOGY

Introduction

The Mediterranean basin has long been dubbed the middle sea, but the Adriatic within it could bear the name of the forgotten sea (Boardman 1999). While the Italian coastline is defined by a shallow, sandy bottom with relatively few true harbors, the Eastern coastline is dotted with rocky islands, outcroppings, undersea mounts, and numerous deep water ports and harbors (Jurišić 2000:52). These aspects create a significant draw for maritime trade despite certain locations being dangerous for maritime travel under unfavorable weather conditions. Also to be noted among the islands dotting the coast, are submerged seamounts that, during swells, can become hazardous to maritime travel. However, these obstacles also exist elsewhere in the Mediterranean and did not hinder trade in a significant manner.

The Adriatic Sea, as part of the Mediterranean, does not experience major tidal shifts; instead, it is subject to the influence of winds and storms. Much of the coastline is limestone and is dotted with bays, islands, and caves, both at sea level and submerged (Faivre et al. 2011:132). In the regions north of Zadar, Faivre and his team used tidal notches along the coast, as well as Roman jetties and fish ponds, to discover that sea levels have risen over 1.0m since the first century. A jetty in Valeta Bay from the Roman era with dimensions of 35.0m in length and 10.0m in width began about 5.0m from the shoreline and was submerged to a depth of 0.75m, which equates to a shoreline slope of an 8 degree grade. Two smaller jetties in Sveti Ivan Bay were discovered at a depth of 1.0m. These jetties were also discovered to begin a few meters away from the current shoreline and are at a depth of 0.4m, which indicates an even shallower slope than in Valeta Bay. Jetties were not the only formations studied by the group; fish ponds also portray similar aggregate slope values at Verige bay on Brijuni Island and in Kupanja Bay.

South of Zadar, the shoreline inclines slightly and the relief is low. This structure appears to have limited the number of geological markers in the area, although jetties and fish ponds are still found in relatively high numbers. Here the team found a submersion of 1.5m or greater for fish ponds on Svršata Island and at Mala Proversa. The port structures at Kumenat and Polacine on Pašman provide similar evidence at depths of 1.4m and 1.6m respectively. Moving south of Šibenik, the team found no viable archaeological markers in the form of jetties or fish ponds. This lack of data possibly occurs because of the coastline morphology in the southern Adriatic. In places, the coastline slope can reach upwards of a thirty percent grade.

The Croatian coast lies on an elevating fault line. While the mainland and the hinterlands have risen slowly over the past two millennia, the Istrian Peninsula and many of the nearby islands are subsiding (Faivre et al. 2011). The Adriatic sits on the Apulian microplate, which separated from the African plate in the Mesozoic Era. Its separation and subsequent interactions with the Eurasian plate provided the foundation for the mountain ranges as well as the coastal islands. The limestone bedrock of Croatia and other eastern Adriatic countries is responsible for the karstification of the landscape. This type of environment limits surface water accumulation and was one of the main reasons that some of the rivers in the region were seasonal, especially during the dry periods of antiquity (Wilkes 1992:13). According to Wilkes, only the Drin and Neretva are permanent rivers since most of the rainfall drains to the east of the Dinaric Mountains and add their waters to the Danube and eventually the Black Sea as opposed to the Adriatic. Only light craft were able to navigate the remaining rivers along the eastern Adriatic, and only in the lower reaches of each river.

Both of these major rivers play important roles in the development of the area. The Neretva is the major route from the coast into what is now central Bosnia-Herzegovina and has

been in use since prehistoric times (Wilkes 1992:14). The Drin, in contrast, supplies most of the water for Albania and has a number of branches on the coastal plain. The rivers of Albania experience drastic changes from the mountains to the coastal plain. Once they reach the plain, their flows become languid and in places are more marsh-like than a defined river, especially during the spring thaws. During the summer, these dry up as the soil of the karst is not capable of holding large amounts of water. This plain varies in width from the coast and can be anywhere from just a few miles to over thirty miles wide; at only a few meters above sea level, the plain provided excellent winter grazing in ancient times. Northward, from Dures to Split, the plain narrows and in places is nonexistent as the mountains fall almost directly into the Adriatic. Continuing north from Split to Zadar, the plain reappears, and these lowlands are once again suitable for agriculture and grazing. Finally, on the Istrian peninsula, the karst landscape once again predominates over most of the region. However, the higher water table, caused by the rivers in the region, prevents the landscape from suffering the more severe aspects of a karst landscape.

The two dominating hydrogeological formations on the coast are described at KA1 and KA2. KA1 is described as having karst aquifers of high permeability, intensely karstified terrains with karstic type porosity, and a high transmissivity and turbulent water regime of ground water flow. This type describes the regions of higher slope on the islands of Vis, Korčula, and Hvar. The arable regions of the above islands and Zlarin are of the KA2 type. This type consists of karst aquifers of moderate permeability, karst-fissure type of porosity, and a medium level of transmissivity. The lithology of this landscape is dominated by marly limestones which are thinly bedded, with marble and dolomites interspersed with calcirudites, breccias, and sandstones.

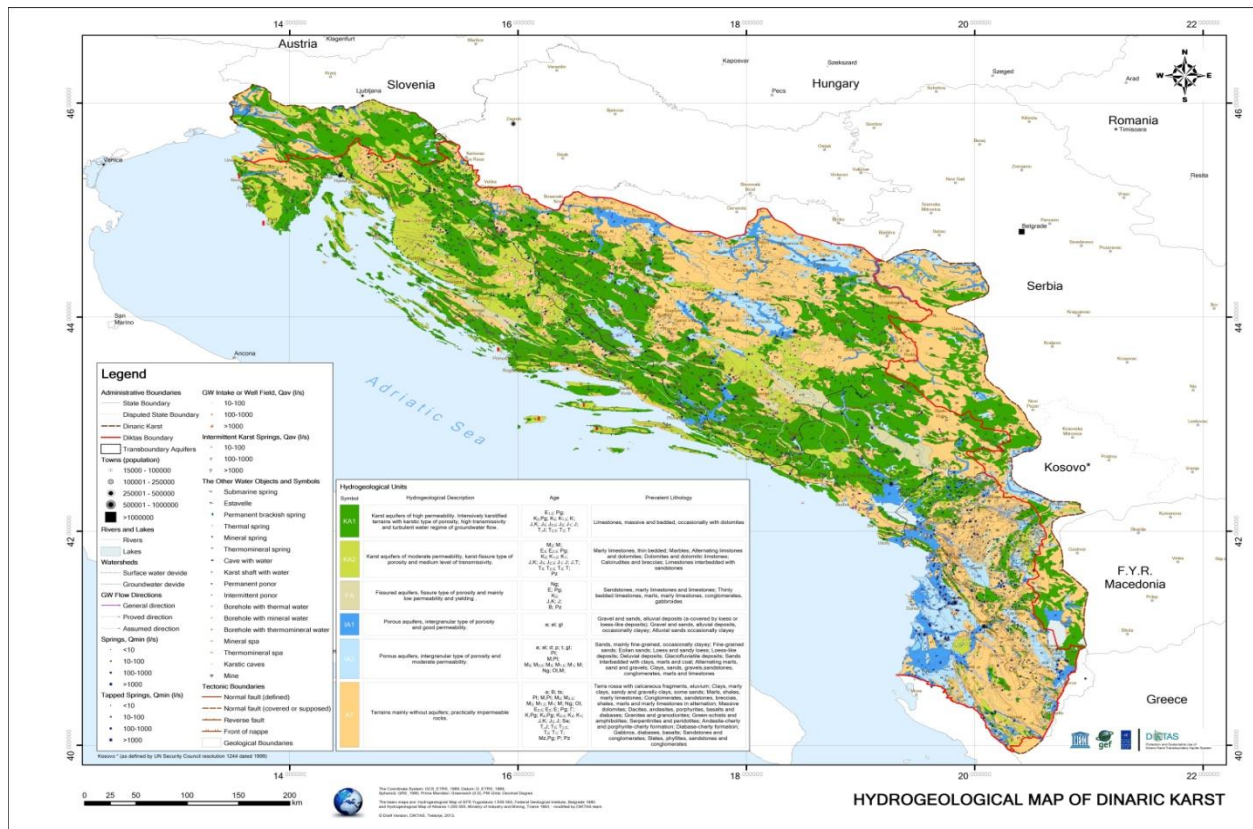


Figure 13: Modified Hydrogeological Map of the Dinaric Karst (DIKTAS, 2013).

Soil composition in Dalmatia varies greatly from island to island as well as along the mainland coastline. The coastal area of middle Dalmatia is composed mainly of Upper Cretaceous and Eocene limestone. The current structural setting is due largely to Palaeogene tectonic uplift caused by the above mentioned fault, producing karst napes and Eocene carbonate flysch deposits (Korbar 2009). According to Korbar, such platform environments contain limited areas for clay formation and deposition. However, localized clay deposits can be attributed to Cretaceous rocks related to paleo-relief and paleo-karst. Durn et al. (2006) identified greenish-gray clays in the Aptian-Albanian paleo-karst of Istria that appear to have been caused by erosion of surficial soils and sediments that accumulated in paleo-karst pits, following oscillating marine transgressions. The clay is mostly illitic, but it is strongly believed that some transformation of smectite to illite must have taken place, due to the repeated wetting and drying

on the landscape. Along the coastline of middle Dalmatia Terra Rossa is in abundance. This is likely due to Eocene carbonate to marly flysch depositing in the areas between Resnik and Cape Ploča.

In a region predominantly composed of limestone, Vis is an anomaly in that volcanic outcrops exist on the island. These are mainly located in the southwestern part of the island, near Komiža, and consist of basic to intermediate Triassic porphyric hypabyssal extrusives (Crnjaković 1998). These outcroppings along with the iron deposits identified by Kirigin make Vis unique in the region.

Hydrology

The rivers that filter into the Adriatic, as described above, in ancient times were mostly seasonal, with the exception of the Drin, Neretva, and Po rivers. These rivers, and those of more intermittent flow, are mainly fed by the Alpine waters that surround the Adriatic basin. As these waters flow into the Adriatic, they join the counter-clockwise flow before emptying into the Mediterranean as seen in Figure 14.

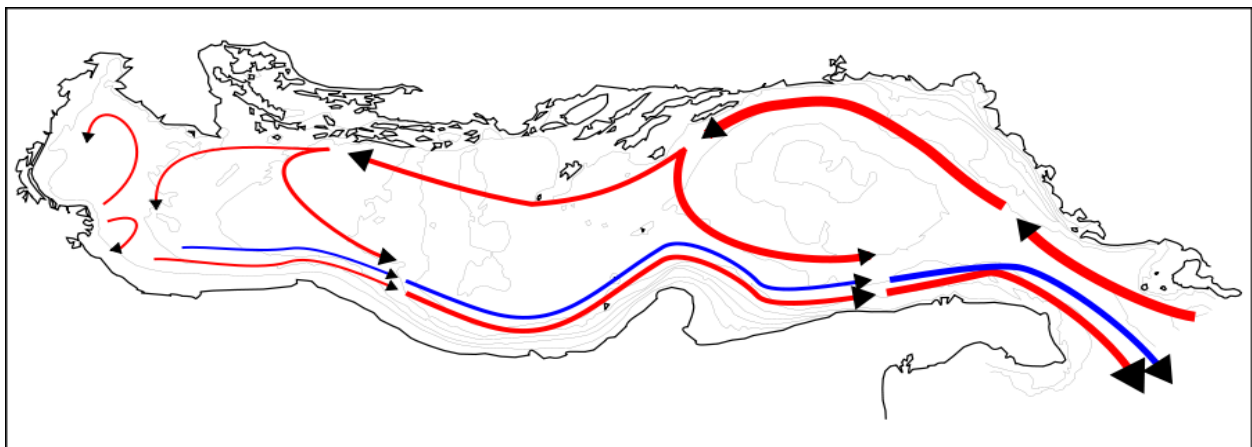


Figure 14. Currents of the Adriatic (Tomobe03 2012).

These currents and their direction are one of the reasons that the island of Corfu was so important to the colonization effort. Many colonists would sail north before turning back to the

southwest and would be buoyed by the outflow from the Adriatic. These currents also follow the bathymetrics of the basin. The three major current changes all correspond to major depth changes seen in Figure 15.

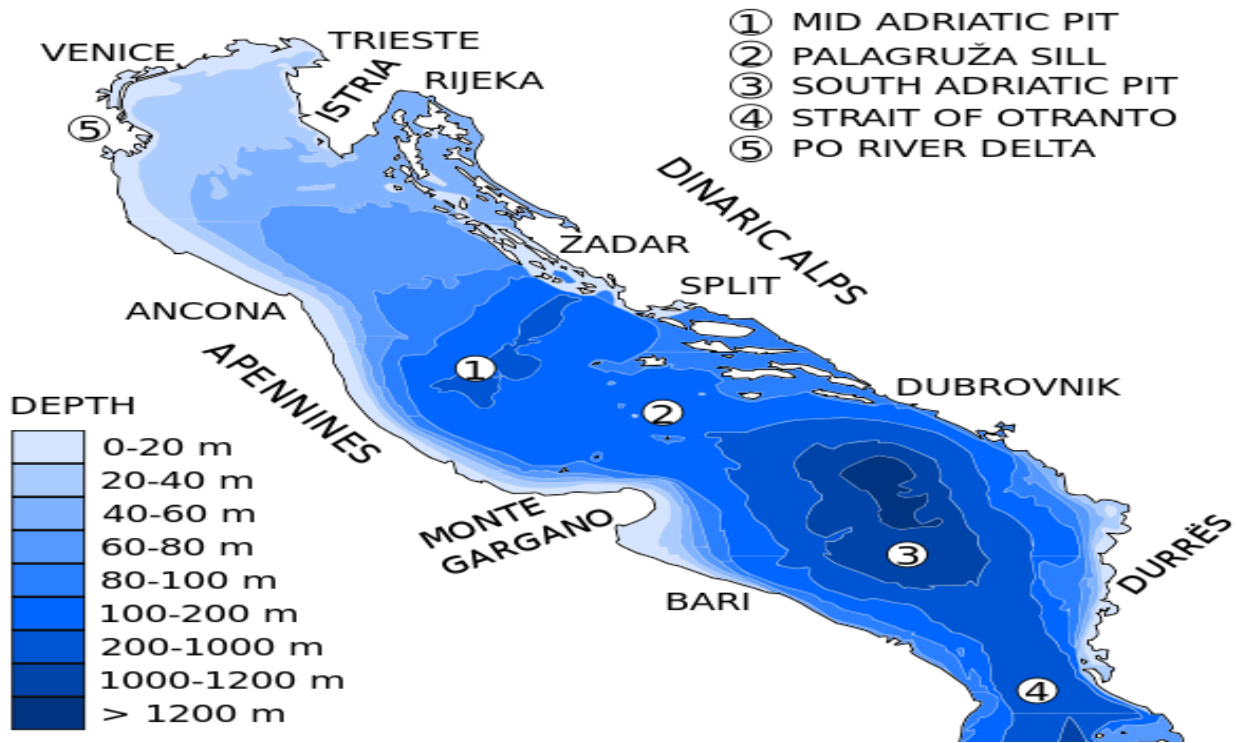


Figure 15. Bathymetry of the Adriatic Sea (Tomobe03 2012).

Average sea temperatures in the summer months are between 22 °C and 27 °C, and the lowest temperature, in winter, by the shore is about 7 °C (Miroslav Krleža Institute of Lexicography 2016). These elements provide a wide range of climates along the Adriatic which is more commonly based on altitude than on latitude. The highlands are subject to short but hot summers and long cold winters while the coastal regions experience milder wet winters with longer, drier summers. Winter snows are isolated in the higher elevations and are rarely seen on the coast. Rainfall is most common during the spring and autumn months (Wilkes 2012:25). As for winds, the Adriatic is at the mercy of the European continent as a whole. The high pressure system in the north and the lower pressure over the Mediterranean combine to create the winter

bura, a cold harsh wind that is a severe danger to watercraft and even trees along the coast. The wind is typically more severe in the northern reaches but can continue the entire length of the Adriatic (Wilkes 2012:24).

High winds and the limestone bedrock coalesce to create poor soil conditions for much of the region. These factors combine for a shallow, dry soil that is of a rocky consistency. However, in the river basins, the slow moving waters and alluvial flow from the mountains can provide enough soil for cultivation with the help of irrigation from the nearby streams and rivers. Overall, these conditions combine to make the Adriatic basin a lucrative, but at times dangerous, location for inhabitants.

The chain of islands off the Croatian coastline is an important aspect to consider when discussing Greek colonization. These islands add nearly five times the mileage in coastline to the Adriatic while only accounting for 5.8% of the landmass of Croatia. There are 79 islands in total along the coastline and many more rocks and reefs that are uninhabitable. Including these islets and rocks brings the total number of above seawater obstructions to 1246. Less than fifty of the islands have people living on them. The islands vary widely in terms of size and drop off rapidly in terms of landmass after the largest are taken into account.

Island	Surface Area in km ²	Island	Surface Area in km ²
Cres	405.7	Mljet	98.0
Krk	405.2	Vis	89.7
Brač	395.4	Rab	86.1
Hvar	297.4	Lošinj	74.0
Pag	284.1	Pašman	60.1
Korčula	271.5	Šolta	58.2

Dugi Otok	113.3	Ugljan	40.8
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Table 2: Surface Area for largest 14 islands on the Dalmatian coast.

Size is not a great indicator of the population each island can support. In fact, some of the smaller islands boast a larger population than Cres, the largest island in area. For instance, Prvič, with a land mass of 2.41 km², hosts a population of 453 people, thus ranking 66th in terms of area but 21st in population. This difference is caused by the landscape of those islands in the karst region along the Dalmatian coast. The thin, rocky substrate and lack of vegetation on many of these islands, along with severe elevation changes even at the coastline, provide for poor living conditions for humans in the region. Also of note, the most current area measurements, taken in the early 2000s, have changed the ranking of landmass for the two largest islands. Prior to 2000, Krk boasted the largest land mass. Very possibly rising sea levels have impacted each coastline differently. If this is the case, each island may have shrunk a not insignificant level since ancient times. The vegetation, or in some cases lack thereof, also varies greatly from island to island. The karst landscape of the mainland can also be seen on some of the islands, which can be completely rock covered. A few of these islands even exemplify the definition of a karst landscape, the valleys where silt and rainwater can sit have over time enabled vegetation to grow where it would otherwise be impossible. However, these pockets of green in a sea of grey are still not conducive to agriculture as the soil is very thin.

Changing sea levels are also important when shipping lanes and maritime travel are concerned. With the results of the Faivre study, the number of rocks and reefs has probably changed over the past two millennia as sea level has risen over a meter. Taking this into account, there were likely more obstructions during the era of colonization in question. However, this

circumstance does not necessarily make the region more or less dangerous, as rocks that were only slightly submerged in the past may not be out of range for the hulls of modern boats.

CHAPTER 5: RESULTS

Introduction

Based on the historical data and archaeological research described in the previous chapters, this chapter collects and analyzes the empirical data concerning all of the mentioned sites. Data from the Black Sea sites will be used in an attempt to create a baseline threshold for colonization, which can then be compared against the Adriatic sites. Then, by analyzing these results, a discussion will be initiated for the types of network in each region and for how the Dalmatian network fits into the greater Greek and Mediterranean networks. The empirical data for the archaeometric analysis of the Adriatic ceramics can be found here. For the Dalmatian sites, coinage distribution and data are also gathered in this chapter. These data will be paramount for the network analysis of the region and for comparing the Dalmatian network to the Black Sea.

This chapter is organized by region and foundation date. The first part will contain the data from the Black Sea region. Once this baseline has been established and the site data compiled for Black Sea sites, the Adriatic data will be introduced in the next section, and each site will be added to their proposed networks. In chapter six, these data will be analyzed in greater detail, and site relationships will be examined; the subjective economic and strategic values of the Adriatic sites will also be added.

The Black Sea

When the Greeks sailed through the Bosphorus, they entered a sea of opportunity. The Black Sea offered fishing, farming, and trade with both the East and central Europe via the Danube (Drews 1976:21). However, the first colonies in the Black Sea were along the northern coastline of Turkey. Geographically, the Pontus functioned in a way similar to the North African

coast; it controlled the interior trade via coastal trade, as well as trade to the east and west. As sailors sailed along the Pontus on their way to Colchis and Iberia, they needed safe harbors and shelter in the event of storms and settlements where they could resupply for their voyages. Similar to Carthage, Sinope filled this role for the Black Sea. Located centrally along the shipping route, it protrudes into the Black Sea in a way that made it nearly impossible for ancient sailors to miss. Miletus was the dominant colonizing power in the Black Sea (Grammenos 2007:5). The number of colonies created by Miletus far surpasses any other mother-city. Pliny the Elder (NH 5.112) mentions 90 colonies that were founded by Miletus, among these: Apollonia, Odessos, and Sinope.

The Greeks penetrated the Black Sea and colonized along both the northeast and western shores. The existence of three cyclon currents formed by river run-off and the direction of dominating winds creates a unique hydrology (Figure 16). The aspects of this hydrology were even more prominent during the period of Greek colonization, when the sea level was 5-8m below the modern level, and climate was more humid. Ancient seafarers were engaged mainly in coastal sailing, and cabotage was illustrated by Homer throughout the journey of Odysseus. However, the analysis of the paleohydrology and paleoclimate of the Black Sea, along with the archaeological record of shipwrecks, shows that they sailed in the open sea as well (Casson 2014:15). The most suitable route for sail to the northwestern and northern coasts of Black Sea was the route through the center of the west ring of currents or its eastern arc allowing ships to reach ports of the northern Black Sea in a short period of time (1.5- 2.5 days). In a similar fashion the eastern gyre allowed sailors to return to the southern coastline after exchanging goods on the eastern shores before sailing back through the Bosphorus. The position of Sinope at

the southern intersection of the two major gyres enabled it to regulate a significant amount of the trade in the Black Sea, especially any trade to the east.

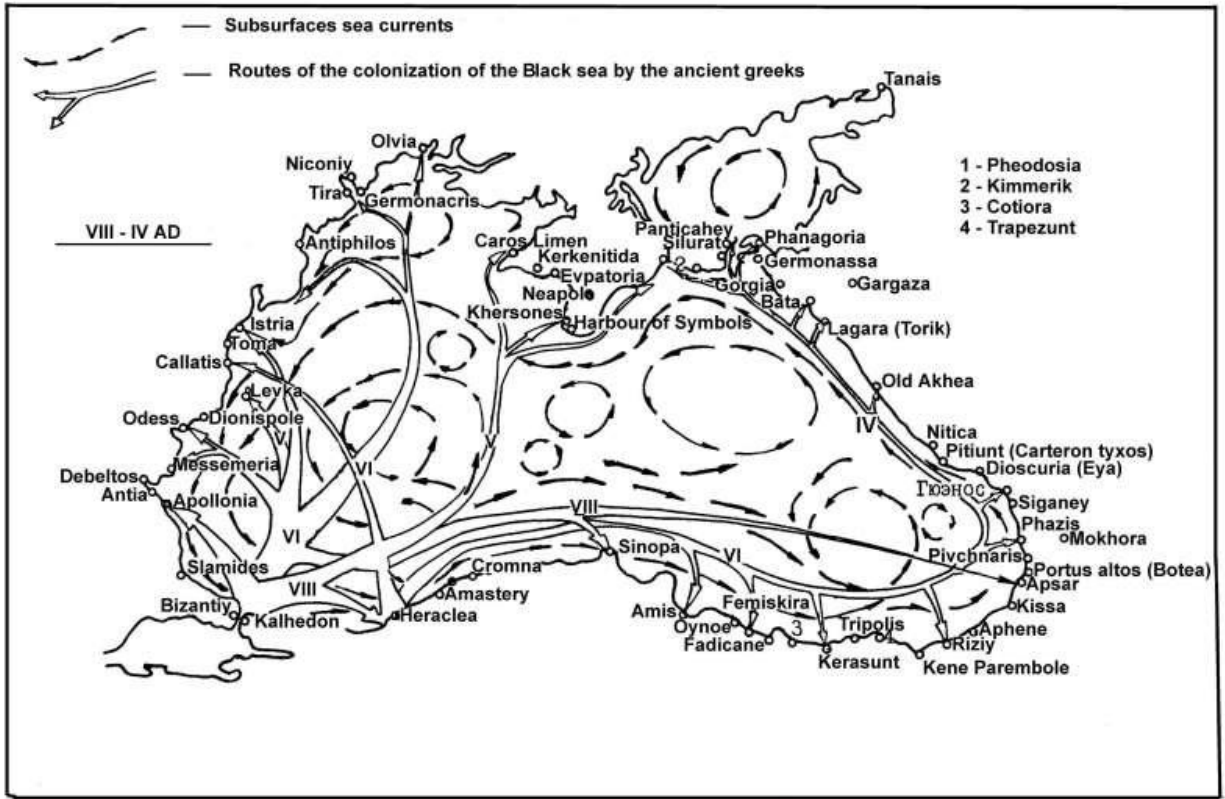


Figure 16: Black Sea Hydrology (Bondyrev 2003).

Sinope, however, does not have a natural port. To reach Sinope, the colonists from Miletus had to travel 700 nautical miles up the Bosphorus and along the southern coastline. Centrally located on the Pontus, Sinope is 355km west of Heraclea and 458km to the east of Trapezus. Because of its location and subsequent overall importance in the surrounding region Sinope became the capital of the Pontic Kingdom during the 4th century (Casson 2014:21). While lacking a natural harbor, the southern coastline was converted early on during Greek settlement into a viable harbor. Submerged moles have been discovered, and it is believed that during this time the original city walls were constructed (Çetin 2011:37). A second smaller harbor was also established on the northern coastline. Prior to the construction of these harbors, a

cove, named Aklıman (Figure 18), northwest of the city center was used in ancient times as shelter (Çetin 2011:33). The Küre mountains dominate the surround region covering 74.3% of the land area and provide a natural barrier from the interior while plateaus (23.4%) and plains (2.3%) make up the remainder of the landmass (Çetin 2011:32). However, these mountainous regions are not unfertile and the slopes and valleys possess a high degree of agricultural fertility.

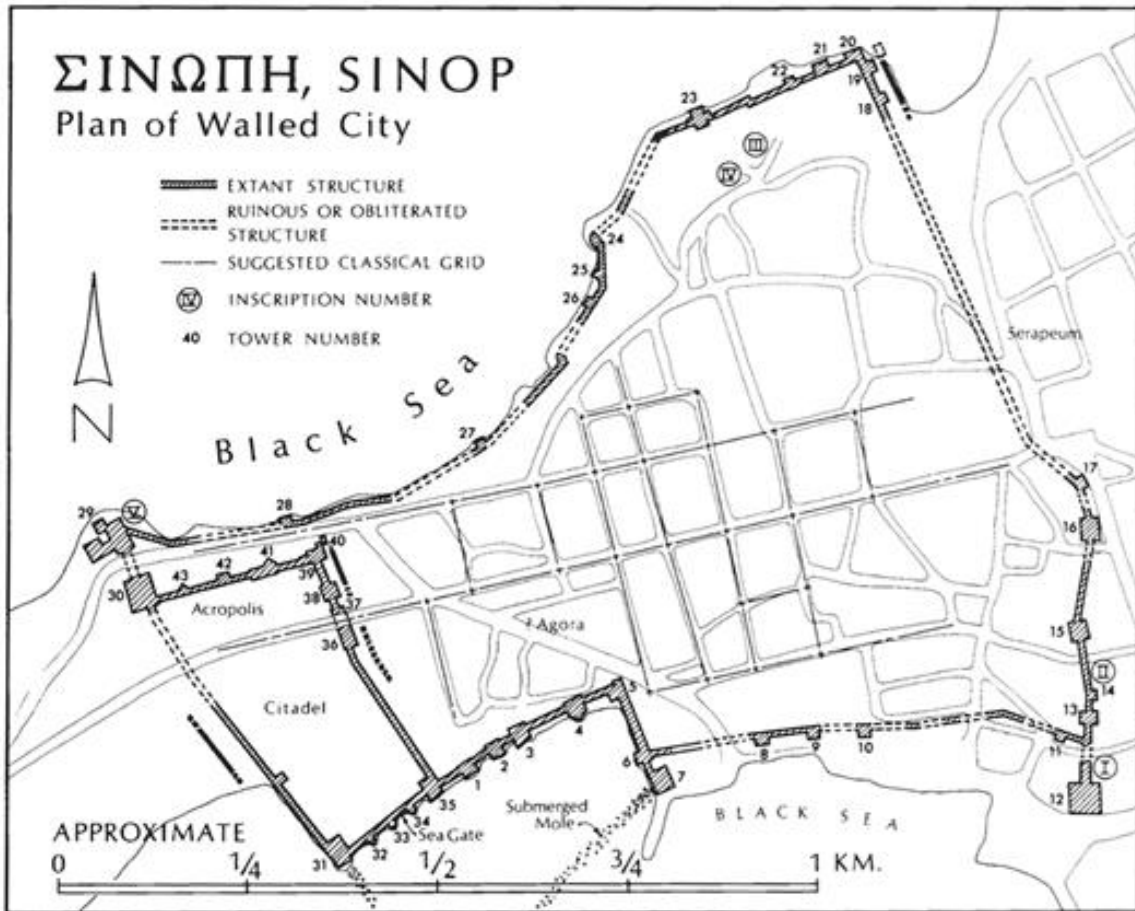


Figure 17: Plan of ancient Sinope (Bryer and Winfield 1985).

The surrounding region is well known for the production of olives, olive oil, timber, ceramics, and fishing. However, it is the location and geography of Sinope that allowed the city to become a regional power with influence outside of the Black Sea. Its location on one of the most defensible pieces of land in the Black Sea, in addition to its relatively central location, made Sinope a hub of trading activity and goods produced here can be found throughout the

Greek world. Coins from Sinope typically had the head of a nymph, eagle, or dolphin and can be found throughout the Black Sea region. Roof tiles and amphora have also been excavated in Colchis, indicating extensive trade to the east as well as with the Mediterranean.



Figure 18: Harbor northwest Sinope, Akliman (Image by author, 2016).

Ceramic finds at Sinope are vast, dating to the late 5th-4th millennium with the Chalcolithic occupation. According to Casson (2014:25) this is the first of four distinct settlement mounds followed by Early Bronze, Late Iron, and Hellenistic levels.

250 nautical miles to the east, citizens from Sinope founded Trapezus (modern day Trabzon). Trapezus is located at the outflow of a mountain river and was home to one of the last harbors before reaching Colchis (Figure 19). A mostly constructed harbor, it was still one of the more protected sections of coastline in the eastern Black Sea. Situated at the foot of the Pontic Alps, the slope rises quickly from sea level. However, like the lands surrounding Sinope, the valleys of these mountains are extremely fertile, and the river gives access to the hinterland and more agricultural areas.



Figure 19: Ancient harbor site at Trapezus (Image by author, 2016).

The other major site on the Black Sea is Heraclea Pontica. Unlike Trapezus and Sinope, Heraclea was founded by the city-state of Megara. The site is one of the first major ports upon entering the Black Sea and provides a staging point for journeys to the east. The port at Heraclea Pontica is the best natural harbor of those examined in this study with over 5km of viable coastline. Similar to the rest of the colonial sites in the Black Sea region, Heraclea has ample access to the hinterlands via the Lycus river.

Casson (2014) and Knight (2012) both show that colonies along the Pontus tended to interact and trade with other Black Sea coastal cities rather than the hinterland. Ceramic and coin finds show that goods traveled in both directions along the southern coastline of the Black Sea. The southern coastline appears to have been the route of choice for merchants peddling goods from the eastern regions to the rest of the Mediterranean, and the colonial cities appear to have been a consequence of trade similar to the way railroad cities were created in the United States during the westward expansion.

The Adriatic Sea

Greek colonization in the Adriatic was later than the rest of the Mediterranean and was much less encompassing. Research and excavations have been delayed by a number of political factors. However, recent excavations have unearthed artifacts, showing a more pervasive Greek presence in the Adriatic during the sixth and fifth centuries. One point of debate in the Adriatic is Heraclea, which is an undiscovered Greek city, referenced by Pseudo-Scylax. Zaninović (1992) and Kirigin (1999) are just two of many archaeologists who have discussed the location and dates of Heraclea. Kirigin postulates that the undiscovered site appears to have been very active for at least a short period of time since surveys in the Dalmatian islands have unearthed a number of 4th century coins which bear the mark of Heraclea. Figure 20 shows the provenance of these coins.

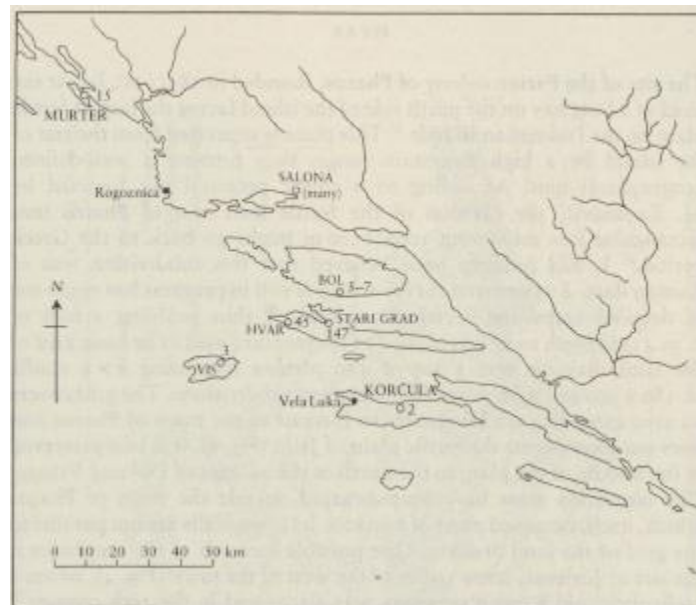


Figure 20: Distribution of coins from Heraclea in central Dalmatia (Kirigin 1999:295).

Kirigin also mentions that considerable number of coins are likely held in a number of numismatic collections throughout former Yugoslavia and abroad, and the provenance of many of these coins cannot be known.

Pharos, modern Stari Grad, is the best-known and researched site in Dalmatia. A number of surveys and excavations have taken place both in the town and in the plain on the island. In 2004, Kirigin published a comprehensive ceramic report based on previously published reports. In this report, he argued that *Gnathia* vessels found on Hvar were not imported on a larger scale, nor were they imported from nearby Issa. Remains of a pottery kiln were found near the northern town walls, and during the recent excavations a fragment of poorly fired kitchen ware was found within the residential complex. Furthermore, the preliminary archaeological analyses indicate local production of fine table vessels. However, the archaeometric analyses were not conducted to confirm these archaeological assumptions (Miše 2013). Unfortunately, these artifacts are still undergoing archaeometric analysis. A newly created archaeometric database for Adriatic ceramics was set to be published in 2016 but has been delayed. However, early analysis has indicated that the firing temperature of these locally produced ceramics did not exceed 950°C (Maja Miše 2016, personal communication).

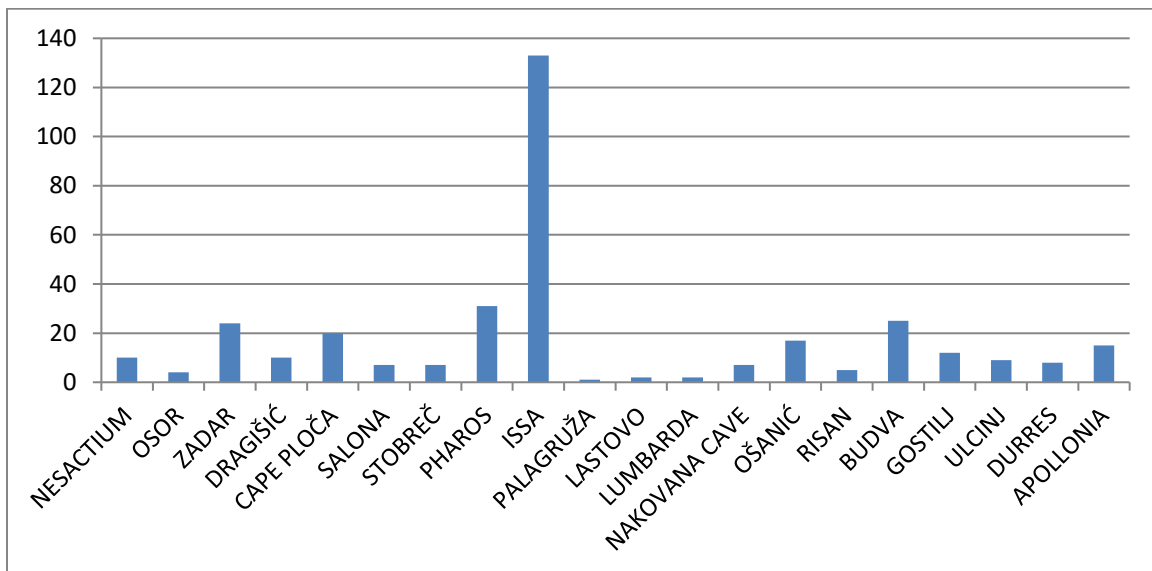


Table 3: *Gnathia* Ware on the East Adriatic Coast (Miše 2015:19).

In the quantity of Hellenistic Dalmatian ceramics, Issa surpassed all of the other sites by a wide margin (Table 3). The ceramics produced here have been excavated at a number of sites in the region including the island of Pharos and mainland sites such as Cape Ploča, Trogir, and Resnik (Figure 21).

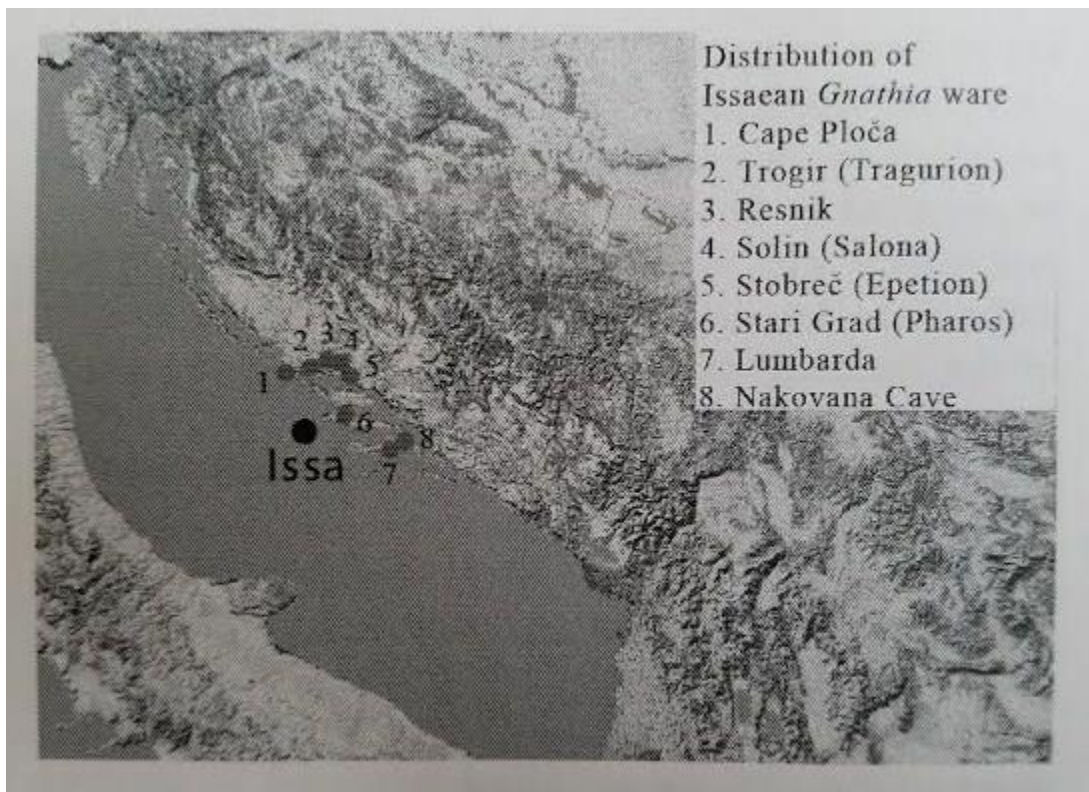


Figure 21: Map of Issaeen *Gnathia* ware distribution (Miše 2015:41).

The available ceramics that have been archaeometrically tested and published can be found in table 4. While lacking in numbers the samples from Vis show distinct differences from those at Cape Ploča and Resnik. Through the use of ICP-MS, specimens uncovered at Vis show an elevated level of high-field elements (Zr, Hf, Nb) and relatively low amounts of light rare-earth elements (La, Pr, Ce) (Šegvić et al 2012: 79). Differentiation of these values clearly separate the potsherds produced at Issa from those produced on the mainland (Figure 22). Variables for the analysis are based on statistical values of SiO₂, CaO, Sc, Zn, Ga, Rb, Y, Nb,

and Th. According to Šegvić (2012:79), Ga and Nb give the most weight to the discriminating function CV1, whereas CV2 is based on difference in the values of Nb and Sc.

Sample	Morphology	Ceramic Class	Thickness (mm)	Applied Methods
Vis 1	Rim and body of gray plain Plate/bowl	Tableware	~3	ICP-MS, XRD, XRF, SEM, EMPA
Vis 2	Rim of pythos	Storage vessel	4.1	ICP-MS, XRF, XRD, SEM, EMPA
Vis 3	Rim of pythos	Storage vessel	4.2	ICP-MS, XRF, XRD
C.P. 1	Body and foot of red painted jug	Tableware	3-5	ICP-MS
C.P. 2	Rim and body of semi-glazed bowl	Tableware	5	ICP-MS, XRD
C.P. 3	Rim and body of black-slipped saucer	Tableware	3	ICP-MS
C.P. 4	Rim of gray slipped krater	Tableware	7	ICP-MS, XRD
C.P. 5	Foot of skyphos	Tableware	5	ICP-MS
C.P. 6	Body of articulated kantharos	Tableware	5	ICP-MS
C.P. 7	Lower body of black-slipped jug	Tableware	5	ICP-MS, XRD
C.P. 8	Body and foot of gray-ware kantharos	Tableware	5	ICP-MS, XRD
C.P. 9	Neck of gray-ware jug	Tableware	4-5	ICP-MS
C.P. 10	Body and foot of gray-slipped bowl	Tableware	7	ICP-MS, XRD
C.P. 11	Body of painted jug (pelike)	Tableware	3	ICP-MS
C.P. 12	Body of black-slipped saucer	Tableware	4.5	ICP-MS, XRD
C.P. 13	Body of gray-slipped thorn kantharos	Tableware	3	ICP-MS, XRD
C.P. 14	Handle of black-slipped jug	Tableware	5	ICP-MS, XRD
C.P. 15a	Rim of gray-slipped relief mould-made krater	Tableware	2.6	ICP-MS, XRD
C.P. 15b	Body of red-slipped relief mould-made bowl	Tableware	3-4	ICP-MS, XRD
C.P. 16	Body of brown-slipped thorn kantharos	Tableware	3	ICP-MS
C.P. 17	Body of Gnathia skyphos	Tableware	4	ICP-MS, XRD

C.P. 18	Body of Gnathia jug	Tableware	4-4.5	ICP-MS, XRD
C.P. 19	Body of gray-slipped relief mould-made bowl	Tableware	5	ICP-MS
C.P. 20	Rim of brown-slipped relief mould-made bowl	Tableware	4.5-5	ICP-MS
Resnik 9	Body of gray-slipped relief mould-made bowl	Tableware	3.1	ICP-MS, XRD, EMPA
Resnik 12	Body of Gnathia skyphos	Tableware	3.2	ICP-MS, XRD
Resnik 21	Body and handle of jug	Tableware	3	ICP-MS, XRD
Resnik 22	Rim and handle of jug	Tableware	3	ICP-MS, XRD
Resnik 23	Body of gray-slipped jug	Tableware	4	ICP-MS, XRD
Resnik 24	Rim and body of gray-slipped bowl	Tableware	4	ICP-MS, XRD
Resnik 25	Bottom of reddish-slipped jug	Tableware	7-8	ICP-MS, XRD
Resnik 26	Body of gray-slipped articulated kantharos	Tableware	4	ICP-MS, XRD
Resnik 27	Bottom of jug		3-3.5	ICP-MS
Resnik 28	Body and bottom of gray-slipped bowl	Tableware	5-1.2	ICP-MS
Resnik 29	Body of gray-slipped relief mould-made krater	Tableware	5-9	ICP-MS, XRD
Resnik 30	Handle of jug	Tableware	8	ICP-MS

Table 4: List of archaeological artifacts, thicknesses, and applied treatments (Šegvić et al 2012: 68).

Differences in Issaeian and mainland pottery exceed the chemical makeup of the ceramics. Vessels recovered from Vis show increased levels of calcite dissolution and spherical voids indicating firing temperatures in excess of 800°C. At certain temperatures elements and inclusions can break down. The presence or absence of these elements is a great indicator of temperature during the firing process. Pressure lamellae in the calcite temper seen in the Cape Ploča tableware indicate that firing temperatures were below 700°C, possibly as low as 600°C (Šegvić et al 2012: 81). The presence of white mica in these samples, which obliterates at 800°C, also indicates that temperature could not have exceeded that upper limit. Resnik samples with the

presence of almadine garnet set their upper limit $\sim 900^{\circ}\text{C}$ but were likely fired between 600°C and 800°C , similar to those found at Cape Ploča (Šegvić et al 2012: 81). Melilite inclusions in the Vis pottery dictate temperatures between 800°C and 1000°C , when melilite begins to break down. Uniform distribution of spherical voids (present in Vis sherds) along with melilite and andradite garnet indicate a firing range between 850°C and 1050°C . Additionally, trace element inclusions of Zn and Ni in the Vis pottery can be taken as an indication of a volcanic component during clay formation. As Vis is the only landmass in the region with this geological setting, it is most likely a clear indication of locally sourced clay.

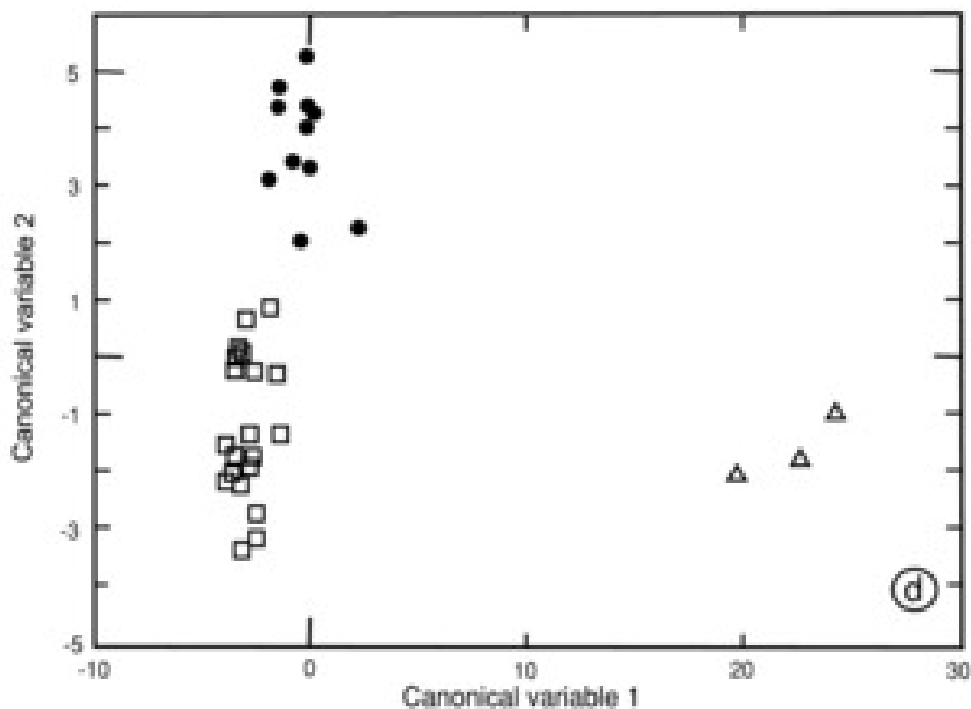


Figure 22: Elemental separation of mainland and Issaeian pottery (Šegvić et al 2012: 80).

The city layout and its size of 10 hectares, as defined by the fortifications in a study by the University of Ljubljana in 1984, show Issa to have been the largest Greek settlement in Dalmatia. However, very few excavations have taken place, and according to Kirigin (1999:305) very little is known about the city structure. Nearly all of the archaeological data come from the

Martvila cemetery west of the city. Excavation results show that Issa was involved in widespread trade. Grave goods from Sicily, Greece, and both northern and southern Italy all attest to this fact. Coinage from the rescue excavations are documented in Table 3.

Grave Site	Year of Excavation	Date	Number of Finds	Unidentified Coins
3	1976	III	2	6
6	1976	III-II	2	7
VA	1955	II	1	1
19	1979	II	1?	1
III	1955	II	1 (lost)	3
IV	1955	II-I	1	1
9	1976	II-I	1	2

Table 5: Coin finds from the Necropolis at Issa (Kirigin 1999).

Coinage from the island of Korčula is varied. A series of bronze coins has an elderly bearded male on the obverse and a lion's head on the reverse. Rendić-Miočević (1980) dates these coins to the 4th century Cnidian colony on Korčula because the lion's head on the Korčula finds bears a resemblance to the coins minted at Cnidus during the same period. Kirigin (1999:293) points out that of the 10 known coins of this type, none have been found on Korčula: eight are from Issa, one was discovered on Hvar, and the exact provenance of the example previously in the Stockert collection is unknown. In addition, small finds on the western side of the island consist of several silver and bronze coins: a 4th century Corinthian stater, two tetradrachms of Alexander the Great, one tetradrachm of Nicomedes Epiphanes found near Blato; one Athenian tetradrachm from the 2nd century found at Vela Luka; a small silver coin of Alexander the Great; a 4th century silver coin of Siphnos; a 3rd century coin of Neapolis in Campania; two bronze coins of Rhodes; four bronze Carthaginian coins (three from the 4th century and from a later Sardinian mint); two 4th century coins from the Adriatic Heraclea; four silver and one bronze coin from Apollonia dating to the 3rd and 2nd centuries; eight silver and four bronze coins from Dyrrhachium; one coin of Corcyra; two bronze Illyrian coins of King

Ballaeus; one tetrabol of Histiaea dated to the late 4th century; three bronze coins with the head of Apollo on the obverse and an ear of corn on the reverse (believed to have been issued by the first Issaeon colony at Lumbarda); and five unidentified bronze coins.

The area around Lumbarda has less than 50 hectares of arable land according to surveys conducted by the AIP. The harbor at Lumbarda is also the smallest of the colonial harbors in this study. The Lumbarda *psephisma* does indicate that 200 colonists made the journey from Issa to the eastern edge of the island of Korčula to found the new colony. Kirigin (1999:148) analyzes the size of this colony based on the amount of land available, and he posits that Lumbarda was possibly a military outpost instead of a proper colonial endeavor. However, the coinage attributed to Lumbarda and the famous founding inscription indicate at the very least a trading outpost. Without a full-scale excavation and more field surveys, the nature of the settlement is unlikely to be verified at this time.

Conclusion

Pottery and coins are among the most widely traded and lasting artifacts of the ancient world. The dispersion of these materials can indicate the extent of trade networks and political relations with neighboring states. With the added technology of archaeometric analysis archaeologists can delve even further into the history of these artifacts, discovering the process of fabrication and the location where they were made. In regard to the above material, firing temperatures clearly indicate two distinct methods of fabrication in the region, likely the local tradition and that of a higher technology that was imported by the Greek colonists.

The variety of coins found on Issa, Hvar, and Korčula attests to the intricate network active in Dalmatia. In the next chapter, the variety, mint site, and provenance of the coin finds will be discussed and analyzed to characterize the local network for comparison to that of the

Pontus. Of importance will be how the two regions differ in terms of mainland sites and island sites and how each of these environments influence the direction of the colonial efforts.

CHAPTER 6: ANALYSIS

Introduction

This chapter provides an analysis of the data identified in the previous chapter and examines whether a correlation exists between the Black Sea and Dalmatian sites in terms of their potential for colonization and network creation. Dissimilarity between an outpost and a colony will be a major theme in this chapter. The first section of this chapter investigates the technological differences between the local mainland Adriatic sites and the Greek island colonies in terms of ceramic fabrication. The second section uses the technological differences to create the Dalmatian network. In the next section, the Black Sea sites are discussed in network terms. The fourth section investigates the comparison between the two networks. In the final section, the limiting factors of the research and results will be discussed.

Greek Dalmatia

Traditional push factors for colonists were the lack of available land resources at home. Land availability would be an important quality for any colonization site chosen by the Greek colonists. Under these restrictions, mainland sites with access to a hinterland and abundant exploitable resources would appear to be the most logical choice. However, as Kirigin (1999:291) points out, the Greeks established their first colonies on islands since they were –as they still are– less densely populated than coastal areas and not as dangerous to colonize. Greek colonies in the Adriatic dotted the coastline with sites like Epidamnus and Apollonia but were concentrated in the Dalmatian islands. This concentration of colonies in a relatively small local area was important in creating the regional trade network. Irad Malkin is a firm believer in the Greek-to-Greek network that developed by consequence of overseas colony creation and shared experiences and traditions. The interconnectivity of the Dalmatian islands lends itself to this

method of network creation. The increased firing temperature of Issaeian ceramics compared to mainland cities is a clear indication of a separate method of fabrication. The lack of archaeometrically analyzed samples from Pharos and the two sites on Korčula is alarming, but as Lumbarda is an offshoot of Issa and Pharos is a Greek colony, I would postulate that the firing temperature of ceramics produced at kilns on these sites would more closely resemble those of Issa than the mainland. However, the chemical makeup of pottery produced on Pharos will likely differ from Issaeian pottery because of the lack of volcanic materials. When the new database for Adriatic *Gnathia* ware is published, likely within the next two years, this uncertainty should be resolved. Under these conditions, the Greeks likely did not share technology with the locals as their high quality ceramics were luxury trade goods, and while style and form can be imitated, the quality of the ceramics could not. The dispersion of Issaeian ceramics seen in the previous chapter supports this inference. A similar dispersion of ceramics from Pharos is expected. While Lumbarda has been shown to have a kiln and pottery workshops, it is unlikely that the volume produced could permeate the entire region as colonial estimates on the population of Lumbarda did not exceed two hundred colonists, and according to Kirigin (1999), the amount of arable land in proximity to the colony could not support a greater population.

The Dalmatian Network

Coinage dispersion, especially of those minted at the Adriatic Heraclea, shows a concentrated network that spanned not only the majority of the Dalmatian island population centers but also mainland sites at Salona and Murter. The geographic location of Dalmatia played an important role especially in the development of the regional network. Aside from the relatively small deposit of local iron ore found on Vis, the region has few natural metallurgical resources. However, situated at the terminus of the amber road, the Dalmatian islands and the

Adriatic as a whole were able to remain an important distribution point for Baltic amber. Within the micro-region, the spread of coins located in colonies other than the colony of mint indicates a vibrant trade network in both directions (Figure 23). The imitation of Greek art and pottery by the mainland as well as the increase in wine drinking post colonization points to an integrated trade network. With the extensive interconnectivity between nodes and no central power, the Dalmatian islands fit almost exclusively into a decentralized small world network with a middle sea. While Issa has been proven to be the largest of the Greek cities in the region, it did not rule over the other colonies despite sending out its own colonial offshoots such as Lumbarda.

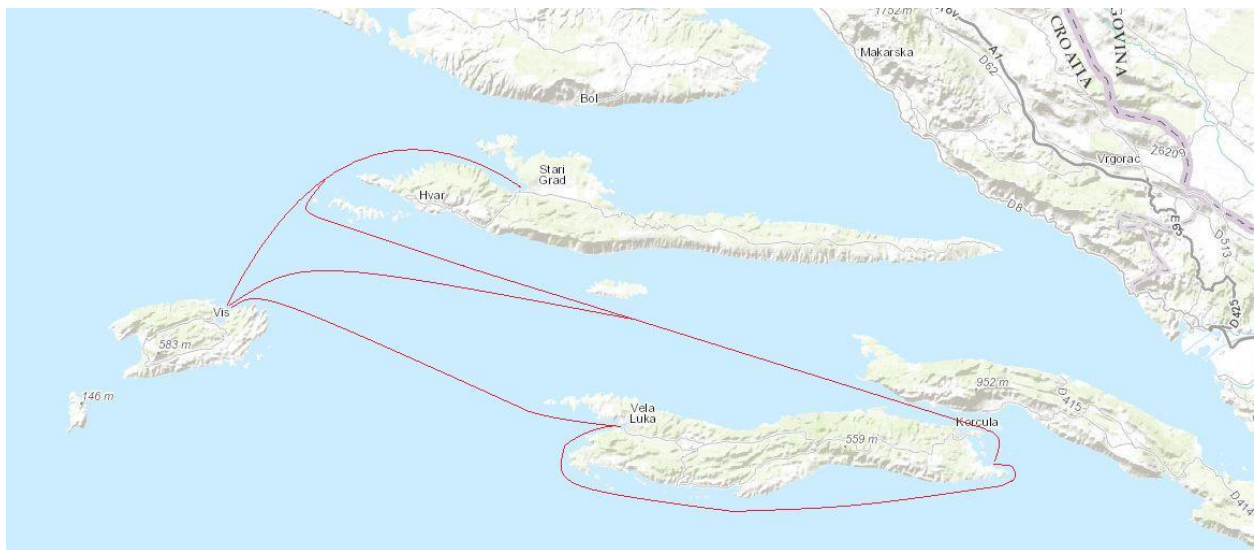


Figure 23: Dalmatian island small world network (Image by author, 2016).

These random links within the island chain reflect a network of Greeks independent of their mother-city trading with other Greek colonies in the region, thereby reaffirming Malkin's (2011:218) statement about colonial connectively creating a Mediterranean wide Hellenistic identity. In this situation, we have Parians, Syracusans, Isseans, Cnidians, Illyrians, and others trading in Greek colonies, exchanging Greek goods and knowledge, and practicing Greek rites and customs. Malkin goes further, stating that under these circumstances the different Greek peoples have more in common with each other than the "barbarian" or non-Greek locals, which

created a sameness that over time grew into the panhellenic identity as opposed to individual Parian, Cnidian, Syracusan, or Corinthian identities. This creation of a Greek cultural center in a foreign territory then became a distant node within the decentralized Mediterranean network. Links to and from this micro-region are to the north, south, east, and west, and connect the Dalmatian islands with the Adriatic headwaters, the Mediterranean, mainland Illyria, and Italy, respectively. It must also be mentioned that the Greek colonies in the region were not isolationists. Recent studies have shown that mainland sites had extensive intermingling of peoples despite the island colonies being referred to as Greek in the *Periplus* and the indigenous population of Hvar being displaced during the colonization of Pharos.

The Black Sea Network

The region around Pontus in the Black Sea is quite different for network creation from the cluster of the Dalmatian islands. Even with a maritime perspective, the Pontus is a linear network where nodes can be bypassed, but the overall route is not shortened. To reach the far eastern shores, traders must pass Heraclea, Sinope, and Trapezus. There are no random links that will shorten the journey. However, if the Black Sea is considered as a whole, then random links, especially those between the two central gyres from Sinope to the north and the reverse, do enable the Black Sea to act as a traditional small-world network. Without these cross sea links the Black Sea would have been a Regular network with cabotage dominating the regional trade types. As mainland sites but sea-first colonies, these places fostered interaction with the local population; but according to Casson (2014) and Bauer (2006), there was a distinct preference for sea trade and stronger links with other coastal colonies rather than with the hinterland.

Network Comparison

While the colonies within both networks can be defined as sea-first; the Adriatic network is characterized by island colonies which necessitate this organization. Some historians, Malkin included, have even classified mainland Greek colonial sites as like islands because of their lack of interaction with the hinterland, with some colonies never even venturing further inland than a few kilometers. Nevertheless, there still exists a stark difference between the two regions. Within the Dalmatian network, the nodes appear to have the greater equality characteristic of a distributed network. The Black Sea, in contrast, is defined by regional centers at Sinope and Heraclea that oversaw and at times controlled large stretches of the coastline, which points to the regional network as being hierarchal in nature and a much more centralized network than in the Adriatic. By founding subcolonies, Heraclea and Sinope effectively formed micro-regions of centralized networks that intersected with one another as separate nodes in the overall decentralized Hellenistic network that encircled the Black Sea while also spreading Greek material and culture to the hinterland via riverine links. While by no means pervasive, the spread of Greek culture in and around the Black Sea was more widespread because of the nature of the mainland colonial sites in that region.

In the Adriatic, Greek colonial efforts did not deviate from the island-first mentality of the earliest colonizing Greeks. In doing so, the natural island geography created a buffer between the local culture and their own. Thus, the shared ancestry of the colonizing Greeks may have played an important role in creating the technological rift between the colonists and the indigenous (Vlassopoulos 2007:100). This separation would continue until the eventual Romanization of the region. However, because of the scarcity of natural resources in many areas of the Adriatic, trading with the local population was a necessity, and a type of intermingled

Hellenism did occur, albeit at a much slower pace than around the Black Sea. Colony location in both regions is positioned for maximum exploitation of both natural resources and economic trade opportunities. However, site selection in the Dalmatian region is more restrictive, and in some cases, sites, such as Lumbarda, were colonized despite the lack of natural resources in order to control regional trade. The northeastern facing harbor at Pharos is not well positioned for merchants entering the region from the south and can be subject to the winter bura. Issa, being the furthest colony from the mainland aside from the shrine at Palagruža, is not ideally positioned for coastal trade, but does have the advantage of being centrally located in the long-distance sea lane. However, sea lanes in the Dalmatian archipelago are much less defined and appear more as a spider web overlaying the entire region since most of the nodes are rather close to each other and could be reached in less than a day or so.

Sea lanes in the Black Sea are much more defined, circling the coastline in both directions, which makes cabotage a likely form of trade, in addition to having longer north/south voyages between the northern and southern nodes of the network. It must also be noted that the terminus at the eastern edge of the Black Sea was one of the major ways for eastern goods to enter the region. Thus, some of the Greek colonies along the southern Black Sea could be viewed as pit stops that evolved into cities along the trade route from Colchis to the Mediterranean.

Within the greater Hellenic network that was being created by Greek colonists throughout the entire Mediterranean, the Dalmatian islands would be considered a small node. Trade throughout the region was active but not comparable in scale to the Black Sea, the Western Italian Coast, Sicily, the Near East, or southern France. One could agree that the Adriatic region in its entirety was insignificant to the Greek world if the amber trade had not existed. However, the Adriatic did still play a minor role in Greek colonization, and many sites deserve more in-

depth excavations as they will surely provide insight into cultural and economic interactions with the Illyrians.

Other Limiting Factors

Based on the results of this study, geological factors were not a determining factor in Greek colonization. There are two main remaining possibilities for the lack of Greek colonial involvement in the Adriatic: politics and economics. The Adriatic lacks the natural resources available in the other parts of the Mediterranean, such as gold, silver, tin, and iron; but there is still a wide range of available natural resources in the area. Amber is the most recognized export of the region because of the Baltic trade routes, but resources such as limestone, timber, wine, olives, and recently uncovered iron at Vis, do exist in surplus. However, land availability in the Adriatic, specifically on the Dalmatian islands, was not in abundance, especially not in locations suited to long distance economic trade. Vis was widely uninhabited prior to colonization in the area. In some instances, in the Adriatic, the Greeks either displaced the locals or, in rare cases, enslaved them prior to colony formation.

A region's political barriers are harder to identify archaeologically unless there are catastrophic events that leave artifacts. For example, a naval battle occurred off the coast of Hvar in 384 B.C., but the battleground is still undiscovered. Its discovery could provide artifacts and possibly unveil political implications which are otherwise usually known only from literary sources. Also, the *Periplus* of pseudo-Scylax refers to many of the Adriatic natives as barbarians. This derogatory term leads historians to believe that relations between the two cultures were less than amiable and, together with the historical might of the Liburnian thalassocracy, could have prevented the Greeks from risking colonization in the area since the Greek colonists had

experienced a number of failed colonial attempts in the Black Sea because of the Cimmerian Empire prior to permanent Greek colonization in the 6th century (Højte 2008:156).

CHAPTER 7: CONCLUSION

Introduction

Colonization archaeology is still in its infancy in the Adriatic basin. The Adriatic Islands Project and other ongoing research are allowing the field of archaeology in the Adriatic to quickly gain parity with the rest of the Mediterranean. New technology enables archaeologists to reexamine older finds and sites for a more complete history of the region. Political strife and dangerous working environments (because of unexploded ordinance from regional conflicts) are disappearing from the region, which allows work to be conducted where it was previously impossible. Underwater exploration of the coast is a continuing venture that has led to numerous new discoveries in recent years, and as forthcoming results are published, they should provide a wealth of information about trade and life in colonial Dalmatia. With expansion in funding and site availability, especially on islands with rapidly decreasing populations, archaeology has a strong future in the Adriatic, if looting can be curtailed. While the majority of research has been focused on the Roman and Byzantine eras, there is now a growing amount of data concerning the Greek influence in the region. This thesis highlights current research and modern technology to identify the possible networks of Greek trade in the region, a subject prominent in discussions for regions outside the Adriatic. By comparing these Adriatic sites to models created from other colonization zones, this thesis examines the evidence for a regional network in the Adriatic based on ceramics and coinage.

Review

The purpose of this master's thesis is to discover whether the Adriatic basin fits into an existing colonization and trade model within the Greek spectrum. Alan Small's (1969) model for the Viking colonization of the Shetland and Faroe Islands was adapted to identify the type sites

in the Adriatic. As a requirement, each site had to meet all four characteristics described by Small. Once the sites were chosen, they were historically and geologically examined for any potential limiting factors for colonization. From this point, archaeological surveys, topographic maps, and aerial photographs were used to obtain comparative data. The distribution of coins, data obtained from museum collections published by Branko Kirigin, assisted in identifying the formation of network interconnectivity among the Dalmatian colonies. Analysis of the ceramic technology used at Issa compared to the mainland production sites further limits the extent of the Greek network in the region. Thus, the Adriatic most accurately fits into the small-world model defined by Irad Malkin, particularly in regard to the random links identified by coinage distribution and to how ceramic technology was guarded by the Greeks and not disseminated to the indigenous population centers. The regional colonies also continue with the Greek preference of island colonization over mainland sites. In the course of this study, it was apparent that the Black Sea sites differ from the first traditional Greek colonies; this is likely because of the lack of offshore islands along the northern coast of what is now Turkey. However, the most important take away from the study comes from the discovery that the Greek colonies traded goods freely with the surrounding mainland but not technology. This phenomenon may characterize the trade networks in the Adriatic. The earliest Greek sites in the Adriatic appear to be more like the *emporion* at Pitheculia than anywhere else in the Mediterranean and slowly evolved into colonies along the lines of Malkin's theory of Hellenism, through distance and small-world network creation in foreign lands based on ethnicity and common colonial experiences. These small *emporia* then coalesced into a superregional Greek identity as opposed to previous individual regional identities, such as Corinthian or Rhodian, and thus technology in Dalmatia appears to be defined as Greek or indigenous instead of a more homogenized technology across the region.

Interpretation

The primary research question in this thesis was to determine whether the known Adriatic sites accurately fit into the greater Greek model of colonization for the Mediterranean. If this were not the case, then there was need to determine whether those same sites fit into a different model of colonization. If the Adriatic did not fit into any existing model, then it might provide its own unique model. The quantitative data obtained from the surveys and archaeometric data enabled these questions to be answered within the historical context.

The Adriatic sites fit best into the Italian and Sicilian model for Greek colonization. The preference for offshore islands, based on the protection they provide, is a factor that can be taken advantage of in the Adriatic, as there are thousands of islands. Similar to the Italian and Sicilian colonies, the early Greeks kept to the small islands in Dalmatia. In contrast to the Italian colonies, a Dalmatian micro-region and a clearly defined distributed network were created, and that is rarely seen in the rest of the Greek world. This most likely occurred due to the greater political differences here between the colonists and natives than appeared elsewhere. However, dispersion of material goods and coins show that trade was lively between the local and Greek populations.

As archaeology in the Adriatic increases, more and more sites and finds should enhance the picture. In most cases, 100% coverage of an island is not possible because of funding and time, and it is because of these reasons that sites like “Heraclea with a port” remain undiscovered. It is entirely possible that this site could negate the findings of this paper, but it is just as likely to confirm the findings as well, should the ceramics and coins reveal greater similarity to the Greek technology and tradition.

Unanswered Questions and Future Research

This thesis only covered a few of the most well-known sites in Dalmatia. The Adriatic basin has hundreds of islands as well as many other mainland coastal sites where Greeks could have been more integrated with the local population and shared technology as well as goods. Expanding the scope of this project to each site would be nearly impossible, given the time and monetary restrictions of a graduate student. Jurišić and Kirigin, who are both well-known and respected archaeologists within the Adriatic region, believe that there are at least two sites that have not been discovered. For example, historical references and archaeological records indicate “Heraclea with a port,” and there are coins attributed to this unlocated colony. While evidence is in abundance for Heraclea, a second major site can be hinted at by the overall collection of artifacts in the region without a distinct provenance. Surely, other smaller sites did not make it into the literary record and have been lost. Finding these sites and others like them could prove that the involvement of the Greeks in the Adriatic Basin was greater than previously thought and more integrated. If so, this involvement could also indicate a widespread participation of the Adriatic colonies in the greater Mediterranean trade network.

Future research would certainly involve an expansion of this study to encompass all of the major islands in the Adriatic. Additionally, the upcoming archaeometric database for Dalmatian pottery should shed additional light on the technology present at Pharos and other smaller Greek colonies in the region.

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