THESIS

GREEK COLONIAL EXPANSION:

IMPACTS ON ILLYRIAN PHYSICAL ACTIVITIES

Submitted by

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ABSTRACT

GREEK COLONIAL EXPANSION: IMPACTS ON ILLYRIAN PHYSICAL ACTIVITIES

As countries conquer and colonize new territories, their level of exploitation tends to coincide with how indigenous populations are used. However, this level of exploitation is wholly dependent upon local technology and colonial policies. Colonial research in the Americas indicates that after the colonial conquest, native inhabitants' lives were impacted negatively due to changes in health and diet (Klaus et al., 2009; Larsen, 1987; 1994; Larsen et al., 2001). I hypothesize that a similar situation may have taken place during the Hellenistic expansion into Illyria (modern Albania). This research will test the null hypothesis that physical activity levels, as evidenced by osteoarthritis in human skeletons, remained constant at Epidamnus, and Apollonia, Albania during Greek colonial expansion (620 BCE-229 BCE). To test this hypothesis, I examined skeletal remains for severity and prevalence of osteoarthritis among ancient Illyrians and their Corinthian colonizers. In an effort to test these differences between pre- and post-colonial populations a comparison is made between males and females. In addition, adults were differentiated from one another by age groups consisting of Young adults (18-34), Middle-age adults (35-49), and Older adults (50+). These skeletal remains come from precolonial sites that include Lofkënd, Corinth, and Apollonia, along with the postcolonial sites of Corinth, Apollonian, and Epidamnus.

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Throughout this process I had the invaluable support of friends and family. I would particularly like to show appreciation towards my parents, children, grandchildren, and cousin for their support, love, and being a necessary diversion throughout both my undergraduate and graduate school years. Last of all, but definitely not least of all, I want to recognize all the friends I have made along the way both at UNC and CSU. Your chats, advice, and most importantly your rallying cry have kept me fueled in my effort to complete this thesis.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

Anthropological studies include the ways in which lifestyle, environment, and diet can affect us biologically. Comparatively, anthropologists see how behavior and nutrition have shaped humanity from hunter/gatherers through the advent of agricultural societies and even into the modern day. Changes in the way a person or group of people live can leave evidence on the human skeleton. Bones and teeth have the ability to record a population's diet, ailments, mechanical stressors, and even their level of activities, thereby offering insight into their daily lives (Larsen, 1997). One way anthropologists can understand these changes is by examining osteoarthritis, which is a universal ailment that has plagued our bodies from the earliest ancestors through modern times (Bridges, 1991; Eshed et al., 2010; Larsen, 1997).

My research specifically will compare activity levels within precolonial, colonial, and postcolonial Illyrian populations by looking at varying levels of osteoarthritis. Archaeological excavations in central and southwestern Albania have brought to light the cultural and skeletal remains of the ancient Illyrians. This research will contribute to anthropological knowledge by identifying levels of osteoarthritis in order to ascertain if, indeed, the physical activity of the Illyrians, ancient Albanians, increased after colonization. The osteological data I will use was collected and analyzed by both Dr. Britney Kyle and me.

I will use Wallerstein's world system theory to understand colonization's effect on native populations, which created a cultural homogenization of those who were assimilated into the dominant political empire (Wallerstein, 1976). As Corinthians expanded into the Adriatic region of the Mediterranean, they incorporated southern Illyrians into their Corinthian domain. Some of the benefits for the Illyrian acceptance of Greek Hellenization could have led to their economic, political, and social gain (Galaty, 2002; Stallo, 2007; Wilkes, 1992). However, one of the main costs for Illyrians was loss of lands traditionally used for their herds (Galaty, 2002; Hammond, 1992; Stallo, 2007; Wilkes, 1992).

Another theoretical perspective comes from Eric Wolf, who examined the history of society for patterns of production and exchange, along with the evaluation of variation in populations and their economy. Wolf states, that people have been interconnected through great distances due to long-distance trade networks, which occurred prior to European colonial expansion in the 15th century (Wolf, 1982:71). Unlike Wallerstein who indicates that all societies would resemble one another; Wolf argues that colonization would not impact each group identically. For Wolf, capitalism influenced societies in different ways particularly since each capitalist and indigenous culture is unique. Therefore, their impacts upon others would not be homogenous (Wolf, 1982). As commerce moves throughout an area, material goods and resources can often create internal conflict, diversity, and further divisions among groups (Wolf, 1982:103-110). Ultimately it is trade, politics, and economic behavior that can create changes to the traditional aspects of indigenous daily life. Both Wallerstein and Wolf were looking at colonization on a global level, characterized by the exploitation of indigenous groups by various political empires. Since the Greeks were not working on the same level as European colonization, we should not expect the same levels of exploitation by the Greeks on the native Illyrians.

I hypothesize that Greek colonization would have created new social dynamics among the Illyrians. My reasoning is that before colonial expansion took place the majority of Illyrians were nomadic pastoralists. The material wealth of nomadic people would have been tied to their herds (Galaty, 2002:113; Halstead, 1987:79; Hammond, 1992: 29; Stallo, 2007:28). However, after initial colonization of the region by the Greeks and loss of pastoral lands, many of the

Illyrians began a sedentary way of life. Their new lifestyle became dependent on making a living around a Greek port, which would have included trade and large-scale agriculture. These changes would then correlate with different kinds of repetitive physical activity as exhibited in Illyrian skeletal remains. Specifically, these changes would be found on the remains of Illyrians during the Greek colonial expansion (Galaty, 2002; Gwynne, 1918; Srejovic, 1998:17; Stallo, 2007; Stipčević, 1977; Tsetskhladze, 2008). It is this modification that I am looking for, in order to determine whether Illyrian physical activity patterns changed in the way in which I predict.

RESEARCH QUESTION

Much of our information about Illyrian history comes from outside sources including the Greeks and Romans (Stipčević, 1977:35-36). Even the first archaeological excavations were conducted by foreign researchers such as the Austrians Camillo Praschniker, and Karl Patsch, Englishman William Martin Leake, Frenchmen Henri Daumet, Leon Heuzey, and Leon Rey along with the Italians Luigi M. Ugolini, Pirro Marconi, and Domenico Mustilli prior to World War I and II (Ceka, 2005:9-13). Unfortunately, many of these early archaeological finds, which included Hellenistic sculptures, were shipped out of Albania and displayed in other countries including Italy (Ceka, 2005:12).

It was not until the late 1940s that Albanian archaeologists Hasan Ceka and Skënder Anamali were able to conduct their own research into Albania's past (Ceka, 2005:14-15). By 1957 the University of Tirana allowed a museum to be put in one of its buildings, thereby displaying Albania's past. The 1990s saw real changes for Albania, mainly the end of isolation from the rest of the world due to political issues (Ceka, 2005:19). All these factors together help explain why many modern-day Albanians may not truly understand their own prehistory (Ceka, 2005; Stipčević, 1977).

Bioarchaeology, the examination of skeletal remains, has the ability to tell an individual's story even when we lack written documentation. This study can help with understanding the impacts of colonial policies upon the native inhabitants in the Old World. In addition, Albanians can gain a more comprehensive view of their ancestors by providing additional information about the impacts of various social, economic, and political forces that may have helped shape their modern population.

This research will study the levels of Illyrian physical activity during Hellenistic Greek colonial rule (620 BCE-229 BCE). In particular, the study of osteoarthritis can provide information about changes in Illyrian activity levels, allowing us a better understanding of the biocultural impacts of Greek colonization upon the ancient Albanians. Were the Illyrians the new labor force for Greeks in the region? Did the Illyrian way of life change drastically after Greek colonial expansion? A comparative look at human skeletal remains from archaeological sites at various locations within Albania, both before and after colonial expansion, will be made as a way to view changes in activity. The sites studied include Lofkënd, which is located in the interior of the country and was inhabited prior to Greek expansion. Also included are the coastal Greek trade colonies of Epidamnus and Apollonia. The final site is the homeland of the colonizers who came from the Greek city-state of Corinth (Figure 1).

Figure 1. Map of present day Greece and Albania, showing the locations of Epidamnus, Apollonia, Lofkënd, and Corinth.

This study will test the null hypothesis that there is no difference in workloads among these communities. Since osteoarthritis is a degenerative joint disease and typically occurs with age, this study will include only adults. A comparison will be made between age and sex of individuals with varying occurrence and severity of osteoarthritis. I will examine the individuals by three adult age categories: Young adults (18-34), Middle-age adults (35-49), and Older adults (50+). In an attempt to determine whether there are any differences in osteoarthritis the data will be separated into both pre- and post-colonial populations. This comparison will ultimately show if indeed osteoarthritis changed after Greek colonial expansion into Illyria.

SUMMARY OF CHAPTERS

The first part of Chapter 2 looks at research by Larsen and colleagues (2001) on the biocultural impacts of Spanish colonial policies in the southeastern United States. The rest of the chapter provides historical information about the Illyrians and their Greek colonizers, the

Corinthians. The last part of the chapter provides information on the four sites used in this research, which include Lofkënd, Apollonia, Epidamnus, and Corinth.

The third chapter explains osteoarthritis by describing how physical activity and repeated patterns of movement leave stress markings on our skeleton. Chapter 3 also provides a look at research and questions that can be answered by the study of osteoarthritis at the Egyptian colonial outpost of Tombos. The final part of this chapter discusses the future direction of the study of osteoarthritis.

Chapter 4 describes where and when the skeletal remains were recovered at each site. This chapter also discusses prior studies on biodistance analysis as a way to determine whether the Illyrian skeletal remains belong to the colonizers or the colonized. The fourth chapter reviews methodology used for determining not only the age and sex of an individual, but also the scoring methods utilized for this study of osteoarthritis.

The fifth chapter provides in-depth analysis of the data from each of the six sites. The analysis examines males and females at each site in order to determine whether one sex is particularly prone to osteoarthritis. Examination of each age group is conducted in order to learn whether one age group shows higher prevalence of osteoarthritis than any other. Three joints in particular show a higher frequency of osteoarthritis. So the hip, thoracic vertebrae, and temporomandibular joint (TMJ) are examined in detail. This examination is made in an effort to determine whether pre- or post-colonial sites indicate a higher frequency of osteoarthritis.

The results of the research are presented in Chapter Six. In this case it is demonstrated that the null hypothesis of no differences in workloads for the pre- and post-colonial inhabitants is correct. In addition, there is no apparent difference regarding variation in osteoarthritis between males and females; however, as expected, age was a contributing factor for the development of the degenerative joint disease. There was no notable difference between sites with regard to colonial expansion. Additional research into other Corinthian Greek colonial sites may be necessary to determine if Greek policies and practices may have varied at other Mediterranean locations.

CHAPTER 2: COLONIZATION

In order to understand how colonial policies can impact local inhabitants we must first determine what makes a colony. Stein (2005) defines colonies as settlements implanted either in uninhabited regions or within another society's territory (Stein, 2005:10-11). An overseas community established for long-term habitation is distinguishable from the surrounding indigenous cultures. There is a distinctive identity to these settlements that often exhibit certain ties to its native country through either cultural or traditional bonds, as opposed to government domination (Stein, 2005:10-11). Some of the ways in which colonial settlers chose to interact with natives can include long-term competition, supremacy, and/or alliances (Hodos, 2006:14; Stein, 2005:14).

Colonial expansion tends to result in a colonizer's economic gain, as measured by the development of trade routes, tributes, taxation, and the surplus of raw goods (Belcastro et al., 2007; Dougherty and Kurke, 2003; Galaty, 2002; Gwynne, 1918; Hammond, 1992; Harding, 1992; Hodos, 2006; Klaus et al., 2009; Larsen, 1994; Larsen et al., 2001; Schrader, 2012; Stallo, 2007:15; Stipčević, 1977; Wilkes, 1992; Wright, 2014). Transformation of both the colonizers and colonized occurs during forays into new territories (Hodos, 2006:17; Klaus et al., 2009; Larsen, 1987; Larsen, 1994; Larsen et al., 2001; Wright, 2014). On one hand colonizers traverse into foreign lands in an effort to create a new way of life for themselves. Alternatively, indigenous populations face new pressures including, among others, economic, social, and even political changes required to fulfill the demands of colonization (Schrader, 2012:60; Stein 2005:3-4). There are very few advantages for natives during transitional periods following colonial expansion aside from the possibility of exchanging knowledge between differing cultures (Galaty, 2002; Hammond, 1992; Harding, 1992; Stipčević, 1977; Wilkes, 1992).

BIOCULTURAL IMPACTS OF COLONIZATION IN SPANISH FLORIDA

A study by Larsen and colleagues (2001) examines the biological impacts of Spanish colonization on indigenous American populations in the southeastern United States. Researchers addressed how colonization and missionization affected the lives of local populations by analyzing tooth microwear, skeletal and dental physiological stressors, skeletal morphology, and analyze the stable isotope of the teeth (Larsen et al., 2001:70-73). Their study used documents kept at the Spanish missions and examined skeletal remains of the indigenous inhabitants. Skeletal remains included pre-contact populations and their descendants from the Santa Catalina de Guale mission on St. Catherines Island in Georgia. The study also included samples from two Spanish missions in Florida that consisted of both pre- and post-contact inhabitants. The native populations of this region were the Guale in Georgia, and the Timucua, Yamasee, and Apalachee in Florida.

Examination of the skeletal remains permitted researchers to focus on the health and lifestyle of these individuals. Changes in diet impacts health and well-being, whereas variations in physical activities can create lifestyle changes for the region's inhabitants (Larsen et al., 2001). This study shows there was an adverse effect on the lives of indigenous people during colonization (Larsen et al., 2001). Before colonial expansion native inhabitants made use of the diverse foods of their regions including wild game, plants, and aquatic foods. Following colonization, maize became the all-important staple in the natives' diets since the colonizers kept the majority of highly nutritious foods (Larsen et al., 2001; Schrader, 2012:60). These dietary changes led to an increase in dental diseases along with disruption to the normal growth patterns of indigenous children. Dependence on maize caused another condition prevalent among the natives, anemia. This condition was due to phytate a substance found in maize that causes a lack of iron absorption in the body (Larsen et al., 2001:75).

Resettlement of natives created higher population densities in the region that had a negative effect on the indigenous population's health and culture. Before colonial expansion locals lived in smaller groups and inhabited large expanses of land (Larsen et al., 2001). After the Spanish conquest the majority of natives were forced into close contact with one another and their conquerors. Due to these new living arrangements, diseases passed easily among the populations (Larsen et al., 2001:75).

The physical activities of local populations also changed after colonization. Spanish colonizers often forced indigenous peoples to intensify their physical labor in both construction and agriculture. Since larger populations were now inhabiting smaller areas of land located near Spanish missions, there was a greater demand for food. Some of the natives' new workloads consisted of carrying heavy cargos and traveling longer distances, since there were no beasts of burden in the Americas. It was not until the late mission periods that horses and cattle were brought to the region (Larsen et al., 2001:75).

This particular study showed how colonial expansion in the Americas impacted the health and lifestyle of the indigenous population. Health problems included an increase in dental caries (Larsen et al., 2001:83), porotic hyperostosis and cribra orbitalia, indicators of anemia, along with periosteal reactions, an indicator of infection (Larsen et al., 2001:91-94). The mean age-at-death for four of the five periods was the early 20s, whereas during the late colonial period the mean age-at-death was 29.8 years. A reduction in fertility and a decline in the birthrate among later native inhabitants resulted in diminished infant mortality and created decreasing population size throughout the region (Larsen et al., 2001:95-97). Larsen and colleagues also demonstrated an increase in osteoarthritis, particularly in the spine, hip, shoulder, wrist, and hands, indicating changes in lifestyle for the native inhabitants (Larsen et al., 2001:99). In the later mission period males showed an increase in frequency of osteoarthritis, particularly in the vertebral column. The cause of these changes probably stemmed from carrying heavy loads long distances along with substantial labor duties, imposed by the Spanish, which included construction and fieldwork. Possible intensification from the mechanical loading of these jobs added to the native's weight-bearing joints, specifically their cervical, thoracic, and lumbar vertebrae (Larsen et al., 2001:100). Overall these colonized populations experienced greater mortality, reduced fertility, increased disease, poor nutrition, and greater workloads following colonization by the Spanish. This research demonstrates the biological impacts of expansion by Spanish colonizers on post-Columbian communities in the Southeast United States. However, similar studies in the Old World are just beginning (McIlvaine, 2012; McIlvaine, et al., 2014; Wright 2014).

EARLY GREEK COLONIZATION

Numerous waves of colonization influenced the Mediterranean region from the Archaic Greek through Roman periods (c. 750BCE-AD400). Frequent voyages over land and sea meant that different social groups began interacting with one another. Most Greeks were cultivators of the land (Wilson, 2006:27). Prime regions for farming were not abundant since much of the Greek homeland was mountainous; therefore, many Greeks ventured into the Mediterranean Sea in search of fertile, hospitable lands (Cameron and Neal, 2003:33-35; Gwynn, 1918:89; Hodos, 2006:10; Pomeroy et al., 2004:53; Snodgrass, 2000:417; Stallo, 2007:20; Wilson, 2006:25). Initially establishment of Greek colonies was for extraction of food resources, raw goods such as metal, along with slaves (Cameron and Neal, 2003; Ceka, 2005; Galaty, 2002; Gwynn, 1918; Hammond, 1992; Harding, 1992; Hodos, 2006:10; Pomeroy et al., 2004:54; Snodgrass, 2000:417; Stallo, 2007; Wilkes, 1992; Wilson, 2006). Another reason for creating new outposts was the removal of unwanted people, such as political rivals from their homelands (Gosden, 2004:65; Wilson, 2006:31).

These first waves of colonial expansion began during the Greek Archaic period (Table 1). This initial phase of colonization took place when Greek city-states themselves were undergoing political and social changes. For some researchers this period of fluctuation explains why these first Greek colonies were rather politically independent from many of their mother-cities (Antonaccio, 2001:122). Many of these initial Greek settlements were non-colonial, according to Stein's (2005) above definition, precisely because there was a lack of control and/or power enforced upon surrounding native populations by Greek colonizers (Antonaccio, 2001: 114; Gosden, 2004:3; Stallo, 2007:14).

Table 1. Chronological timeline of Greek expansion into Illyrian territory of the Western Balkans [1].

Illyrian Prehistory	Early Bronze Age	c. 1900 – 1500 BCE
	Middle Bronze Age	c. 1500 – 1300 BCE
	Late Bronze Age	c. 1300 – 1000 BCE
Greek Dark Ages	Iron Age	c. 1100 – 750 BCE
Archaic Greek	Iron Age	c. 750 – 480 BCE
Classical Greek	Iron Age	c. 480 – 323 BCE
Hellenistic	Hellenistic Period	c. 323 – 146 BCE
Roman Greece	Roman Period	229 BCE – AD378

[1] Taken from Stallo (2007) and Wilkes (1992).

Even though early Greek colonies maintained kinship or commercial ties with their cities of origin, they were not directly under the political control of that conquering city. Instead management of the colony was in the hands of either founding families or local elites (Cameron and Neal, 2003:35; Gwynne, 1918:100; Hodos, 2006:13 Stallo, 2007:22; Wilson, 2006:43). For the Greeks colonial expansion of the empire developed during Alexander the Great's rule in c. 336-323 BCE, whereas modern 15th century European colonization was specifically to expand each countries empire and natural resources (Ceka, 2005:84; Gwynn, 1918:100; Stallo, 2007:14). Therefore, it is understandable why Greek law during this early period required Greeks to give up any rights to their homeland in their quest to become colonial citizens in new territories (Gwynne, 1918:106; Stallo, 2007:22).

As Greek colonists spread throughout the Mediterranean people did not refer to themselves as Greek. Instead they identified one another by their ethnicity, meaning their *ethnos* or tribe (Antonaccio, 2001:114). These early Greek colonists often would distinguish themselves by their place of birth or the city-state to which they belonged, such as Corinthians, Athenians, or Spartans. It was not until the Persian Wars (490-469 BCE) when an identity of "Greekness" started to expand throughout the Mediterranean (Antonaccio, 2001:115; Gosden, 2004:65; Tsetskhladze, 2008:lx).

Greeks and Illyrians first encountered one another through various trade routes. Initially the Illyrian reputation for being barbarians meant that many Greeks were unwilling to put their lives in jeopardy. Nevertheless, the need for raw goods, which included wood and precious metals found in the Illyrian hinterland, and desire for financial success overruled many Greek fears allowing them to colonize the Illyrian coast along the Adriatic Sea at the port cities of Epidamnus and Apollonia (Ceka, 2005; Galaty, 2002; Hammond, 1992; Harding, 1992; Stallo, 2007; Stipčević, 1977; Wilkes, 1992). Many of these colonizing groups were small; for instance, there were 200 Corinthians who colonized Apollonia (Ceka, 2005:66; McIlvaine, 2012:47; Stallo, 2007:20; Tsetskhladze, 2008:xxx; Wilkes, 1992:112). This small number may account for the importance of both local inhabitants and their Greek colonizers working together in order to assure the prosperity of a region.

Greek colonization often involved the establishment of either a settlement that reproduced the founding city-state, which in this case was Corinth, or an outpost for trading (Stein, 2005:12). Both Epidamnus and Apollonia were the latter. These colonial outposts were created as both areas of commerce and large-scale operations of agriculture to be exported by the Greeks (Ceka, 2005:66; Cameron and Neal, 2003:35; Galaty, 2002:119; Stallo, 2007:20). Therefore, Greek colonization based on trade for this district was significant because it altered the Illyrians' traditional nomadic pastoralist lifestyle. Even though many Illyrians were pastoralists, there were other occupations throughout the region such as mining in the hinterlands, fishing near the coasts, and small-scale farming. As a result of colonization, many Illyrians voluntarily chose to settle near the Greek urban communities in an effort to prosper in the various Greek trade networks (Ceka, 2005; Galaty, 2002; Hammond, 1992; Stallo, 2007; Wilkes, 1992). Some Illyrians even became part of Corinth's navy and military (Ceka, 2005:68; Hammond, 1992:36; Stipčević, 1977:41-42). Still other Illyrians became producers of goods such as pottery and metallurgy for the area's elite population (Cameron and Neal, 2003; Pollo and Puto, 1981).

ILLYRIAN CULTURE

The Illyrians were an Indo-European people who first migrated into the area between the Adriatic Sea and Sava River during the Middle to Late Bronze age circa 2000-1200 BCE (Ceka, 2005:33; Harding, 1992:17; Srejovic, 1998:14; Stallo, 2007:7; Stipčević, 1977; Wilkes, 1992:37-39). The Illyrian population developed into tribal societies, characterized by a certain flexibility in the political and social makeup of the group. Originally the term Illyrian referred to a single tribe; however, it soon became synonymous with all who shared similar cultural traits and language (Ceka, 2005:33; Srejovic, 1998:14; Stallo, 2007:5). The Illyrian territory covered the western Balkans between the Middle Danube valley and the Adriatic Sea (Harding, 1992; Wilkes, 1992:92). Today this region consists of Bosnia and Herzegovina, Kosovo, Slovenia, Macedonia, Croatia, Serbia, Montenegro, and of course Albania (Figure 2).

Figure 2. Map of Illyrian, Greek, and Thracian Territory (Wikipedia, 2007).

The Illyrians' traditional livelihood came from pastoralism, along with small-scale agriculture and trade (Galaty, 2002:110; Stallo, 2007:25). Many of the Illyrian tribes became dependent upon transhumant pastoralism, meaning they would graze their herds along coastal plains in the winter and move to the mountains for the summer (Galaty, 2002:113; Halstead, 1987:79; Hammond, 1992: 29; Stallo, 2007:28). The exceptional pasturage was the result of the region's warm temperatures and wet weather, ideal conditions for the herds of mules, horses, cattle, sheep, and goats (Halstead, 1987:79; Hammond, 1992:29; Stallo, 2007:9; Wilkes, 1992:109). The Illyrians used hides and wool from their flocks to produce clothing and leather. Much of their daily diet was also influenced by their flocks and consisted of milk, cheese, and meat (Galaty, 2002:113; Hammond, 1992:30; Stallo, 2007:9). Prior to Greek colonization many Illyrians were involved in trade networks around the Adriatic Sea. Some of the items exported to their neighbors included slaves garnered during tribal conflicts, and hides from their flocks (Galaty, 2002: 112; Stallo, 2007; Stipčević, 1977; Wilkes, 1992).

Illyrian tribes often warred with one another but periodically they would join to create alliances, only to later change or break these treaties (Srejovic, 1998:15-17). Greek historians made note of the savageness of Illyrian mercenaries (Casson, 1926; Wilkes, 1992). According to the Athenian historian Thucydides, the Illyrians were barbarians. He referred to them as robbers by sea and land who were powerful but not ingenious in war tactics (Srejovic, 1998:12; Stallo, 2007:26). Due to these fierce fighting skills, it is understandable that both the Greeks and the Macedonians wanted to win Illyrian tribes over as their allies (Srejovic, 1998:12; Stipčević, 1977:43).

Illyrians were hostile towards their Macedonian neighbors (Ceka, 2005:33; Stipčević, 1977:43; Wilkes, 1992). In 336/335 BCE Alexander the Great was able to put an end to this hostility by sweeping through the Balkans with his well-trained army. The combination of his military prowess, cavalry, and armored infantrymen allowed Alexander to shock and awe many of the Illyrian tribes, bringing them under his control (Ceka, 2005:84; Stipčević, 1977:44; Wilkes, 1992:121-124).

Many rural Illyrians altered their way of life due to Greek culture which influenced the Illyrians after colonization. Part of this influence stemmed from trade networks and urban areas created after Greek colonization (Stallo, 2007:29). Larger groups of Illyrians began to settle in and around these communities. Unfortunately for the Illyrians, Greek colonists took control of natural resources which ranged from local mines to former pastoral lands. This confiscation of Illyrian lands stemmed from levying of taxes on the pastoralists, when they brought their herds in to graze (Ceka, 2005:67; Galaty, 2002:119; Gwynne, 1918:108; Hammond, 1992:33; Stallo, 2007:27; Wilkes, 1995:127). Due to these taxes more and more Illyrians decided to give up pastoralism for urbanization and agriculture (Galaty, 2002; Hammond, 1992; Stallo, 2007; Wilkes, 1992).

Even though newly-arrived Greeks exploited the native populations through taxation and control of local mines, many of the Illyrians were still able to benefit from this colonial relationship (Antonaccio, 2001:126; Gwynn, 1918:108; Stallo, 2007:29). Numerous influential Illyrians acquired political rights and succeeded in attaining high positions within these colonies (Pollo and Puto, 1981; Stallo, 2007). Neighboring Illyrians were also able to maintain their own culture, social, and political organizations (Galaty, 2002:119; Gwynne, 1918:107; Stallo, 2007:29). In fact, due to Corinth's liberal colonial policies several Taulantii tribal kings were able to occupy and rule both Epidamnus and Apollonia by the third century BCE (Gwynne, 1918:116). Illyrians could rule in peace as long as nothing interfered with Corinth's city-states imperial claim on trade (Gwynne, 1918:116; Stallo, 2007:30).

Illyrians also profited from trade through their continued contact with the Corinthians. The Greeks were able to provide a framework for expansion of Illyrian commerce throughout the region (Galaty, 2002:119; Gwynne, 1918:107; Stallo, 2007:29). Overall the mutual benefit of trade seems to have been the underlying reason why these two groups maintained such peaceful relationships built on mutual benefits (Gwynne, 1918:107; Stallo, 2007:30; Stipčević, 1977:38). One of the differences between the southern Illyrians and other Illyrian tribes throughout the region came from the assimilation and acculturation between the Greeks and those who chose to live in the newly established colonial ports (Galaty, 2002; 117; Srejovic, 1998:17; Stallo, 2007:31; Tsetskhladze, 2008:lii-lvi). Even though many southern Illyrians incorporated Greek culture into varying aspects of their lives, there were still areas in which some Illyrians' held on to their traditions. One Illyrian tradition they held onto was the ways in which they buried their dead.

BURIAL MOUNDS

The Illyrians created large earthen mounds known as tumuli, whereas the Greeks used flat graves dug into the earth, similar to today's "Western" burial plots (Galaty, 2002; Hammond, 1992; Harding, 1992; McIlvaine, 2012; Snodgrass, 2006; Stallo, 2007; Wilkes, 1992). During the Bronze Age, Illyrians placed their dead in the center of these large earthen mounds (Ceka, 2005:3; Galaty, 2002:120; Hammond, 1992:33 Harding, 1992:18; McIlvaine, 2012:36; Stallo, 2007:9; Wilkes, 1992:105). Some Illyrians still practiced this type of mound burial after Roman rule in the area c. 229 BCE (Casson, 1926:300; Stallo, 2007:11; Wilkes, 1992:241). Many researchers believe several generations of Illyrian transhumant pastoralists visited and added to these tumuli memorials (Hammond, 1992:34; Stallo, 2007:10).

At the center of a tumulus laid a warrior chieftain with his armor. Over time additional graves were added to these mounds (Galaty, 2002:120; Hammond, 1992:33; Stallo, 2007:10; Wilkes, 1992:127). Shafts were excavated into the mounds and the interments were placed in the shafts. Later the shafts were filled in with dirt (Stallo, 2007:10). This way of inserting the dead in the tumulus makes stratigraphic dating impossible. Therefore, dating occurs through material found with the interment (Stallo, 2007:10). It has been the traditional belief that many of the mounds contain the same clan or tribal members, and in some areas several mounds clustered together created a cemetery-type compound (Galaty, 2002:120; Hammond, 1992:33; Wilkes, 1992:140).

Many of the objects found within the tumuli showed evidence of Illyrian craftsmanship and trade. These included iron weapons such as axes, swords, and shields, along with amber used for charms, beads, and necklaces (Hammond, 1992:34; Stallo, 2007:12; Wilkes, 1992:105). By the fifth and sixth centuries Illyrian elites had fine goods such as gold and silver girdles, belts, and jewelry buried with them (Stallo, 2007:11; Wilkes, 1992:105). Illyrian tumuli also contained high quality Greek pottery, jewelry, and metal works (Galaty, 2002:120; Stallo, 2007:11; Wilkes, 1992:105), thus showing the extent of Illyrian trade networks.

Greek burial practices during this same period consisted of either *enchytrismòs* (burials in jars called *pithoi*) or sarcophagi along with the placement of various goods such as painted pottery (Amore, 2005: 90; Galaty, 2002:120; Snodgrass, 2006; Stallo, 2007:11). After colonization of southern Illyria by the Greeks, Illyrian burial practices began to alter. In particular Apollonia's tumulus show a variety of burial practices including sarcophagi, various pits including simple wood, mud-brick, or tile-lined, along with in situ cremations, urns, and enchytrismòs (Antonaccio, 2001:126; Amore, 2005:90; Lafe, 2003:78; Stallo, 2007:11). Wealthier Apollonians used marble sarcophagi, like their Greek counterparts, but inside a tumulus. Some of these individuals had their names—many of which show both Greek and Illyrian origins—carved onto stelae as a way of marking their place of burial (Galaty, 2002:120; Lafe, 2003:77). Even though Apollonia's tumulus shows Greek influence on burial practices, the Lofkënd tumuli held only traditional Illyrian burials indicating that Greek influence did not reach this far inland.

Lofkënd

The ancient city of Lofkënd, located east of Apollonia in the Mallakaster hills, predates Greek colonization in the region (Papadopoulos, 2006; Papadopoulos et al., 2007; Papadopoulos et al., 2008). Today the Lofkënd tumuli is the only feature remaining of this ancient village and dominates the local landscape (Figure 3; Papadopoulos, 2006; Papadopoulos et al., 2008). The modern city of Lofkënd is one of the oldest villages in the region and lies 3 km east of this tumulus (Papadopoulos et al., 2007). Understanding this ancient culture comes from material remains excavated from within the mound. Many of the items span from the Bronze Age to Early Iron Age. Researchers believe that Apollonia and Lofkënd coexisted for a short time; however, the burial mounds did not contain any pottery from the Corinthian colonial period (McIlvaine, 2012; McIlvaine et al., 2014; Papadopoulos, 2006; Papadopoulos et al., 2007; Papadopoulos et al., 2008; Schepartz, 2010).

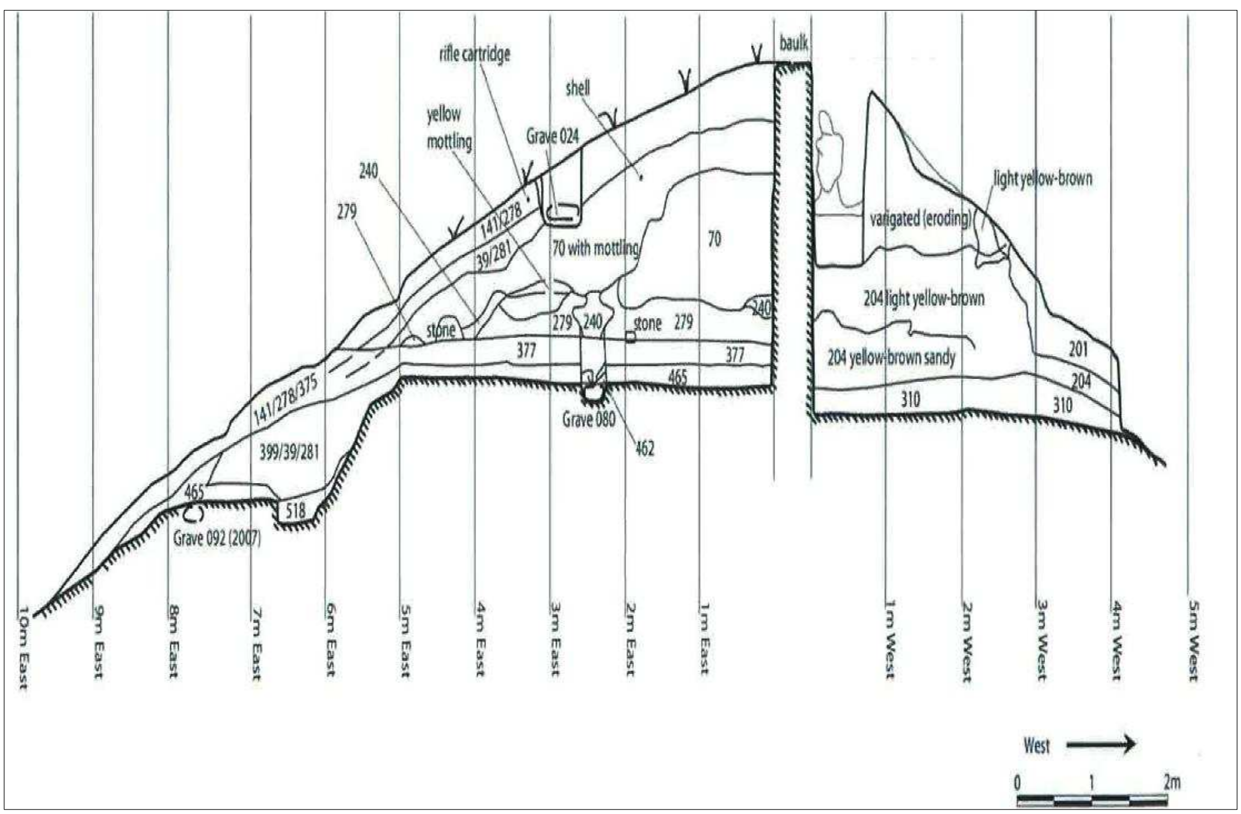

Figure 3. East-west section through Lofkënd tumulus (Papadopoulos et al., 2008:693).

Greek colonization did not extend to Lofkënd, so it is possible to make a comparison of these early Illyrian inhabitants to the later colonized groups at Epidamnus and Apollonia. The only information known about the original inhabitants of Lofkënd is that they were traditionally nomadic pastoralists (Papadopoulos, 2006; Papadopoulos et al., 2008).

Many of the nearby contemporary village inhabitants believed that the burial mound was possibly a collective grave for foreign soldiers from the First World War. However, after excavation of the tumulus many of the neighboring Lofkënd inhabitants now identify the prehistoric burials with a sense of local pride, thereby allowing for a better understanding of their own history (Papadopoulos et al., 2008). This knowledge of tradition Illyrian culture helps when ascertaining the extent of Corinthian Greek influence in the southern Illyrian region.

CORINTHIAN COLONIZATION

Prior to the 8th century BCE Corinthians subsisted on agriculture and pastoralism; however, cultivable land soon was in short supply (Angel, 1972; Gwynn, 1918; McIlvaine, 2012; Pomeroy et al., 2004; Stallo, 2007) During the 8th century BCE, ruling members from eight villages formed Corinth and dominated their neighbors, thus beginning their local expansion. This small independent city-state soon became a regional powerhouse (Antonaccio, 2003; Dietler, 2005; Gwynn, 1918; McIlvaine, 2012; Stallo, 2007). The city-state of Corinth made use of the narrow isthmus between the Gulf of Corinth and the Saronic Gulf as a strategic point, thereby allowing the Corinthians to prosper in the region as they brought trade and travel under their control (Pomeroy et al., 2004:163; Stallo, 2007:16). Another advantage for this city-state was its navy, which established trade routes throughout the region (Hammond, 1975; McIlvaine, 2012; Pomeroy et al., 2004; Stallo, 2007).

Corinth's first wave of colonial expansion began during the mid-eighth century BCE (Gwynne, 1918:92 122; Pomeroy et al., 2004:66). Unlike later colonizers these first groups were in search of cultivatable land. Initial colonizers would lay the foundation for colonial expansion throughout the Mediterranean. Colonization in these early years was not built on the extension of political might for the creation of an empire; instead it was in search of resources (Gwynne, 1918:92; Hodos, 2009:226; Pomeroy et al., 2004:66). By 733 BCE the Corinthians had established two colonial settlements; one named Syracuse on the island of Sicily, and the other Corcyra, on the island of Corfu (Figure 4; Cabanes, 2008; Graham, 1983; Hammond, 1992:31; Hodos, 2009:226; Lafe, 2003:75; McIlvaine et al., 2014; Pomeroy et al., 2004:66; Snodgrass, 2000:120; Stallo, 2007; Wilkes, 1992; Wilson, 2006).

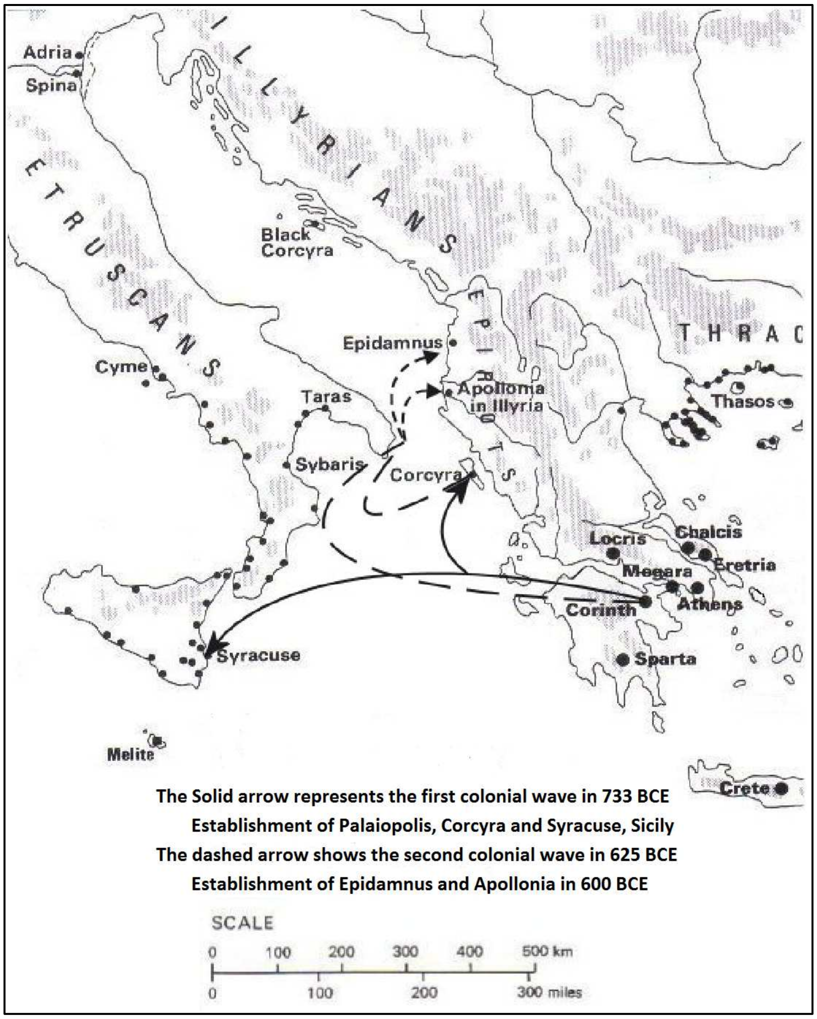

Figure 4. Map showing Corinthian colonial expansion (from Stallo, 2007:19).

The second wave of Corinthian colonization began with the need for new resources (Ceka, 2005:59; Gwynne, 1918:92 122; Pomeroy, et al., 2004:66). Since raw materials were scattered geographically throughout the ancient world, trade was necessary. The formation of these Mediterranean trade systems allowed for both the exchange of goods and ideas (Pomeroy et al., 2004:162). Development of trade routes allowed Corinthians to launch the first commercial networks. The extent of Corinthian trade is reflected by how widely their coins, the earliest known ones struck on the Greek mainland, were distributed throughout the region (Gwynne, 1918:93).

Researchers believe that it was the Taulantii who requested Greek assistance in Illyria as a way to give them an advantage over other Illyrian tribes (Ceka, 2005:67; Galaty, 2002:118; Stallo, 2007:20; Stipčević, 1977:42; Wilkes, 1992:98). However, once there, the Greeks used trade to further their expansion into this territory. Greek expansion consisted of two types of colonies, which were settlements and trading outposts (Hodos, 2006:19; Stein, 2005:12). For the Corinthian Greeks who ventured up the Adriatic coastline, trade was their primary goal. Illyrian exports included wool, salt, bitumen, metal ores, hides, stock, timber, and cereal grains. Illyrians also profited from the sale of slaves and loaning out of their mercenaries to others in the region (Hammond, 1992; Wilkes, 1992). On the other hand, Illyrian imports consisted of Greek ornaments for clothing, wine, olive oil, weapons, jewelry, armor, ceramic vessels, and metal utensils (Ceka, 2005; Hammond, 1992; Stallo, 2007; Wilkes, 1992).

This second colonial wave resulted in the formation of Epidamnus in 627 BCE and the wealthier Greek colony of Apollonia around 600 BCE (Casson, 1926:322; Ceka, 2005:66; Galaty, 2002:119; Gwynne, 1918:103; Hammond, 1992:31; Lafe, 2003:75; McIlvaine, 2012:58; Srejovic, 1998:22; Stallo, 2007; Stipčević, 1977:38; Tsetskhladze, 2008:lxv; Wilkes, 1992:110). According to historians there are conflicting dates in regard to the colonization of Apollonia, either 600 BCE or 588 BCE. Part of this confusion might come from the fact that the colony was originally named after its founder Gylax and called Gylakia in 600 BCE. Then in 588 BCE the colony became Apollonia as a way of linking it to Apollo (Amore, 2005:45; Ceka, 2005:66; Stallo, 2007:21; Wilson, 2006:47-48). To maintain consistency, I will use the date of 600 BCE (Amore, 2005:23-24; Galaty, 2002:119; Hammond, 1992:31; McIlvaine, 2012; Srejovic, 1998:22; Stipčević, 1977:38; Tsetskhladze, 2008:lxv; Wilkes, 1992:110). Roman armies advanced throughout the region in 229 BCE, resulting in the loss of Greek influence over the Illyrians (Ceka, 2005:121-122; Hammond, 1992; Stipčević, 1977; Wilkes, 1992; Wright, 2014).

Epidamnus

The port city of Epidamnus was originally an Illyrian stronghold built by the sea (Ceka, 2005; Wilkes, 1992). However, the marine harbor on the shore of the Adriatic Sea became a flourishing center of commerce for Corinth and its colonial city Corcyra. This tactical location enabled the Greeks to bring the southern Italian trade under their control (Ceka, 2005:66-67; Stallo, 2007; Wilkes, 1992; Wright, 2014). The port city of Epidamnus also allowed the Greeks to secure control over silver deposits from mines located in Illyria's interior (Ceka, 2005:66; Hammond, 1992; Stallo, 2007; Wilkes, 1992:110; Wright, 2014).

After colonization trade may have shifted from slaves to agricultural products. Change in land use created a ripple effect on the traditional Illyrian way of life (Galaty, 2002:121; Hammond, 1992:37; Stallo, 2007:27; Wilkes, 1995:127; Wright, 2014). The ever expanding Greek population took large swaths of farmlands from Illyrians' traditional pastoral lands. Unfortunately, Greek annexation of coastal regions also took away Illyrians' prime winter grazing area (Ceka, 2005:67; Galaty, 2002:121; Stallo, 2007:27; Wright, 2014). As a result, many Illyrians changed how they lived. Some of them became Greek servants and serfs; in this case the term serf refers to native inhabitants who were bearers of water and tillers of land, now owned by the Greeks (Galaty, 2002:120; Gwynne, 1918:108-109; Wilkes, 1992:1). Still others chose to become miners, farmers, and breeders of livestock (Galaty, 2002:119-120; Gwynne, 1918:108; Hammond, 1992:32; Srejovic, 1998:24; Wilkes, 1992:109). There was a lack of discriminatory attitudes towards people of differing religion, culture, and race; therefore, inter-marriages between the Greeks and the Illyrians allowed a syncretism of their cultures to emerge.

Mixed archaeological evidence of pottery, jewelry, and weapons were found in the burials indicating a merging of these cultures (Antonaccio, 2001 2003; Ceka, 2005; Galaty, 2002; Gwynne, 1918; McIlvaine, 2012; Stallo, 2007; Stipčević, 1977; Tsetskhladze, 2008; Wilkes, 1992). Greek assimilation also allowed many of the local Illyrians to gain political, economic, and social status both locally and abroad (Galaty, 2002:120; Stallo, 2007:30; Wilkes, 1992:110-112).

Apollonia

As stated above, 200 Corinthians settled near the mouth of the Vjosë River to form Apollonia (Ceka 2005:66; McIlvaine, 2012:47; Stallo, 2007:20; Tsetskhladze, 2008:xxx; Wilkes, 1992:112). These Corinthian settlers established an oligarchy over the local native population (Amore, 2005; Galaty, 2002; Gwynne, 1918:113; Hammond, 1992; Stallo, 2007; Stocker and Davis, 2006; Wilkes, 1992). Many of the local Illyrians worked for the city's ruling class either in the fields or with their herds (Ceka, 2005; Galaty, 2002; Stallo, 2007; Wilkes, 1992). However, the creation of this trading post allowed many of the local Illyrian aristocracy to purchase Greek luxury items (Galaty, 2002; Hammond, 1992; Wilkes, 1992).

The wealthy colony of Apollonia was renowned throughout the region and earned the nickname 'City of Statues' due to the city's artisans (Amore, 2005; Pollo and Puto, 1981; Wilkes, 1992). The artisans created earthenware vases, ceramic and stone statues, along with tiles. The Greek school of sculpture influenced Apollonian artisans until the 3rd century BCE when they began to develop their own sense of style (Pollo and Puto, 1981). Appolonians were also renowned for their school of philosophy and rhetoric, so much so that Emperor Augustus went there to learn. Even Cicero, a Roman philosopher, described the town as "magna urbs et gravis" ("a great city and a great number"). During its existence Apollonia's population ranged from 40,000-50,000 inhabitants (Pollo and Puto, 1981; Wilkes, 1992).

These two colonial cities - Epidamnus and Apollonia - controlled local mines which allowed the minting of coins. The Illyrian king Monounions in Epidamnus began minting coins in approximately 280 BCE (Hammond, 1992:32; Srejovic, 1998:26; Stallo, 2007:26). Many of the silver coins known as Illyrian drachmas were minted at both Epidamnus and Apollonia. These Illyrian drachmas have been found in far off places such as modern Rumania and Bulgaria (Ceka, 2005:92; Pollo and Puto, 1981; Stipčević, 1977; Wilkes, 1992; Wright, 2014).

These urbanized settlements influenced local Illyrians to forgo the transhumant life, thereby Hellenizing the Illyrian inhabitants near these cities. However, unlike the modern city of Durrës built on top of Epidamnus on the Adriatic shore, abandonment of Apollonia occurred in 400 CE. This desertion came from the loss of Apollonia's harbor due to the changing course of the Vjosë River. Today the ruins of Apollonia are found on the Pojani hill (Amore, 2005; Stallo, 2007; Wilkes, 1992).

SUMMARY

As Greeks started to venture away from the mainland, their focus was not on building an empire. Unlike colonization that took place during the modern 15th century when native people were often subjugated, Greek colonial policies tended to be more inclusive of the local populace. Each new colonial settlement was an independent *polis* whose power lay in the hands of the local elites. Even though these new regions maintained kinship ties to their mother-cities, they were not politically controlled by them. Another way Greek colonial rule differed from New World colonial policies can be found in the fact that many of the Illyrians were able to live more or less the way they had prior to colonization by the Greeks. Some of these occupations included artisan production, mining, fishing, and even serving in the military. Therefore, many of the local inhabitants, with the exception of pastoralists, were left to live as they had before colonization (Cameron and Neal, 2003; Gwynne, 1918; Hodos, 2006; Stallo, 2007).

The traditional pastoral Illyrian lifestyle changed as new urban colonial areas encroached upon prime pastoral lands (Galaty, 2002; Stallo, 2007; Wright, 2014). The once transhumant population settled around their Greek colonizers. Many southern Illyrians were able to prosper and maintain peace with the Greek colonizers and were able to preserve their combined trade networks (Ceka, 2005; Galaty, 2002; Gwynne, 1918; Srejovic, 1998; Stallo, 2007; Tsetskhladze, 2008). Did these changes create physical hardship for the local populations? Or did the Illyrian lifestyle change without creating a physical burden for them?

CHAPTER 3: OSTEOARTHRITIS

Osteoarthritis is one of the most common ailments plaguing humanity. Since these pathological lesions are universal, osteoarthritis can be used to assess behavioral changes in early populations (Bridges, 1992:67; Larsen, 1997:164-166; Waldron, 1995:385; 1992:235). There are multiple reasons why osteoarthritis occurs, and these can include repetitive use of a joint from exercise, activity, work, or even forced labor brought on during colonization.

This degenerative disease is found in articulating joints. These are the joints that allow for movement in the body. Chronic breakdown of cartilage is the main cause of osteoarthritis and typically occurs from mechanical stressors, injury, and age. The effects of this breakdown leave marks on the bony tissues of the joints, which can impact the joint's ability to withstand long-term use (Larsen, 1997:165-166; Radin, 1983:20). Osteoarthritis of the joints appears as marginal lipping, porosity, eburnation, or a combination of these three changes (Cope et al., 2005; Eshed et al., 2010; Jurmain, 1980; Jurmain and Kilgore, 1995; Klaus et al., 2009; Larsen, 1997:165; Lieverse et al., 2007; Rogers et al., 1987; Waldron, 1995; Weiss, 2006). Mechanical stressors are due to the repetitive use of the weight bearing joints of our body. Some factors which can influence these stressors are an individual’s handedness, sex, and cultural practices (Cope et al., 2005; Eshed et al., 2010; Imeokparia et al., 1994; Jurmain, 1980; Jurmain and Kilgore, 1995; Klaus et al., 2009; Lieberman et al., 2001; Lieverse et al., 2007; Ortner, 1968; Papathanasiou, 2005; Weiss, 2006; Weiss and Jurmain, 2007). Sufferers of osteoarthritis experience joint stiffness, pain, and swelling, leading to a loss of motion and strength in the affected joint (Bridges, 1993:293; Cope et al., 2005:391; Felson, 1990:49; Larsen, 1997:168).

As stated above, the two main causes of osteoarthritis are mechanical stressors and carrying heavy loads, which may seem odd in regard to the development of temporomandibular joint arthritis. However, there are multiple causes for osteoarthritis of the temporomandibular joint which include, but are not limited to, trauma of the jaw, grinding of one's teeth when chewing or sleeping, loss of teeth, and clenching of the jaw. This last one, clenching of the jaw, can occur from stress or biting such as when holding onto something while working. Possible examples of occupations which would impact the jaw can include holding rope for the tying of knots in the creation of fishing nets. Another occupation that would have put stress on the jaw is biting and holding onto animal hides when tanning them in the production of leather (Bridges, 1992; Hodges, 1991; Ferrazzo, et al., 2013; Rando and Waldron, 2012; TMJ Disorders, 2013; Visser, 1994; Zarb and Carlsson, 1999)

Another arthritic condition known as Schmorl's nodes impacts the vertebral column. This ailment occurs when the jelly-like substance of the inter-vertebral disk, known as the nucleus pulposus, leaks out. This seepage causes degeneration of the bone which can impact the vertebral disk, as well as the adjacent vertebrae. Schmorl's nodes are often caused by the compression of the spinal column. This condition is usually due to repetitively carrying heavy loads and tends to affect the middle and lower spinal column (Jurmain and Kilgore, 1995:448; Klaus et al., 2009; Larsen, 1997:166).

When comparing hunter/gatherer groups to agriculturalists, researchers have shown a difference in the distribution of osteoarthritis in the body. Among agriculturalists there is an increase in osteoarthritis as evidenced by an increase in osteoarthritis of the upper body, but a decrease in bone modifications in the lower body (Eshed et al., 2010:122). One explanation for these changes may be due to the repetitive movements of the agriculturalist. In some agrarian societies activities would have involved land clearing, planting, harvesting, and processing crops and caring for domesticated animals (Bridges, 1991; Cope et al., 2005). However, not all research supports this explanation. Many agricultural groups in the Americas showed a decline in osteoarthritis when compared to hunter/gatherers from the same locations (Eshed et al., 2010:122).

There have been comparisons of males and females in both hunter/gatherer and agricultural groups. For hunter/gatherers in Alabama there is little difference in osteoarthritis between males and females. Among agrarian groups from northwestern Alabama, however, there is a marked difference in osteoarthritis between the sexes. In this population males are particularly prone to osteoarthritis of the elbow and knee, whereas females show no particular prevalence of osteoarthritis (Bridges, 1991; Eshed et al., 2010). Based on these different patterns of osteoarthritis in various joints agriculture seems to have brought about a change in the division of labor among the sexes (Bridges, 1991:385; Weiss, 2006:691).

Osteoarthritis can also be an indicator of an energetic lifestyle and it suggests physically demanding activities (Larsen, 1997:166; Papathanasiou, 2005:388; Thelin et al., 2004:203). Exercise can lead to the development of osteoarthritis as it occurs from the result of repetitive impacts on the shock-absorbing tissues of our joints. Over time this repetition causes the joint space to narrow and the joint can no longer handle the strain of absorbing these shocks (Hoffman, 1993:896). The individual's lifestyle includes whether there was any previous injury, exercise, or a job that may have involved high dynamic repeated impacts in the area of the knee, weight or obesity, along with age (Baetsen et al., 1997; Hoffman, 1993:898).

Osteoarthritis has been used as a marker for different types of manual labor. Various jobs can put repetitive strain on the skeleton from standing, kneeling, grabbing, grasping, squatting, and bearing heavy loads multiple times a day (Sandmark et al., 2000:21). During modern times, blue-collar jobs such as janitorial services, cleaning, construction work, and firefighting may cause osteoarthritis (Felson, 1990:48-49; Thelin et al., 2004:203; Vingård, 1996:678). Understanding these markers for manual labor can assist researchers when studying various ancient occupations, such as those in Ancient Egyptian colonies.

A CASE STUDY OF PHYSICAL ACTIVITY CHANGES AT TOMBOS, NUBIA

Schrader (2012) examined osteoarthritis and entheseal remodeling (musculoskeletal stress markers from where tendon, ligament, or joint capsule attaches to the bone) at Tombos, Nubia after Egyptian colonization during the New Kingdom (1550-1069 BCE). Schrader used skeletal remains as a way to compare activity patterns of the population before and after Egypt's colonial expansion into Nubia.

There are conflicting views about the ways in which colonial policies may have impacted indigenous Nubians. According to Schrader, some scholars argue that Egyptians forced the local population to pay tribute which included slaves, goods, gold, and grain (Schrader, 2012:61). Others argue that the Egyptian expansion created positive interactions between the two groups which included minimal tribute and the ability of Nubians to maintain their cultural values (Schrader, 2012:62).

Schrader's research focused on osteoarthritis and entheseal changes as a measure of musculoskeletal stress markers, in an effort to understand how Nubian activity levels changed at Tombos (Schrader, 2012:62). The sex, age, and body size of an individual along with environmental factors and genetic predispositions impact both entheses and osteoarthritis (Schrader, 2012:62). Even though neither osteoarthritis or entheses allow us to know exactly what an individual did while they were alive, these pathological changes do offer certain information about activity patterns of the population. For example, if the individual worked as a manual laborer it would be expected that the individual would show evidence of greater osteoarthritis or entheses compared to an individual who was engaged in a less physically demanding position such as an administrator (Schrader, 2012:62).

Schrader examined 85 adult individuals for the assessment of arthritic changes (Schrader, 2012:62). Skeletal remains of subadults and bones showing either fractures or pathological lesions were not included in the study (Schrader, 2012:61-62). A comparison was also made between males and females among varying age groups (Schrader, 2012:63).

Schrader first considered entheseal remodeling and osteoarthritis. Her analysis indicates that males showed a higher consistency of entheseal development when compared to females and that entheseal changes of the elbow had a higher score compared to the knee. By contrast osteoarthritis was higher in the shoulder and hip as opposed to the rest of the joints. As expected, age was a determining factor as to whether an individual showed changes in entheses or osteoarthritis remodeling (Schrader, 2012:65).

Schrader also examined osteological data from other Ancient Egyptian sites from earlier time periods. These sites included both the Predynastic and Early Dynastic (4000-2900 BCE) periods of Hierakonpolis and Naga ed-Dêr, Old Kingdom burials (2686-2181 BCE) at Giza, which housed a more elite population. Schrader's data also included the non-elite population from the Middle Kingdom (2055-1650 BCE) of Abydos and individuals from Kulubnarti which dates to the Early Christian Period that dates between AD550-800 (Schrader, 2012:62-63). These additional comparisons between sites show us that Tombos exhibits a relatively low amount of osteoarthritis indicative of physical activity, even though it was a colonial outpost of the Egyptian New Kingdom (Schrader, 2012:66-67).

The archaeological record at Tombos indicates that the town was, in fact, an imperial administrative center. The evidence suggests that there was a high degree of integration between both Egyptians and Nubians in the Tombos population, as opposed to the structured separation found in many of the colonial policies utilized after the 15th century. It seems that the 15th century colonial practices may have led to higher levels of osteoarthritis in the inhabitants of the Americas, specifically since New World native inhabitants were often the new labor force. The lack of evidence for high levels of activity among the inhabitants of Tombos indicate that these people came from the upper to middle socioeconomic levels (Schrader, 2012:68). Schrader suggests that the Tombos population was possibly made up of minor officials, craftsmen, scribes, and those from lower levels of bureaucracy (Schrader, 2012:68).

Schrader presents evidence to indicate that the Tombos population used the elbow more than any other joint, even when compared to other Nile Valley populations. She proposes that those from Tombos engaged in limited physical activity (Schrader, 2012:67). She also concludes that her research supports the hypothesis that Egyptian colonial policies did not always have a negative impact on Nubian communities. However, to gain a better understanding of how Egypt's colonial policies affected Nubian outposts, further studies need to be conducted at places located within the Egyptian empire's periphery (Schrader, 2012:68). Studies such Schrader's shows us how mechanical stressors allow researchers to ascertain the occupations of ancient societies. However, mechanical stressors are not the only factor to consider when evaluating why an individual would develop osteoarthritis.

FUTURE DIRECTIONS FOR THE STUDY OF OSTEOARTHRITIS

According to Weiss and Jurmain (2007) there are heritability studies which examine the frequency of certain skeletal traits such as osteoarthritis. These studies look at both monozygous and dizygous twins. At least nine genetic loci have been identified that can significantly affect osteoarthritis. Weiss and Jurmain (2007) further point out that of these loci certain ones that can influence particular joints. The lumbar region of the spine is an area that tends to develop degenerative lumbar disk disease (Weiss and Jurmain, 2007:4). Vitamin D receptors and osteophyte development, or marginal lipping of the vertebral body, can also work in conjunction with these loci to encourage loss of cartilage, thereby narrowing the joint space. Ultimately, the loss of cartilage can speed up the formation of osteoarthritis (Weiss and Jurmain, 2007:3).

Therefore, it seems that osteoarthritis is more complex than originally believed. This study allows us to understand that osteoarthritis is not only caused by a person's activity levels, nor does it indicate a specific occupation that the individual may have experienced. The study also points out that age is not a factor for the development of osteoarthritis, particularly if mechanical stressors are experienced early on in one's life (Weiss and Jurmain, 2007:8). It seems as if osteoarthritis is more complex than just a degenerative joint disease that increases with an individual's age. There are a number of contributing factors which can include age, sex, previous injuries, an individual's occupation and genetics.

SUMMARY

The research reviewed here shows how the genetic heritability of certain traits and different receptors can impact the development of osteoarthritis. These receptors play a part in either the loss of cartilage or the development of osteophytes. Osteoarthritis is a degenerative joint disease that affects people as they age, regardless of the underlying genetics of the condition. However, there are still some aspects of the arthritic condition controlled by a person's genetics that should be kept in mind when studying past populations.

Physical stressors can leave markers upon our bones and provide a better understanding of the types of repetitive activities in which past humans engaged. However, as the above section pointed out these activities are not the only determining factor for the development of osteoarthritis. Schrader's case study shows how the population at Tombos was conceivably made up of scribes, minor officials, lower levels of bureaucrats, and craftsmen (Schrader, 2012:68). Her study offers support as to how Egyptian colonial policies may not always have had a negative impact on the Nubian communities they colonized.

On the other hand, Larson and colleague's study (2001) in chapter Two, indicated that European colonial policies did have a negative impact on indigenous cultures. One of the main differences between ancient colonial policies and those used after the 15th century would appear to be how indigenous populations were used. Therefore, when attempting to understand ancient cultures we must determine whether or not there were extenuating physical activities enforced upon native populations by their colonizers.

The study of osteoarthritis does not allow us to determine the specific type of activities in which an individual participated during their lifetime. However, by looking at the variation in expression of osteoarthritis specifically following colonization we can gain a better understanding of the way in which a society may have changed. It is possible to hypothesize that any increase in osteoarthritis would likely be caused by an escalation in physical activity or an amplification in mechanical loads following colonial expansion.

CHAPTER 4: SKELETAL MATERIALS AND METHODS USED FOR SCORING OSTEOARTHRITIS

Skeletal remains from Lofkënd, Corinth, Epidamnus, and Apollonia were examined for evidence of osteoarthritis. This research will test the null hypothesis that physical activity levels, as evidenced by osteoarthritis in joint spaces, remained constant at Epidamnus, and Apollonia during Greek colonial expansion (620 BCE-229 BCE). The assemblages from each site were first divided according to sex and adult age groups: Young, Middle-age, and Older adult (Table 2). In an effort to compare pre- and post-colonization, the skeletal remains at Corinth and Apollonia were further divided into precolonial and colonial periods. Details of each site are described below.

Table 2. Lofkënd, Corinth, Epidamnus, and Apollonia divided into adult age categories and separated by sex.

	Young (18-34)	Mid-age (35-49)	Older (50+)	Male	Female	Unknown	Total Remains
Lofkënd	43	30	10	32	24	27	83
Precolonial Apollonia	19	19	10	20	10	18	48
Precolonial Corinth	6	6	1	3	8	2	13
Epidamnus	6	19	3	7	17	4	28
Apollonia	27	60	5	22	32	38	92
Corinth	15	26	14	29	19	7	55

Lofkënd

Excavations of Lofkënd occurred between 2004 and 2007 (McIlvaine, 2012; McIlvaine et al., 2014; Papadopoulos et al., 2008). Brian Damiata dated the burials by body positioning, radiocarbon dating, and analysis of associated grave goods. These burials ranged from the eleventh century BCE to approximately 600 BCE (Papadopoulos et al., 2008). The excavations recovered 126 individuals that predate Apollonian colonization; however, all juveniles and those of an unknown sex were excluded from the data. My study will include 83 adults, 32 males and 24 females (Table 2).

Corinth

Various archaeological excavations of Corinth took place during the early 20th century. There were numerous independent excavations which meant that many of the skeletal remains were curated under different practices. Therefore, since our sample size for precolonial Corinth is small, the skeletal remains may not accurately represent the Corinthian precolonial population (McIlvaine, 2012). Altogether, these excavations disinterred 85 skeletons that predate colonial expansion. All burial materials were dated by Larry Angel from items found with the skeletons (McIlvaine, 2012). The remainder of the Corinthian skeletal remains are associated with colonial expansion. My study will include 55 colonial period and 13 precolonial Corinthian adults, but exclude all juveniles and those of an unknown sex. Table 2 shows the number of individuals in these collections divided by age and sex.

Epidamnus

The modern city of Durrës, Albania is built on top of Epidamnus, which was also known as Dyrrachium after Roman occupation of the region (Ceka, 2005; Wilkes, 1992). Excavation of the necropolis occurred from the 1960s into the early 2000s. Additional graves located north of

Durrës in the hills known as Kokoman, Dautaj, and Villa that date from the Greek expansion until the early Roman colonial eras were also excavated (Ceka, 2005:16, 71; Davis, et al., 2003:45). The museum in Durrës houses the skeletal remains, along with field notes and various associated materials. It is this information that has been used to date the skeletal remains by local anthropologists.

During August 2013, Dr. Kyle, a professor of Anthropology at the University of Northern Colorado, and several students traveled to Durrës to collect and evaluate data from approximately 80 burials, of which only six adults could be used for comparison, due to the fact that many of these remains did not come from the Greek period of colonization. The majority of the skeletal remains dated to the Roman period, were of unknown sex, or were juveniles (Wright, 2014). Kyle led another research trip to Durrës in the summer of 2015 that increased the original sample size of six individuals to 28. These individuals were studied to determine their sex, age, any evidence of trauma, and/or disease as well as the colonial periods with which they were associated. For this study, I will use only individuals from the Greek colonial period, excluding those of indeterminate sex and juveniles. The data set included 28 adults of which 17 are females and seven are males (Table 2).

Apollonia

From the beginning of Albanian archaeology Apollonia was an important site which produced many of the country's greatest archaeological finds (Ceka, 2005:15). The skeletal remains from Apollonia were recovered from 2002 through 2006 (Amore, 2010; McIlvaine, 2012; McIlvaine et al., 2014). The burials were placed in mounds known as Tumulus 9 (T9), 10 (T10), and 11 (T11) located near the former city. Archaeological evidence from T10 includes prehistoric burial items dating to both the Bronze and Iron Age (Stallo, 2007:12). Tumulus 9 and

11 date from the sixth to the fourth century BCE (Stallo, 2007:12). These burial mounds held 227 skeletons, including 62 individuals that predate Greek colonization; 135 from the colonial period; and 29 from Medieval/Modern times. For this study, I will be using all but the 29 individuals of the Medieval/Modern period. Analysis of the remains to determine age, sex, trauma, and/or disease was conducted by Schepartz and McIlvaine in 2010.

An additional study by McIlvaine incorporated biodistance and discriminant function analysis to determine whether the Apollonian skeletal assemblages were phenotypically more similar to the inhabitants of Corinth or Lofkënd (McIlvaine, 2012:72). The results of both the dental metric and nonmetric study show Apollonians to be more closely related to the inhabitants of Lofkënd in two out of three tests. The third test link linked Apollonians to Corinthians (McIlvaine, 2012:120). However, the linear discriminant function shows that there are a higher number of individuals in Apollonia who are more closely related to the people of Lofkënd as opposed to Corinth. Overall it would seem that the Apollonians buried in the tumulus are phenotypically closer to the citizens of Lofkënd than to those of Corinth (McIlvaine, 2012:142). The tests show that there is a genetic similarity linking the populations of Apollonia, Lofkënd, and Corinth which may indicate long-term gene flow throughout the region (Antonaccio, 2001, 2003; McIlvaine, 2012:196). This research will examine osteoarthritis from only adult males and females during both the precolonial and colonial periods (Table 2).

METHODS

The Global History of Health Project Codebook (Steckel et al. 2011), and Standards for Data Collection (Buikstra and Ubelaker, 1994) were used to score skeletal materials. These codebooks describe the standardized methods employed by bioarchaeologists internationally. The skeletal remains were first inventoried and then detailed notes were made about skeletal and dental morphology along with any observed pathology. All information was then used to determine the individual's age, sex, disease status, and trauma. This research project specifically documented osteoarthritis in the skeletal remains from the sites as described. An examination of all articulating joints including the shoulder, elbow, wrist, hip, knee, ankle, cervical, thoracic, and lumbar vertebrae, along with the temporomandibular joint surface of the mandible are used to indicate osteoarthritis.

Osteoarthritis is determined by identifying marginal lipping (bony overgrowth), porosity (becoming porous), eburnation (bone on bone contact causing a polishing of the bone), or an amalgamation of these three (Cope et al., 2005; Eshed et al., 2010; Jurmain and Kilgore, 1995; Klaus et al., 2009; Larsen, 1997; Lieverse et al., 2007; Weiss, 2006). A scale is used to score individuals for osteoarthritis as follows: 0 = joint not available for observation, 1 = joint shows no signs of osteoarthritis, 2 = slight marginal lipping, slight degenerative, and/or some porosity, 3 = severe marginal lipping, severe degenerative, eburnation, and/or substantial porosity, 4 = complete or near complete (more than about 80%) destruction of articular surface, and 5 = joint fusion (Figure 5; Buikstra and Ubelaker, 1994; Steckel et al., 2011). The cervical, thoracic, and lumbar vertebrae are scored separately and are as follows: 0 = not available for observation, 1 = no degenerative joint disease present, 2 = marginal lipping formation, 3 = extensive lipping formation (Figure 6). All information was uploaded to the Global History of Health database, allowing others to access information about these remains.

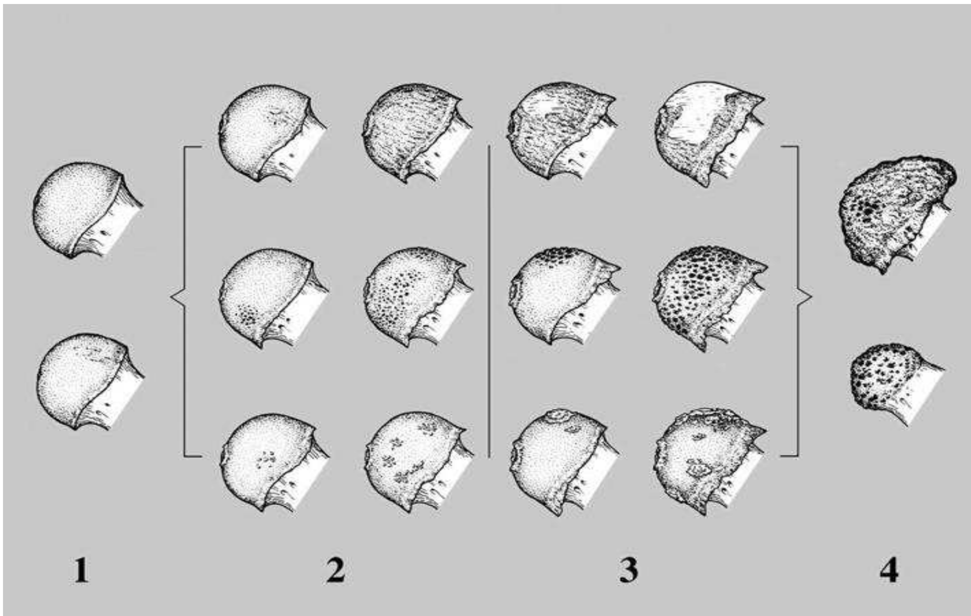

Figure 5. Standard for scoring of the femoral head (from Steckel et al., 2011:33).

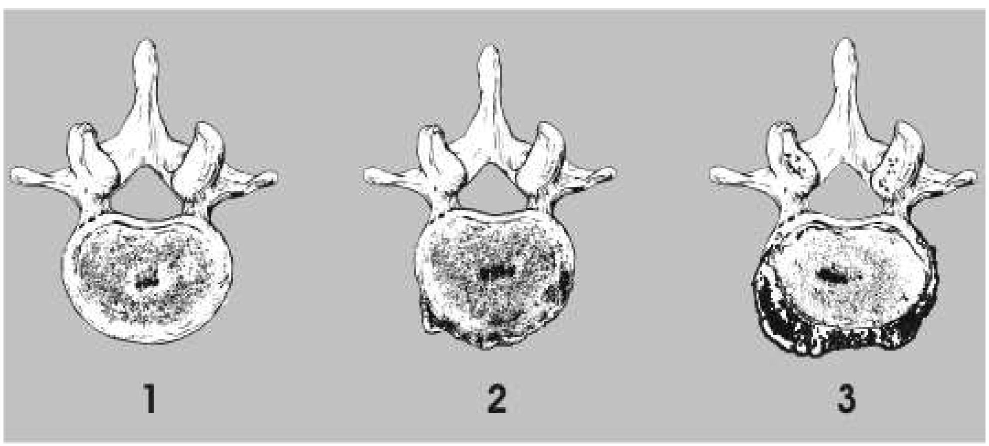

Figure 6. Standard for the vertebral column (from Steckel et al., 2011:33).

SUMMARY

For the purpose of this study, it was assumed that osteoarthritis is primarily associated with an individual's activity level, even though other factors may have an effect as described in the previous chapter. Therefore, an assessment of all joint surfaces was done in an effort to better understand how Greek colonial policy may have changed local Illyrians' activity patterns following colonization. All joint surfaces of the skeletal remains from Lofkënd, Corinth, Epidamnus, and Apollonia were examined and scored for osteoarthritis according to standardized methods. In an effort to understand skeletal degeneration that may be associated with colonial changes in the region both Corinthian and Apollonian skeletal remains were separated into precolonial and colonial periods.

Understanding of an individual's class would allow researchers knowledge as to any physical hardships an individual may have been subjected to during their lifetime. However, of the six sites used in this study we only have an in-depth list of burials along with their goods from both precolonial and colonial Apollonia. All of the precolonial Apollonian remains were recovered from simple graves, of which 34 held no burial goods but 19 contained goods such as pottery. The colonial Apollonian data on the other hand is more complex. The number of burials without goods indicates that there was a total of 14 simple, four sarcophagi, four tile, one urn, and one brick grave. There were 27 simple graves, 16 brick, 11 tile, seven sarcophagi, three wood, and three tile burials that contained grave goods such as pottery. Unfortunately, the majority of our data do not specifically indicate if any of the skeletal remains belonged to those of the upper or lower classes; therefore, this assessment of an individual's life cannot be made. The analysis is presented in the following chapter.

CHAPTER 5: OSTEOARTHRITIS IN INDIVIDUALS FROM THE COLONIAL SITES OF LOFKËND, CORINTH, EPIDAMNUS, AND APOLLONIA.

Analysis of osteoarthritis in the remains from each site was conducted in order to determine whether any of the joint changes in the skeletal remains might indicate changes in physical activity levels in Illyrians following colonization. Caution is needed since our sample sizes are relatively small, particularly at the precolonial site of Corinth. Small data sets such as those in this study create a bias in the analysis of the remains. The first step in ascertaining whether there were any differences in osteoarthritis between the colonial and precolonial eras was to look at the prevalence of this degenerative joint disease.

Bone preservation often plays the largest factor as to whether an individual would show signs of osteoarthritis. Table 3 contains the data from the precolonial sites of Lofkënd, Corinth, and Apollonia. Slightly less than 50% of the individuals from the precolonial site of Lofkënd exhibited at least 10 or more joint surfaces that could be evaluated for osteoarthritis. Of these individuals, the average frequency of affected joint surfaces is 58.5%. The precolonial Corinth skeletal sample is rather small consisting of only 13 adult individuals; only five individuals, or 38.5%, had at least 10 or more joint surfaces preserved for osteoarthritis observation. The mean frequency on those with 10 or more joint surfaces available for observation is 77.8%. Slightly more than half (51%) of the precolonial Apollonian sample of 48 adult individuals had 10 or more joint surfaces preserved for observation. Of these surfaces an average of nearly 72% exhibited evidence of osteoarthritis. Initial analysis of osteoarthritis was done without regard to the age or sex of these individuals.

Table 3. Precolonial sites divided into adult age categories and separated by sex.

	Young (18-34)	Mid-age (35-49)	Older (50+)	Total Remains	Male	Female
Lofkënd	43	30	10	83	32	24
Precolonial Apollonia	19	19	10	48	20	10
Precolonial Corinth	6	6	1	13	3	8

Comparison of osteoarthritis in regard to joint surfaces at the postcolonial sites of Epidamnus, Apollonia, and Corinth (Table 4) suggests that joint preservation was lower than that observed in the precolonial period. At Epidamnus, 25 of the 28 individuals had more than 10 joint surfaces preserved; however, the mean frequency of osteoarthritis on these surfaces is only 21%. Out of Apollonia's 92 individuals, 87 showed observable osteoarthritis. Even though there is a larger number of individuals, preservation at postcolonial Apollonia was not ideal since only 37% of the sample had at least 10 joint surfaces preserved for scoring osteoarthritis. Here the mean frequency of affected joint surfaces is 67%, obviously more than that observed in the sample from Epidamnus. The final colonial period sample is from Corinth; unfortunately, skeletal preservation at the site was generally poor. Only 11 individuals, or 20%, of the 55 adults available for this study had at least 10 joint surfaces preserved well-enough for observation of osteoarthritis. A mean of 60.5% of those joint surfaces were affected by osteoarthritis. Again, it seems that the prevalence of osteoarthritis is relatively common without regard to age or sex of the individuals.

Table 4. Postcolonial sites divided into adult age categories and separated by sex.

	Young (18-34)	Mid-age (35-49)	Older (50+)	Total Remains	Male	Female
Epidamnus	6	19	3	28	7	17
Apollonia	27	60	5	92	22	32
Corinth	15	26	14	55	29	19

Even though bone preservation is quite variable among the six skeletal samples, in general the frequency of joint surfaces affected by osteoarthritis among the colonial period individuals is slightly less, on average, then that observed in the precolonial samples. These values are calculated without regard to the age or sex composition of the samples. At first glance it would seem that the hypothesis, as proposed, is not supported. In the event that the age and sex distribution of the skeletal samples may have an effect on the occurrence of osteoarthritis, it is instructive to look more closely at the six sites where skeletal samples were collected.

Both the right and left sides were examined for the presence and severity of osteoarthritis. However, my initial assessment showed that there are no appreciable differences between the right and left side of any given joint; therefore, only the left side is used for analysis (Table 5). Osteoarthritis of the vertebrae obviously does not have a side, and temporomandibular joint (TMJ) arthritis is simply counted as a single joint. Examination of Table 5 indicates that there is a relatively high prevalence of osteoarthritis in three particular joints; the hip, thoracic vertebrae, and temporomandibular joint (TMJ). These are the three joints that will be compared between each site.

Table 5. Number of individual joints with osteoarthritis at Lofkënd, Corinth, Epidamnus, and Apollonia.

Joint	Lofkënd (n)*	Precolonial Apollonia (n)	Precolonial Corinth (n)	Corinth (n)	Epidamnus (n)	Apollonia (n)
R Shoulder	6 (21)	5 (15)	3 (4)	3 (4)	2 (3)	5 (16)
L Shoulder	6 (20)	5 (12)	0 (0)	1 (3)	1 (3)	8 (15)
R Elbow	6 (26)	6 (21)	3 (4)	3 (9)	3 (3)	1 (18)
L Elbow	5 (27)	3 (17)	2 (5)	1 (8)	3 (4)	2 (14)
R Wrist	6 (41)	4 (22)	3 (5)	2 (9)	4 (4)	5 (25)
L Wrist	6 (38)	2 (24)	3 (6)	3 (10)	3 (3)	2 (25)
R Hip	13 (34)	13 (25)	4 (6)	4 (10)	1 (6)	10 (29)
L Hip	12 (33)	9 (23)	2 (3)	5 (9)	3 (10)	15 (36)
R Knee	3 (29)	5 (20)	1 (3)	2 (4)	2 (7)	5 (19)
L Knee	6 (30)	9 (18)	1 (2)	1 (3)	2 (5)	6 (25)
R Ankle	4 (45)	5 (22)	2 (5)	3 (6)	2 (3)	5 (36)
L Ankle	4 (46)	5 (25)	2 (6)	3 (6)	4 (6)	9 (35)
Cervical	11 (27)	10 (22)	6 (6)	4 (7)	2 (4)	12 (21)
Thoracic	5 (19)	9 (16)	6 (7)	6 (7)	3 (4)	12 (28)
Lumbar	9 (20)	5 (11)	2 (3)	7 (7)	3 (4)	12 (22)
Temp man	8 (36)	4 (19)	5 (11)	20 (42)	5 (19)	7 (34)

*number of observable joint surfaces

QUANTITATIVE ANALYSIS

COMPARISON BETWEEN SEXES

Osteoarthritis assessment began with male and female samples from each site. Methods of sex determination are discussed in Chapter Four. Examination of males and females indicates that males show a higher frequency of osteoarthritis when compared to females. Overall, males have a higher prevalence of osteoarthritis at Lofkënd, Corinth, Apollonia, and precolonial Apollonia (Figure 7). Females, on the other hand, show a higher frequency of osteoarthritis at

Epidamnus, and precolonial Corinth. However, there is no real pattern between either males or females at pre- or post-colonial sites.

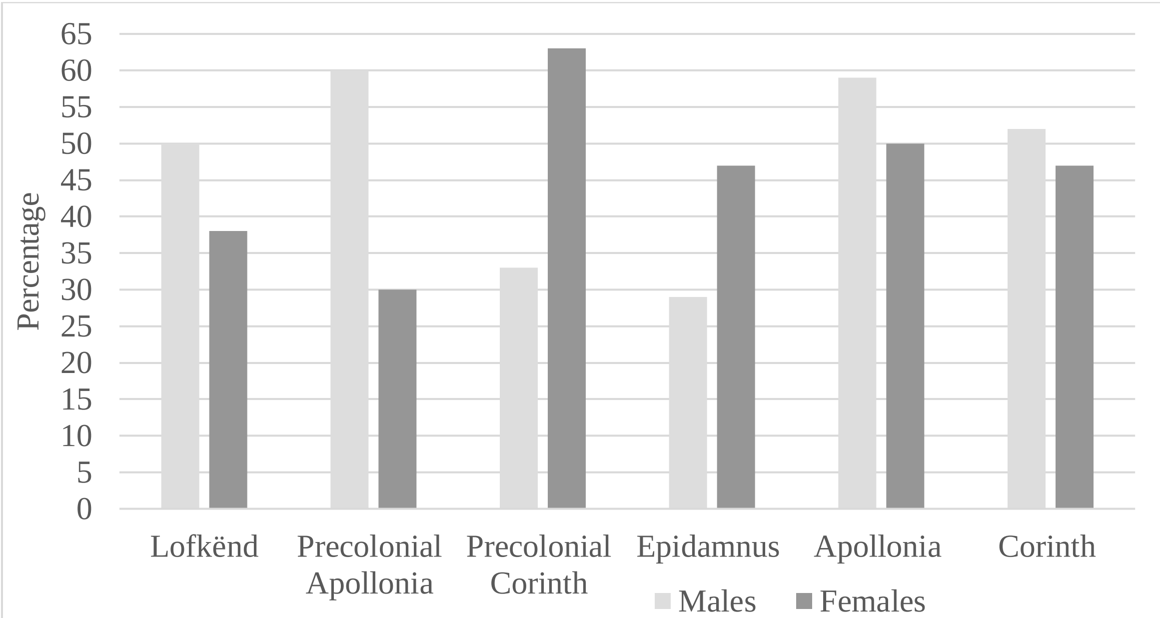

Figure 7. Sex of individuals with osteoarthritis at each site.

COMPARISON OF AGE GROUPS

Osteoarthritis is a degenerative joint disease that generally increases with age. As mentioned previously age was divided into three broad categories: Young (18-34), Middle-age (35-49), and Older (50+) adults at each site (Figure 8). Analysis indicates that age was a factor for osteoarthritis at all sites with the exception of precolonial Corinth. One of the reasons for this exception could possibly be the lack of remains in the precolonial Corinth's Older adult category. Unfortunately, precolonial Corinth overall had a very small sample size; therefore, the sample may not accurately represent the Corinthian precolonial population.

Assessment of pre- and post-colonial sites indicates that there was a decrease in osteoarthritis following colonization for the Older adult age groups; however, there was an increase in osteoarthritis for younger adults at the postcolonial sites. Individuals in the older adult category were impacted more by osteoarthritis in precolonial Apollonia than at any of the other sites. Overall, increasing age was a factor in the frequency of osteoarthritis among the six sites.

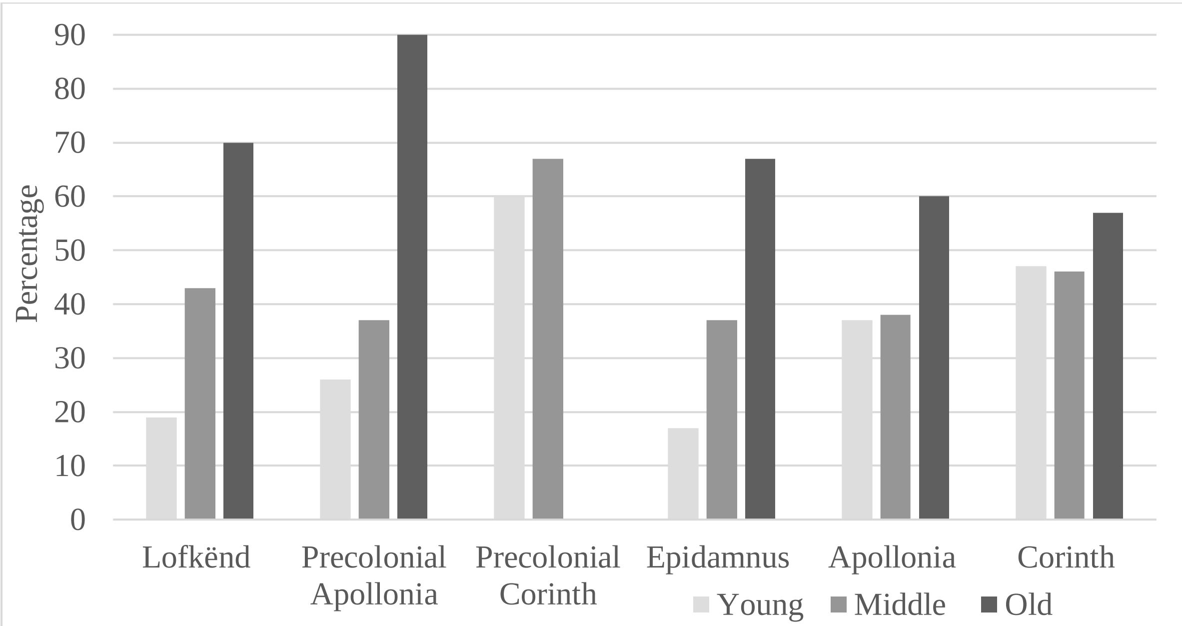

Figure 8. Osteoarthritis by age at each of the six sites.

Appendix A shows a breakdown of osteoarthritis of all joints at each of the six sites. These graphs similarly indicate that age does play a part in the appearance of osteoarthritis. However, Appendix B shows the actual number of joints and individuals available for observation. The sheer number or lack thereof in the sample size can create a bias in the age groups, which can skew the results. (See Appendix A, B, and C for detailed scoring of osteoarthritis of all joints from each site).

COMPARISON OF JOINTS

Initially, comparison of each joint for osteoarthritis was done by separating the skeletal remains into age and sex groups. The majority of the joints showed no real obvious differences in degenerative joint disease regardless of sex. Looking only at age variation for each site we can see how osteoarthritis affected these populations. Overall, the majority of joints does not show any notable differences from one another. (A complete table of sex, age, site, and osteoarthritis in individual joints appears in Appendix D).

Evidence of osteoarthritis in the three joints of particular interest here can be observed in Table 6 and 7 below. Site data were then divided into the three precolonial sites and the three postcolonial sites. This placement was done in an effort to further determine if there is an observable change in the frequency of osteoarthritis among the populations following colonization.

Table 6. Osteoarthritis of hip, thoracic vertebrae, and TMJ at precolonial sites of Corinth, Apollonia, and Lofkënd.

	Young Female n* (%)	Young Male n (%)	Mid Female n (%)	Mid Male n (%)	Old Female n (%)	Old Male n (%)
Precolonial Corinth Hip	1 (33)	0	0	0	0	0
Precolonial Apollonia Hip	1 (10)	0	0	0	1 (10)	4 (20)
Lofkënd Hip	1 (4)	1 (3)	0	5 (16)	0	3 (9)
Precolonial Corinth Thoracic	2 (25)	0	2 (25)	1 (33)	0	0
Precolonial Apollonia Thoracic	1 (10)	2 (10)	0	1 (20)	1 (10)	3 (15)
Lofkënd Thoracic	1 (4)	0	1 (4)	1 (3)	0	2 (6)
Precolonial Corinth TMJ	0	0	3 (38)	1 (33)	0	0
Precolonial Apollonia TMJ	0	1 (5)	0	0	1 (10)	2 (10)
Lofkënd TMJ	0	0	2 (8)	1 (3)	1 (4)	3 (9)

*number of observable joint surfaces

Table 7. Osteoarthritis of hip, thoracic vertebrae, and TMJ at postcolonial sites of Corinth, Apollonia, and Epidamnus.

	Young Female n* (%)	Young Male n (%)	Mid Female n (%)	Mid Male n (%)	Old Female n (%)	Old Male n (%)
Corinth Hip	1 (5)	1 (3)	0	0	1 (5)	1 (3)
Apollonia Hip	0	0	8 (25)	4 (18)	1 (3)	0
Epidamnus Hip	0	0	1 (6)	0	2 (12)	0
Corinth Thoracic	22 (11)	2 (7)	0	0	1 (5)	1 (3)
Apollonia Thoracic	2 (6)	1 (5)	5 (16)	2 (9)	0	0
Epidamnus Thoracic	0	0	3 (18)	0	0	0
Corinth TMJ	0	2 (7)	4 (21)	5 (17)	3 (16)	4 (14)
Apollonia TMJ	0	2 (9)	3 (9)	0	0	0
Epidamnus TMJ	1 (6)	0	1 (6)	1 (14)	2 (12)	0

*number of observable joint surfaces

Hip

At precolonial Corinth it was only the Younger adult group that exhibited a high percentage of hip arthritis. However, after colonization osteoarthritis of the hip among Corinth Older adults increased, but among the Young and Middle-aged adults it decreased. Osteoarthritis of the hip at precolonial Apollonia indicates that the Younger and Older adults had a higher frequency of the condition, whereas after colonization there is an increase in the frequency of hip osteoarthritis that occurs only in the Middle-aged adults. By contrast both Younger and Older adults from Apollonia show a decrease in osteoarthritis. Prior to colonization all of the age groups at Lofkënd were affected by osteoarthritis of the hip. At Epidamnus, a postcolonial site, Older and Middle-age adults showed a greater degree of osteoarthritis of the hip. Overall, it seems that hip arthritis was higher prior to colonization.

Thoracic Vertebrae

Osteoarthritis of the thoracic vertebrae is fairly consistent in affecting all of the age groups at each of the precolonial sites, with the exception of Older adults at precolonial Corinth. However, note that there were no thoracic vertebrae to observe in this category so this is of no importance. After colonization, Younger and Middle-aged adults at Corinth have a decrease in thoracic vertebrae osteoarthritis, but Older adults show an increase. Caution is needed here, though, because the sample sizes are extremely small. After colonization thoracic osteoarthritis decreases for all age groups at Apollonia, but again there are no Older aged adults to observe. At Epidamnus only Middle-aged adults have a high frequency of thoracic vertebrae arthritis; however, there were no Younger or Older adult individuals present with this observable joint. Overall, after colonization it seems that the frequency of thoracic vertebrae arthritis decreased when compared to the precolonial sites.

Temporomandibular Joint

Prior to colonization Middle-aged and Older adults at Lofkënd exhibited arthritis of the temporomandibular joint. It is notable, however, that there were no Young adult individuals present with this observable joint. Middle-age adults in precolonial Corinth show a high frequency of osteoarthritis of the TMJ, whereas in postcolonial Corinth the opposite was true. Younger and Older adults at Corinth show an increase in TMJ arthritis, but the Middle-aged group showed a decreased prevalence of osteoarthritis. Even though TMJ osteoarthritis occurs in the Apollonian population regardless of colonization, prevalence of that joint modification greatly increased in the Apollonian Middle-age group after colonial expansion. At Epidamnus all age groups showed signs of TMJ osteoarthritis. The frequency of temporomandibular joint

(TMJ) osteoarthritis indicates it is consistent at all of the sites regardless of age, sex, or colonial expansion.

SUMMARY

When determining osteoarthritis bone preservation was the strongest factor for whether a person would exhibit osteoarthritis. The post-colonial comparison of osteoarthritis in regards to joint surfaces preserved were lower than those observed in the pre-colonial samples. However, these values are calculated without regard to the age or sex composition of the samples. Yet in the analysis of the skeletal remains there is a certain amount of bias in our comparisons due to the fact that the data samples were relatively small.

In general, males at all of the sites regardless of age group exhibit greater frequencies of osteoarthritis than females. In contrast females, regardless of age, show a higher frequency of osteoarthritis at Epidamnus and precolonial Corinth when compared to the other sites. However, the differences between males and females were not large at any of the sites.

Assessment of age and the occurrence of osteoarthritis at the six sites shows that age is a factor for the development of degenerative joint disease, regardless of the joint considered. However, when comparing pre- and post-colonial skeletal samples there is a decrease in osteoarthritis in Older adults following colonization. Older adults in the precolonial Apollonia sample exhibited a relatively high frequency of osteoarthritis regardless of joint considered when compared to all others. However, caution must be taken as there are a number of cells in the above tables with zero values. The Young adults from precolonial Corinth showed the highest percentage of osteoarthritis when compared to the Young adults at the other sites. Differences in sample sizes may contribute to the differences in frequency of osteoarthritis. However, it would appear that prior to Corinth's colonial expansion both Young and Middle-age adults had higher frequencies of osteoarthritis, whereas osteoarthritis among Older adults at Corinth increased after expansion. Nevertheless, the precolonial Corinth sample is very small and may not adequately reflect the Corinthian precolonial population as a whole. Generally, though, as expected age was a determining factor for the prevalence of osteoarthritis in the skeletal samples from the six sites.

The majority of joints on the skeletons at all sites did not display significant variation in the occurrence of osteoarthritis with the exception of three joints; the hip, thoracic vertebrae, and the temporomandibular joint. Therefore, only these three joints were examined in detail. Very few Young adults, either male or female, are affected by osteoarthritis of the hip, thoracic vertebrae, or TMJ. Before colonial expansion hip osteoarthritis was higher in the Younger adults in precolonial Corinth and precolonial Apollonia, when compared to the postcolonial sites of Corinth and Apollonia. Even though all of the Lofkënd age groups displayed hip arthritis, it was particularly high for the Middle-aged males when compared to others of the same precolonial age group. After colonial expansion there is an increase in hip osteoarthritis in both Younger and Older adults at Corinth. By contrast Middle-age adults at Apollonia experienced twice the hip osteoarthritis compared to those from the precolonial Apollonian sample. Older adults from Epidamnus experienced a higher frequency of hip osteoarthritis when compared to the other Older adults from the other two postcolonial sites.

All of the precolonial sites consistently show signs of thoracic vertebrae arthritis. In particular, precolonial Corinth shows a higher prevalence of thoracic vertebrae osteoarthritis among Middle-age adults when compared to all other sites. After colonization an increase in osteoarthritis of this joint occurs in both the Older and Younger adults at Corinth, whereas at Apollonia these same age groups show a decrease of osteoarthritis in this same joint. Of the postcolonial sites, Apollonia and Corinth show thoracic vertebrae arthritis in all of the age groups. Epidamnus on the other hand only had Middle-age females with thoracic vertebrae osteoarthritis, as the other age groups lacked observable joints. In general, males and females of the Middle-age group, with the exception of precolonial Apollonia, exhibit TMJ osteoarthritis more commonly than other age groups. It is not clear why this is the case. Middle-aged adults at precolonial Corinth exhibit the highest frequency of TMJ arthritis, but all ages at postcolonial Corinth exhibited this type of osteoarthritis.

Unfortunately, none of our data at the six sites, with the exclusion of Apollonia, indicates whether any of the skeletal remains belonged to those of the upper or lower classes. Therefore, we need to err on the side of caution in regard to assessing the extent to which Greek colonization impacted the Illyrians. With the exception of age, there is not a particularly consistent pattern of osteoarthritis exhibited among the skeletal samples from the sites analyzed in this study. During some of the colonial time periods, females exhibit more osteoarthritis than males, but this pattern does not hold for all colonial time periods. Finally, there is not a consistent pattern of osteoarthritis in the three joints examined when comparing pre- and post-colonial expansion. However, it is the lack of skeletal remains that hinder whether or not any patterns may exist between our six sites. The implications of the observed frequency of osteoarthritis will be discussed in the next chapter.

CHAPTER 6: DISCUSSION AND CONCLUSION

This study was conducted in an attempt to better understand how Hellenistic Greek colonization (620 BCE-229 BCE) may have bioculturally impacted the ancient Illyrians who were traditionally a transhumant pastoral society. Some of the questions I was attempting to address through this study were whether or not the Illyrians became the new labor force in the region, and if the Illyrian way of life changed dramatically after Greek colonial expansion. In order to examine some of these changes this thesis tested the null hypothesis that there were no differences in workloads for the Illyrian inhabitants by comparing the precolonial sites of Lofkënd, Corinth, and Apollonia to postcolonial sites of Corinth, Apollonian, and Epidamnus.

Comparisons of osteoarthritis were made not only between males and females, but also between the various adult age groups of the inhabitants. Then an assessment between pre- and post-colonial populations was made by examining osteoarthritis of the hip, thoracic vertebrae, and temporomandibular joint as these joints indicated a relatively high frequency of osteoarthritis. Analysis of the skeletal data at Lofkënd, precolonial and colonial Corinth, precolonial and colonial Apollonia, and Epidamnus shows that there was no clear cut pattern of osteoarthritis according to sex among any of these populations. In general males displayed a higher frequency of osteoarthritis at four of the six sites, with the exceptions being precolonial Corinth and Epidamnus. However, the higher frequency of osteoarthritis among males was not notable when compared to females. Osteoarthritis is a disease that generally increases with the age of an individual, and these findings were as expected in regard to that age-related trend. Regardless of age or sex, analysis of these samples did not show any particular pattern among pre- and post-colonial locations when comparing the hip, thoracic vertebrae or temporomandibular joint.

The reasons for this lack of pattern in the occurrence of osteoarthritis may stem from the fact that unlike European colonization starting in the 15th century, Greek colonization was not an attempt to build an empire. Nor were Greek colonial policies built around the suppression and conversion of native inhabitants (Ceka, 2005; Gwynne, 1918; Stallo, 2007). Greek settlements instead, created an independent polis whose power lay in the hands of the colony's elites. Even though these elite's maintained kinship ties to their mother-cities, they were not politically controlled by them (Cameron and Neal, 2003; Gwynne, 1918; Hodos, 2006, Stallo, 2007).

Upon settlement in Illyria, the Greeks took over prime Illyrian pastoral lands. Loss of their lands altered the Illyrian's traditional way of life since many rural Illyrians began to settle in and around these new Greek urban areas (Galaty, 2002; Stallo, 2007; Wright, 2014). Soon after colonization, Greek culture began influencing many of these southern Illyrian groups and these Illyrians became culturally distinctive from other Illyrians throughout the region (Galaty, 2002; 117; Srejovic, 1998:17; Stallo, 2007:31; Tsetskhladze, 2008:lii-lvi). Many Illyrians maintained peace with their colonizers in an effort to combine and preserve essential trade networks, which allowed many Illyrians to prosper after Greek colonization (Ceka, 2005; Galaty, 2002; Gwynne, 1918; Srejovic, 1998; Stallo, 2007; Tsetskhladze, 2008).

Understanding why there was no sex-related pattern of osteoarthritis can possibly be found in the article by Bridges, "Prehistoric Arthritis in the Americas" (1992). In this paper, Bridges delves into various Amerindian osteoarthritis studies in an effort to compare study results and determine if any commonalities can be observed among these groups. Many of these groups traditionally had been hunter/gatherers who transitioned to agriculture or even fishing. Ultimately Bridges argues that the changes in subsistence practices did not result in a higher frequency of osteoarthritis among various Native Americans, regardless of the subsistence regime they practiced. Reviewing the works of others, Bridges found that osteoarthritis patterns were not indicative of one subsistence economy or another in prehistoric colonial societies in North America (Bridges, 1992:71). However, some of these studies of Amerindian societies show that levels of osteoarthritis did increase after the intensification of agricultural practices, particularly in the vertebral column (Bridges, 1992:78-79).

Even though the Illyrians were traditionally nomadic pastoralists, this study shows that Greek colonization did not create an undue labor burden upon them. Comparison of the sites indicates that there was not an overall increase or even decrease in osteoarthritis among the inhabitants. However, we do need to view these results with caution since there may be a bias in our data. Specifically, because we do not know whether any of the skeletal remains belonged to those of the upper or lower classes.

Many of the Amerindians, upon adoption of agriculture, altered their prehistoric lifestyle by settling down in one area. The North American studies cited in the article by Bridges also point to other causes of osteoarthritis including an increase in warfare which created injuries and caused bones and/or joints to remodel. Some of the prehistoric inhabitants also began settling into larger groups thereby altering their social organizations. One of the byproducts of variations in social dynamics could conceivably be changes in a group's life expectancy (Bridges, 1992:80). These changes in life expectancy can sometimes create an age-related bias in the skeletal record, which in turn could change the record of osteoarthritis.

Many of the Native American studies reviewed by Bridges showed that males had a higher frequency of osteoarthritis compared to females, but these differences were not significant (Bridges, 1992:74). Bridges also argues that the higher prevalence of osteoarthritis exhibited by males might be linked to the sex roles in these societies (Bridges, 1992:85). This can be seen in the study of the Illyrians who settled in and around the Greek colonies. The examination of osteoarthritis of the hip, thoracic vertebrae, and temporomandibular joint exhibited in the samples from these six sites showed there is no overall increase in degenerative joint disease, regardless of age or sex. It is entirely possible that the local inhabitants were not subjected to overly undue hardship following Greek colonial expansion. This study also shows a lack of notable difference when comparing males to females at Lofkënd, precolonial and colonial Corinth, precolonial and colonial Apollonia, and Epidamnus. Only precolonial Corinth and Epidamnus exhibited a higher frequency of osteoarthritis among females when compared to males. However, once again this difference is slight and is not considered to be significant. Aside from the Apollonian burials, none of our data indicated whether these skeletal remains belonged to those of the upper or lower classes. Understanding class differences of the interred individuals could offer a different perspective as to why there were no variations in Illyrian physical activities following colonization.

CONCLUSION

This type of research provides information about physical activity of past societies and how they were able to cope during both political and cultural transitions such as colonial expansion, can prove beneficial. Colonization has had a major impact globally since the 15th century economically, socially, and physically. Building an understanding of such biocultural contacts may prove significant and beneficial for our modern world, particularly in regards to cultural and physical changes among various global inhabitants.

Our understanding of biocultural consequences of colonization comes from the more extreme global expansion pursued after the 15th century. Much of the bioarchaeological research on the effects of colonization delves into this modern expansion's impact on the inhabitants of the Americas. As Wolf stated colonization will not be homogenous, due to the unique cultures of the varying groups (Wolf, 1982). Therefore, there is a need to better understand colonial policies of ancient societies and how they played a role in the conquest of the Mediterranean in Europe, Asia, and beyond. The approach of ancient colonizers may indicate one based on shared commerce, as opposed to one built on the exploitation of local resources and inhabitants.

FUTURE RESEARCH

As this study shows, the lives of the Illyrians were not negatively impacted due to their interaction with the Greeks after colonization in their region, at least as exhibited by the occurrence of osteoarthritis. One drawback to this research was the fact that it lacked data as to the various classes of the individuals. If all the remains came from the upper class, then we are missing those who may have been negatively impacted by the Greek colonial expansion. Therefore, such information on the societal classes of the data sample may alter our understanding of how Greek colonization impacted the lives of native Illyrians.

However, to truly learn if, in fact, Greek colonial policies stayed the same or changed as the Greeks further expanded throughout the Mediterranean region, further comparisons need to be made. Chapter Two discusses Corinthian Greek expansion in 733 BCE to the island of Sicily and Corfu. Future studies of the effects of colonization, as evidenced by osteoarthritis in human skeletons, could be made in these other colonial settlements. By doing so we may be able to learn if there were different colonial policies used by the Greeks in different regions of the Mediterranean.

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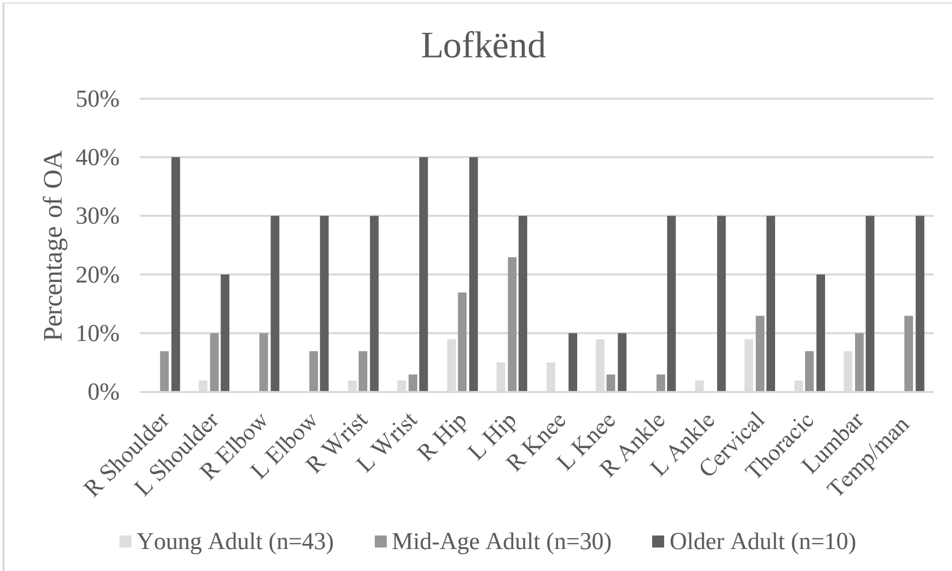
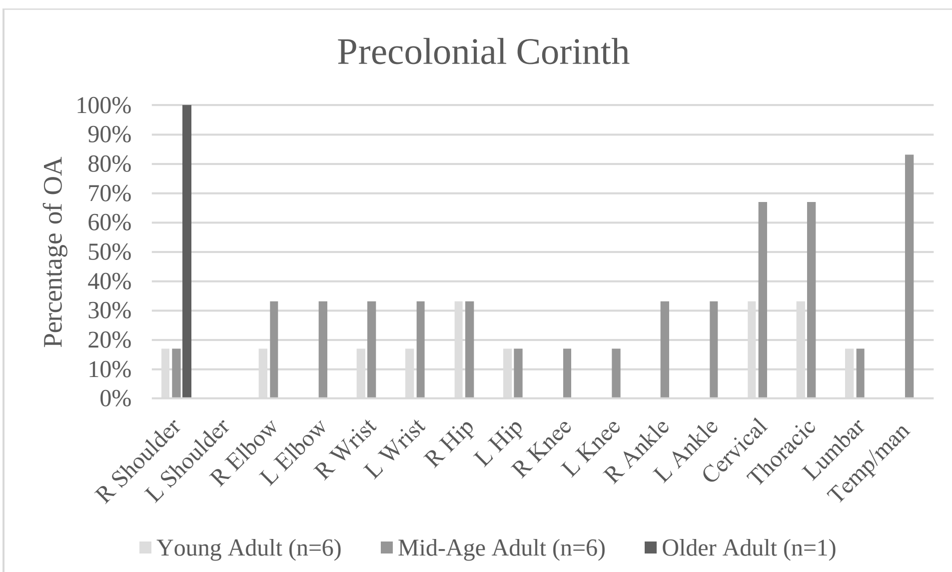
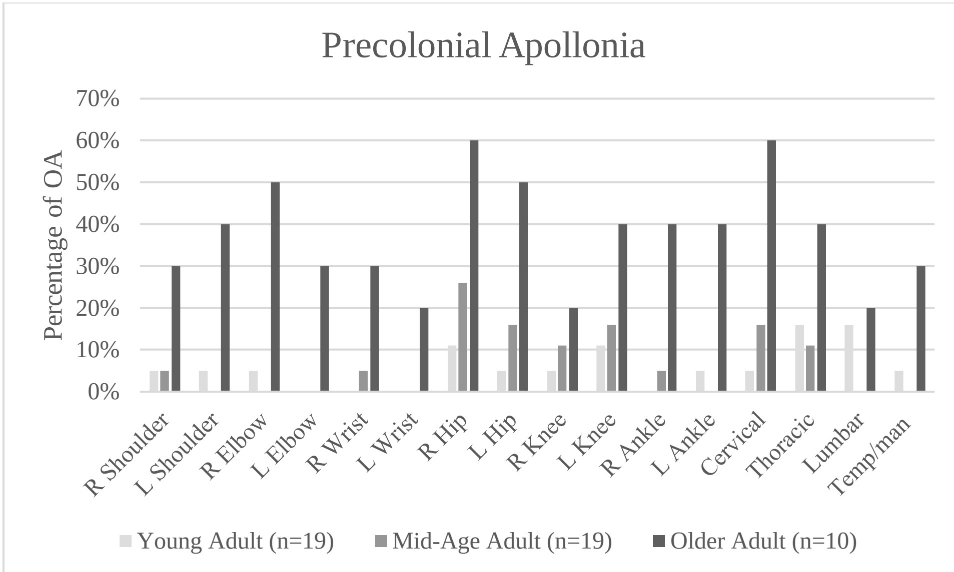
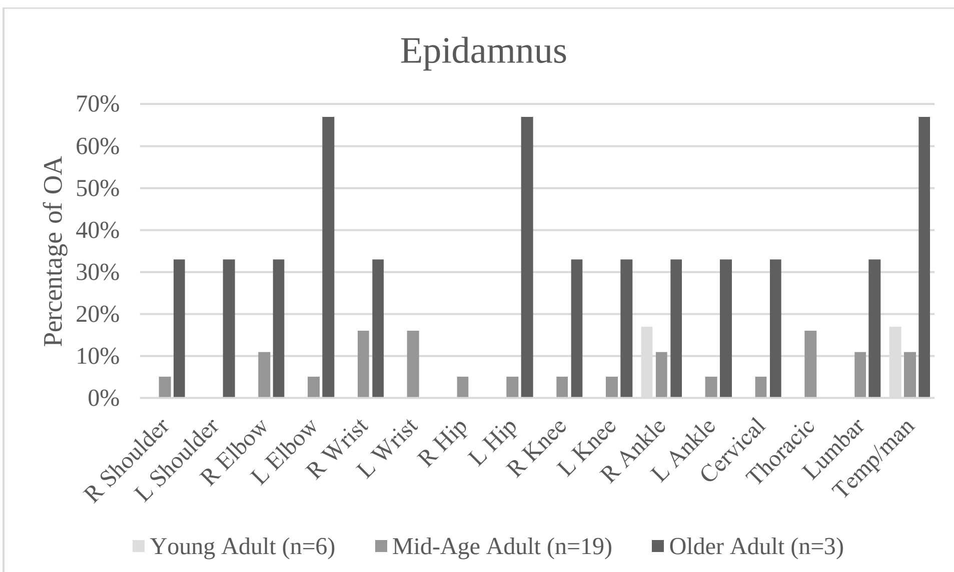
APPENDIX A

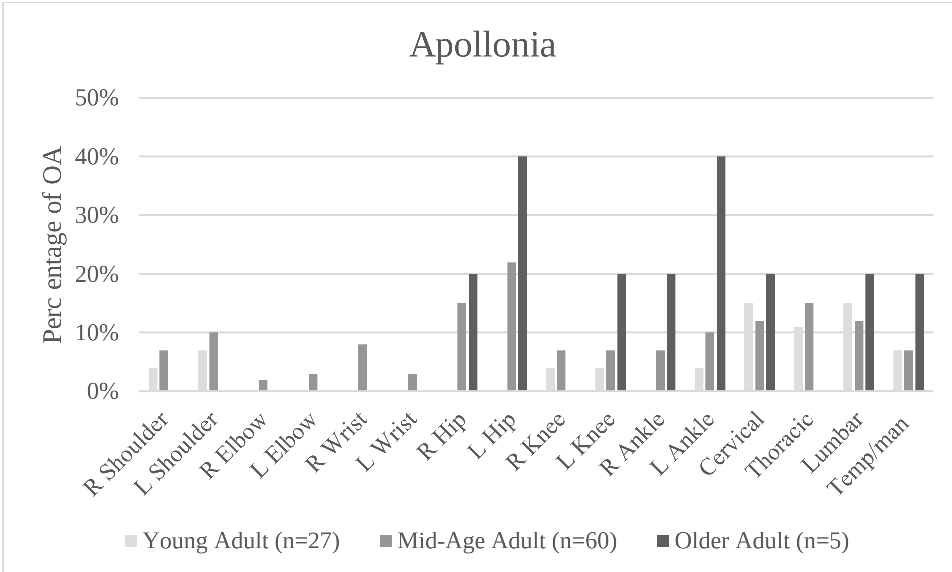
Bar graphs showing osteoarthritis of each joint at sample sites.

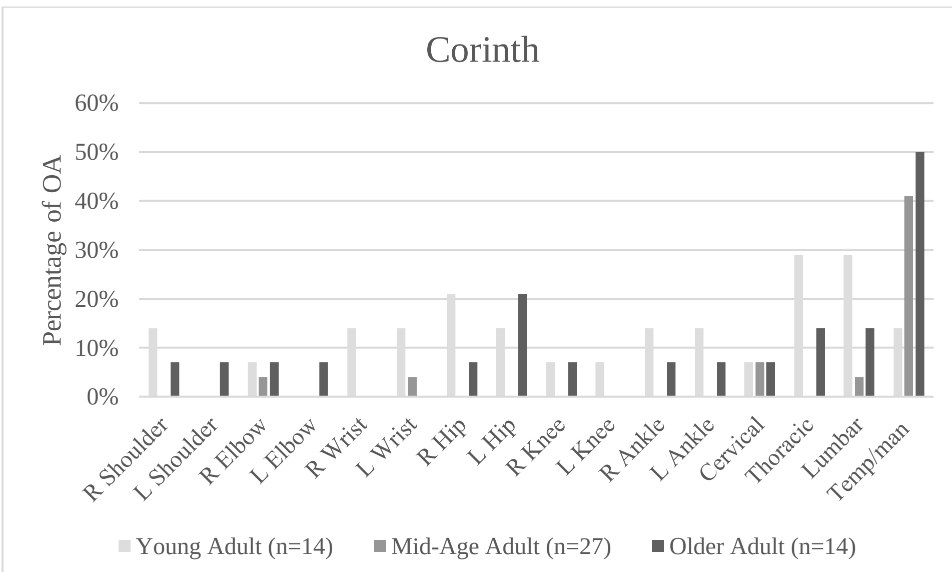





Precolonial Apollonia
Percentage of OA
70%
60%
50%
40%
30%
20%
10%
0%
R Shoulder
L Shoulder
R Elbow
L Elbow
R Wrist
L Wrist
R Hip
L Hip
R Knee
L Knee
R Ankle
L Ankle
Cervical
Thoracic
Lumbar
Temp/man
Young Adult (n=19)
Mid-Age Adult (n=19)
Older Adult (n=10)


Epidamnus
Percentage of OA
70%
60%
50%
40%
30%
20%
10%
0%
R Shoulder
L Shoulder
R Elbow
L Elbow
R Wrist
L Wrist
R Hip
L Hip
R Knee
L Knee
R Ankle
L Ankle
Cervical
Thoracic
Lumbar
Temp/man
Young Adult (n=6)
Mid-Age Adult (n=19)
Older Adult (n=3)


Apollonia
50%
40%
30%
20%
10%
0%
Perc entage of OA
R Shoulder
L Shoulder
R Elbow
L Elbow
R Wrist
L Wrist
R Hip
L Hip
R Knee
L Knee
R Ankle
L Ankle
Cervical
Thoracic
Lumbar
Temp/man
Young Adult (n=27)
Mid-Age Adult (n=60)
Older Adult (n=5)


Corinth
60%
50%
40%
30%
20%
10%
0%
Percentage of OA
R Shoulder
L Shoulder
R Elbow
L Elbow
R Wrist
L Wrist
R Hip
L Hip
R Knee
L Knee
R Ankle
L Ankle
Cervical
Thoracic
Lumbar
Temp/man
Young Adult (n=14)
Mid-Age Adult (n=27)
Older Adult (n=14)

APPENDIX B

Tables showing the number of joints with osteoarthritis at sample sites

Lofkënd	Young Adult (n=43)	Middle-age Adult (n=30)	Older Adult (n=10)
R Shoulder	0	2	4
L Shoulder	1	3	2
R Elbow	0	3	3
L Elbow	0	2	3
R Wrist	1	2	3
L Wrist	1	1	4
R Hip	4	5	4
L Hip	2	7	3
R Knee	2	0	1
L Knee	4	1	1
R Ankle	0	1	3
L Ankle	1	0	3
Cervical	4	4	3
Thoracic	1	2	2
Lumbar	3	3	3
Temp/man	0	4	3

Epidamnus	Young Adult (n=6)	Middle-age Adult (n=19)	Older Adult (n=3)
R Shoulder	0	1	1
L Shoulder	0	0	1
R Elbow	0	2	1
L Elbow	0	1	2
R Wrist	0	3	1
L Wrist	0	3	0
R Hip	0	1	0
L Hip	0	1	2
R Knee	0	1	1
L Knee	0	1	1
R Ankle	1	2	1
L Ankle	0	1	1
Cervical	0	1	1
Thoracic	0	3	0
Lumbar	0	2	1
Temp/man	1	2	2

Apollonia	Young Adult (n=27)	Middle-age Adult (n=60)	Older Adult (n=5)
R Shoulder	1	4	0
L Shoulder	2	6	0
R Elbow	0	1	0
L Elbow	0	2	0
R Wrist	0	5	0
L Wrist	0	2	0
R Hip	0	9	1
L Hip	0	13	2
R Knee	1	4	0
L Knee	1	4	1
R Ankle	0	4	1
L Ankle	1	6	2
Cervical	4	7	1
Thoracic	3	9	0
Lumbar	4	7	1
Temp/man	2	4	1

Precolonial Apollonia	Young Adult (n=19)	Middle-age Adult (n=19)	Older Adult (n=10)
R Shoulder	1	1	3
L Shoulder	1	0	4
R Elbow	1	0	5
L Elbow	0	0	3
R Wrist	0	1	3
L Wrist	0	0	2
R Hip	2	5	6
L Hip	1	3	5
R Knee	1	2	2
L Knee	2	3	4
R Ankle	0	1	4
L Ankle	1	0	4
Cervical	1	3	6
Thoracic	3	2	4
Lumbar	3	0	2
Temp/man	1	0	3

Corinth	Young Adult (n=14)	Middle-age Adult (n=27)	Older Adult (n=14)
R Shoulder	2	0	1
L Shoulder	0	0	1
R Elbow	1	1	1
L Elbow	0	0	1
R Wrist	2	0	0
L Wrist	2	1	0
R Hip	3	0	1
L Hip	2	0	3
R Knee	1	0	1
L Knee	1	0	0
R Ankle	2	0	1
L Ankle	2	0	1
Cervical	1	2	1
Thoracic	4	0	2
Lumbar	4	1	2
Temp/man	2	11	7

Precolonial Corinth	Young Adult (n=6)	Middle-age Adult (n=6)	Older Adult (n=1)
R Shoulder	1	1	1
L Shoulder	0	0	0
R Elbow	1	2	0
L Elbow	0	2	0
R Wrist	1	2	0
L Wrist	1	2	0
R Hip	2	2	0
L Hip	1	1	0
R Knee	0	1	0
L Knee	0	1	0
R Ankle	0	2	0
L Ankle	0	2	0
Cervical	2	4	0
Thoracic	2	4	0
Lumbar	1	1	0
Temp/man	0	5	0

APPENDIX C

Lofkënd Burial data

Burial ID	R Sh.	L Sh.	R El.	L El.	R Wr.	L Wr.	R Hip	L Hip	R Kn.	L Kn.	R Ank.	L Ank.	Cerv	Thor	Lum	TMJ	Sex	Sum Age	Period
Grave 1, Trench 3, Unit 14	0	0								0	1	1				0	M?	20	Prehistoric
Grave 10, Trench 1, Unit 145	0	0	1	1			1		1		0	0	0	0	0	0	U	43	Prehistoric
Grave 10, Trench 1, Unit 146	0	0					0	0			1	0				3	F	45	Prehistoric
Grave 10, Trench 1, Unit 147	2	1	0	2	0	1			1		2	2	2	0	0	2	F?	50	Prehistoric
Grave 10, Trench 1, Unit 148	0	0			1	2			1	2	1	1				0	F	25	Prehistoric
Grave 10, Trench 1, Unit 149																0	F?	55	Prehistoric
Grave 10, Trench 1, Unit 150																0	U	30	Prehistoric
Grave 10, Trench 1, Unit 151	0	0					0	0	0		0	1				0	M	23	Prehistoric

Grave 10, Trench 1, Unit 152	0	0														0	U	25	Prehistoric
Grave 10, Trench 1, Unit 153	0	0			1	0										0	U	45	Prehistoric
Grave 10, Trench 1, Unit 154	0	0	1					1	1	1	1	1	2	0	2	1	F	18	Prehistoric
Grave 10, Trench 1, Unit 155	1	1	2	2	1	2	3	2	1		1	1				1	M	55	Prehistoric
Grave 10, Trench 1, Unit 156	0	0			0	0										1	M	38	Prehistoric
Grave 10, Trench 1, Unit 157	1	0	1	1	1	1	1	1	1	1	1	1	0	0	1	0	M	24	Prehistoric
Grave 10, Trench 1, Unit 158	0	0	3		1	1	2	2		1	1	1	0	0	2	0	M	40	Prehistoric
Grave 10, Trench 1, Unit 159	0	0					0	0			1	1				0	U	35	Prehistoric
Grave 10, Trench 1, Unit 160	0	0					0				1	1					M?	35	Prehistoric
Grave 10, Trench 1, Unit 161	0	0									1	1					U	35	Prehistoric
Grave 10, Trench 1, Unit 162	0	0									1	1				0	U	22	Prehistoric

Grave 10, Trench 1, Unit 163	1	1	1	1	1	1	1	1		1	0	1	1	1	1	1	M	30	Prehistoric
Grave 10, Trench 1, Unit 164	2	0	2	2	1	1	0	2	1	1	1	1	2	2	1	2	M	45	Prehistoric
Grave 10, Trench 1, Unit 165	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	M	22	Prehistoric
Grave 10, Trench 1, Unit 166	0	0			1	1	1	0		1	1	1	1	1	1		F	25	Prehistoric
Grave 10, Trench 1, Unit 167	0	0					0									0	U	35	Prehistoric
Grave 10, Trench 1, Unit 168	1	0	1	1	1	1	2	2		1	2	1	1	0	1	0	M	45	Prehistoric
Grave 10, Trench 1, Unit 169	0	0															F?	35	Prehistoric
Grave 10, Trench 1, Unit 170	0	0					0									0	F?	53	Prehistoric
Grave 10, Trench 1, Unit 171	0	0			1	0							2	0	0	1	M?	45	Prehistoric
Grave 10, Trench 1, Unit 172	0	0			1	0	2	0	1		0	1	0	1	0	0	M	25	Prehistoric
Grave 10, Trench 1, Unit 173	0	0	1	2	2	1		2		0	1	1	1	0	2		U	35	Prehistoric

Grave 10, Trench 1, Unit 174	0	1	0	0	1	1	1	1			1	1				0	F	19.5	Prehistoric
Grave 10, Trench 1, Unit 175	1	2	1	1	1	1	2	2	1	1	1	1	1	1	2	1	F	22	Prehistoric
Grave 10, Trench 1, Unit 176	0	0			1	0				0	1	1	1	0	0	1	F?	25	Prehistoric
Grave 10, Trench 1, Unit 177	0	0		0	1	1	0	3	1	1	1	1	0	0	1	1	M	25	Prehistoric
Grave 10, Trench 1, Unit 178	0	0									1	1				0	U	35	Prehistoric
Grave 10, Trench 1, Unit 179	3	0	2		2	2				2			2	0	0		M?	45	Prehistoric
Grave 10, Trench 1, Unit 180	1	1	1	1	1	1	1	1	2	2	1	1	2	2	0	1	F	30	Prehistoric
Grave 10, Trench 1, Unit 181	0	0			0	1	0	0	0	0			0	0	0	1	U	22	Prehistoric
Grave 10, Trench 1, Unit 182	1	1	1	1	1	1	2	1	1	1	1	1	2	1	1	1	F	22	Prehistoric
Grave 10, Trench 1, Unit 183	0	0					1										U	35	Prehistoric
Grave 10, Trench 1, Unit 184	1	2	1	1	1	1	1	1	1	1	1	1	1	2	1	1	F	40	Prehistoric

Grave 10, Trench 1, Unit 185	0	0			1	1	0	1	1	1	1	1	0	0	0	0	M?	23	Prehistoric
Grave 10, Trench 1, Unit 186	1	1			1	1			1		1	0	0	0	0	1	F?	25	Prehistoric
Grave 10, Trench 1, Unit 187	0	0		0							1	1				3	U	45	Prehistoric
Grave 10, Trench 1, Unit 188	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	F	22	Prehistoric
Grave 10, Trench 1, Unit 189	0	0					0	0									U	25	Prehistoric
Grave 10, Trench 1, Unit 190	3	2	2	1	2	2	0	0		3	2	2	2	3	2	2	M	65	Prehistoric
Grave 10, Trench 1, Unit 191	0	0	1	1			1	1	1	2	1	1				0	M?	20	Prehistoric
Grave 10, Trench 1, Unit 192	0	0	1	1			2	1	1	1	1	1				1	F	35	Prehistoric
Grave 10, Trench 1, Unit 193	0	0							1		0	1					U	25	Prehistoric
Grave 10, Trench 1, Unit 194																1	M?	28	Prehistoric
Grave 10, Trench 1, Unit 195	0	0					1									1	M	21	Prehistoric

Grave 10, Trench 1, Unit 196	2	3			2	2							2	0	0	2	M	55	Prehistoric
Grave 10, Trench 1, Unit 197	0	0			1	1	1	1		1	1	1	1	0	2	1	M	40	Prehistoric
Grave 10, Trench 1, Unit 198	0	0					1	1	1				0	1	0	0	F	21	Prehistoric
Grave 10, Trench 1, Unit 199	1	0	1	1	1	1	1	1	2	1	1	1	1	0	0	1	F?	30	Prehistoric
Grave 10, Trench 1, Unit 200	0	1		1												0	M?	45	Prehistoric
Grave 10, Trench 1, Unit 201	0	0			1	1	2	0			1	0	0	0	2	1	F	60	Prehistoric
Grave 10, Trench 1, Unit 202	0	0															U	35	Prehistoric
Grave 10, Trench 1, Unit 203	0	0									1	0				0	U	32	Prehistoric
Grave 10, Trench 1, Unit 204	0	1														0	M?	25	Prehistoric
Grave 10, Trench 1, Unit 205	0	0	1	1	1	1	2	1	1	2	1	3	2	1	2	1	M	33	Prehistoric
Grave 10, Trench 1, Unit 206	0	0						1			0	1	1	1	0	0	U	35	Prehistoric

Grave 10, Trench 1, Unit 207	0	2					2	2					0	0	0	1	M	40	Prehistoric
Grave 10, Trench 1, Unit 208	0	0		1	1	1	1	2	1	1	1	1				1	U	40	Prehistoric
Grave 10, Trench 1, Unit 209																	U	21	Prehistoric
Grave 10, Trench 1, Unit 210	0	0	1	1	1	1	2	2		1			3	0	0	0	M?	42	Prehistoric
Grave 10, Trench 1, Unit 211	0	1	1	1	2	1	1	1	1	1	1	1	0	1	0	0	M	25	Prehistoric
Grave 10, Trench 1, Unit 212	0	0	0								0	1				0	U	50	Prehistoric
Grave 10, Trench 1, Unit 213	0	0		0	1	1	3	3			2	2				1	M	50	Prehistoric
Grave 10, Trench 1, Unit 214	1	2									0	0				1	U	45	Prehistoric
Grave 10, Trench 1, Unit 215	0	0		1	1	1	1	1			1	1	0	0	1	0	F?	23	Prehistoric
Grave 10, Trench 1, Unit 216	0	0			1	1	0					0				0	U	25	Prehistoric
Grave 10, Trench 1, Unit 217	0	0									1	1					U	21	Prehistoric

Grave 10, Trench 1, Unit 218															0	F?	30	Prehistoric
Grave 10, Trench 1, Unit 219	0	0													0	U	30	Prehistoric
Grave 10, Trench 1, Unit 220	0	0			1	0	0	0			0	0	0	0	0	0	M?	30	Prehistoric
Grave 10, Trench 1, Unit 221	3	0	3	3	3	3	3	3	2				0	3	3	3	M	60	Prehistoric
Grave 10, Trench 1, Unit 222	0	0					1	0	1	1	1	1					U	35	Prehistoric
Grave 10, Trench 1, Unit 223	0	0			1	0							1	1	1	2	F	40	Prehistoric
Grave 10, Trench 1, Unit 224	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	F	22	Prehistoric
Grave 10, Trench 1, Unit 225	1	1	1	1	1	1	1	1		1	1	1	1	1	0	1	M	22	Prehistoric
Grave 10, Trench 1, Unit 226	0	0				1			1	1			1	0	0	0	U	23	Prehistoric

Corinth Burial Data

Burial ID	R Sh.	L Sh.	R El.	L El.	R Wr.	L Wr.	R Hip	L Hip	R Kn.	L Kn.	R Ank.	L Ank.	Cerv	Thor	Lum	TMJ	Sex	Sum Age	Period

N Cem/Hill's series 46A154C	0	0					1	1	1		1						M	35	Late Archaic/Early Classical
N Cem/Hill's Series 3852C																1	M	40	Archaic
N Cem/Hill's series 1745C	0	0											2	0	0	1	F	40	Archaic
N Cem/Hill's series 1858C																4	F	55	Archaic
N Cem/Hill's series 1946C	0	0			0	0							2	0	0	2	F	37	Archaic
N Cem/Shear Excave 17LXXXIX																2	F?	35	Late Archaic/Early Classical
N Cem/Shear Excave 18CIX																1	F	28	Archaic
N Cem/Shear Excave 19LXXI																2	M	40	Late Archaic/Early Classical
N Cem/Shear Excave 20LXXVII																1	M	37	Archaic
N Cem/Shear Excave 22CLVIII																1	M	25	Archaic
Anaploga Sanct, Bone Lot 628, Gr. 8	0	0														1	U	35	Late Classical to Hellenistic
Anaploga Sanct, Bone Lot 6241, Gr. 3																2	F	55	Late Classical to Hellenistic
Anaploga Cistern, Bone Lot B634, Manhole 8	0	1	1	1	0	1	1	1			1	1	0	0	2		M	25	Late Classical to Hellenistic

Anaploga Cistern, Bone Lot B634, Manhole 8.1	0	0	3				0									0	M?	40	Late Classical to Hellenistic
Rd to Hadji Moustapha, Bone Lot 637, Gr. 1	0	0		1	2	2	1				0		1	2	2	1	M	25	Late Archaic/Hellenistic
Rd to Hadji Moustapha, Bone Lot 638, Gr. 2	1	0	1	1	1	1	2	1					2	2	0	0	F?	28	Late Archaic/Hellenistic
Isthmian Gate, Bone Lot 639, Gr. 1																1	U	35	Archaic
Chatoupi Gr., Bone Lot 6415	0	3	2	2	1	1	1	2	3	0	4	4	3	3	3	2	M	60	Archaic
Vrysoula, Bone Lot 6416, Gr. 7	0	0	1		1	1					1	1				0	M	35	Late Classical to Hellenistic
Vrysoula, Bone Lot 6417, Gr. 9	0	0			0	0					0	0				0	F	35	Late Classical to Hellenistic
Vrysoula, Bone Lot 6457, Gr. 1	0	0			0	0	2	2			0	0	1	0	0	0	U	60	Archaic
Vrysoula, Bone Lot 6458, Gr. 6	0	0			1	1					0	0	0	0	2		U	35	Archaic
Anaploga, Bone Lot 691, Gr. B, Manhole 18	0	0		0	0	0							0	0	0	0	F	40	Hellenistic
N Anaploga, Bone Lot 692, Gr. 1, Area A	0	0	0	0	0	2	0	0			0	0	0	0	0	2	M	35	Late Archaic/Hellenistic
N Anaploga, Bone Lot 694, Gr. 2, Area C	0	0	0	0	1	1	1	1	0				0	0	0	2	F?	35	Late Archaic/Hellenistic

N Anaploga, Bone Lot 695, Gr. 2, Area C	0	0	1	1	1	0				1	0	1	0	1	0	0	U	25	Late Archaic/Hellenistic
N Anaploga, Bone Lot 6910, Gr. 1, Area J	0	0			0	0					0	0	0	0	0	2	U	38	Archaic
N Anaploga, Bone Lot 6912, Gr. 1, Area N	0	0														0	U	27	Late Archaic/Hellenistic
Anaploga, Bone Lot 6950, Gr. E, Manhole 18																1	F	35	Late Classical to Hellenistic
N Cem/Shear Excave 21 LXXVIII																1	M	60	Late Archaic/Early Classical
N Cem/Shear Excave 24 LII																2	M	45	Classical
N Cem/Shear Excave 25 85C																0	M	40	Late Archaic/Early Classical
N Cem/Shear Excave 28 CCXXIV																1	M	50	Archaic
N Cem/Shear Excave 29 LXIX																0	M	50	Late Archaic/Early Classical
N Cem/Shear Excave 12 CCCCXXIX																1	M	32	Late Archaic/Early Classical
N Cem/Shear Excave 14 CLXXXII																1	M	40	Archaic
N Cem/Shear Excave 15 CLXXVI																2	M	45	Archaic

N Cem/Shear Excave 16 LXXIV																1	F	40	Archaic
N Cem/Hill's series 2748C																2	M?	60	Archaic
N Cem/Hill's series 2849C																1	F	28	Archaic
N Cem/Hill's series 4954C																1	M	25	Archaic
N Cem/Hill's series 5055C																2	M?	35	Archaic
N Cem/Hill's series 3151C																3	M	60	Archaic
N Cem/Hill's series 4653C																1	F	19	Archaic
N Cem/Hill's series 5159C																1	F	50	Archaic
N Cem/Shear Excave 30 LXXVII																2	M	28	Archaic
N Cem/Shear Excave 31 CCVIII																2	F	40	Archaic
N Cem/Shear Excave 34 CLXXIX																2	M	40	Archaic
N Cem/Hill's series, H&D #134C	2	1	1	1	2	2	2	2	1	1	2	2	1	2	2	1	F	27	Archaic
N Cem/Hill's series 1442C																2	M	50	Archaic
N Cem/Hill's series 1644C																1	F	60	Archaic
N Cem/Hill's series 5356C																2	M	27	Archaic
N Cem/Hill's series 5457C																1	M	60	Archaic

N Cem/Hill's series 34 CLXXIX	3	0	2	1	0	0	2	2	3	2	2	2	0	3	3	1	M	32	Archaic
N Cem/Hill's series 4641C	2	0	1	1	1	1	1	2	0	0	0	0	0	3	3	2	F	60	Archaic

Precolonial Corinth Burial Data

Burial ID	R Sh.	L Sh.	R El.	L El.	R Wr.	L Wr.	R Hip	L Hip	R Kn.	L Kn.	R Ank.	L Ank.	Cerv	Thor	Lum	TMJ	Sex	Sum Age	Period
Lechaion Rd. 318C	2	0						0								0	F	50	Neolithic
Lechaion Rd. 320C	0	0					1						0	0	2	1	F?	28	Neolithic
Lechaion Rd. 319C	0	0											0	1	0	1	M?	30	Neolithic
Lechaion Rd. 321C	0	0						0	1		0	1				1	F	21	Neolithic
Tavern of Aphrodite, Grid 62G, Bone Lot 7120, Skeleton I	0	0		2	2	2	3	2			2	2	3	2	0	3	U	40	Prehistoric
Tavern of Aphrodite, Grid 62G, Bone Lot 7121, Skeleton II																4	F	35	Prehistoric
Tavern of Aphrodite, Bone Lot 7122, Skeleton III	1	0	1	1	1	1	2	2	0		1	1	2	2	0	1	F	30	Prehistoric
Tavern of Aphrodite, Grid 62H, Bone Lot 7123, Grave 2	0	0	0	1	0	1	0	1			1	1	2	2	0	2	F	37	Prehistoric

Bema forum central, Bone Lot 724, Grave 1	3	0	3	2	2	2	2	0	2	2	2	2	3	3	3	3	M	40	Prehistoric
AcroCorinth, Sanctuary of Demeter and Kore, Bone Lot 7207, Grave 1972008	0	0														0	U	45	Prehistoric
AcroCorinth, Sanctuary of Demeter and Kore, Bone Lot 7208, Grave 1972009	2	0	2	1	2	2	2	0	1	1	1	1	3	2	1	1	F	22	Prehistoric
Forum central, Hero shrine, Bone Lot 738, Grave 734	0	0			1	1				0		0				1	M?	30	Prehistoric
Forum central, Hero shrine, Bone Lot 739, Grave 735	0	0	2		0		1						3	2	0	3	F?	40	Prehistoric

Epidamnus Burial Data

Burial ID	R Sh.	L Sh.	R El.	L El.	R Wr.	L Wr.	R Hip	L Hip	R Kn.	L Kn.	R Ank.	L Ank.	Cerv	Thor	Lum	TMJ	Sex	Sum Age	Period
Varri 22a	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	M	35	Hellenistic
Varri 22b	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	F?	40	Hellenistic
Varri 22c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	U	35	Hellenistic
D	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	U	35	Hellenistic

Varri 50a	0	0	0	1	0	0	0	1	0	1	0	0	2	0	0	1	M	35	Archaic to Hellenistic
Varri 50b	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	F	40	Archaic to Hellenistic
I	0	0	0	0	2	2	0	0	1	0	0	1	2	2	2	0	F?	35	Hellenistic
3a	0	0	0	0	0	2	1	1	0	0	0	1	1	2	2	1	F	40	Hellenistic
3b	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	U	20	Hellenistic
Varri 37	0	0	2	2	2	0	0	2	2	2	2	2	0	0	2	2	F	50	Hellenistic?
Kafka 15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	35	Hellenistic
Varri 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	35	3rd BC
Varri 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	F	35	Hellenistic
Kafka 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	40	4th-1st BC
K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F?	80	4th-1st BC
L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	F	20	4th-1st BC
#14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	20	4th-1st BC
Kafka 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M	20	3rd - 1st BC
Varri 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	M?	20	4th-1st BC
Currila 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	35	4th-2nd BC
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	M	35	4th-1st BC
Varri 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	F	35	4th-1st BC
Nekropoli-Kodra e Dautes 1	0	0	0					0								0	F	45	Hellenistic 325-100 BC

NEKROEOL 1965&1968 EOIKOM V15	2	0	2	2	2	2	1	1	2	2	2	2	0	2	0	1	F	45	Hellenistic
Dyrr. Nek. Kodra e Dautes 5432	1	1	2	0	2	0	2	2	1	1	0	2	0	0	0	1	F	47	Archaic/ Hellenistic
Kafka 2	0	0			0	0							0	0	0	0	Unk	40	Hellenistic
SW02-218-#11	2	2		2	0	0	0	4			0	0	2	1	1	2	F	55	Hellenistic
Nekropol-K. Dautes	0	0	0	0	0	0	1	1	1	1	0	2	0	0	0	0	M	30	Hellenistic

Apollonia Burial Data

Burial ID	R Sh.	L Sh.	R El..	L El..	R Wr.	L Wr.	R Hip	L Hip	R Kn.	L Kn.	R Ank.	L Ank.	Cerv	Thor	Lum	TMJ	Sex	Sum Age	Period
Tuma 9, Varri 46, Sector 1, NJS 205	1	0		1	1	0		2	1	1			0	2	0	0	F	35	Archaic/ Classical
Tuma 9, Varri 46, Sector 1, NJS 169	0	0			1	1					1	1				1	M?	50	Archaic/ Classical
Tuma 9, Varri 4.2, Sector 2, NJS 20	1	1	1	1	2	0	1	2	2	2	1	3	0	0	3	0	M	45	Classical
Tuma 9, Varri 55.2, Sector 2, NJS 201	0	0		1			0				0	1	0	2	1		U	35	Archaic
Tuma 9, Varri 55.1, Sector 2, NJS 201	1	1	1		1	0	1	0		1	1	0	1	1	1	1	M?	19	Archaic
Tuma 9, Varri 26, Sector 4, NJS 100	2	2	1		1	1	2		0							1	F	45	Hellenistic
Tuma 9, Varri 26, Sector 4, NJS 101	2	0	1		0	1		1	2	1	1	1	2	0	0	1	M	30	Hellenistic
Tuma 9, Varri 26, Sector 4, NJS 102	1	0			2		1	2		0	1	1	0	1	0	1	M	45	Hellenistic

Tuma 9, Varri 57, Sector 3, NJS 207	0	1	1	0	0	1	1	1			1	1	0	1	1	1	F	25	Classical
Tuma 9, Varri 57.2, Sector 3, NJS 202																0	U	30	Classical
Tuma 9, Varri 36, Sector 3, NJS 135	0	0					2	2								0	U	45	Classical to Hellenistic
Tuma 9, Varri 58, Sector 1, NJS 212	0	2					0	0					0	2	0	0	F	30	Archaic
Tuma 9, Varri 53, Sector 4, NJS 193	0	0															U	35	Classical
Tuma 9, Varri 65, Sector 1, NJS 238	0	0															U	35	Archaic
Tuma 9, Varri 34.2, Sector 1, NJS 127																2	U	35	Archaic
Tuma 9, Varri 67, Sector 4, NJS 259	0	0														0	U	25	Classical
Tuma 9, Varri 42, Sector 4, NJS 156	0	0	1	1	1	1		1	1	1	0	1	0	1	1	1	F	25	Classical
Tuma 9, Varri 31, Sector 1, NJS 118	0	0														0	U	35	Classical
Tuma 9, Varri 5, Sector 2, NJS 27	1	0	1	1	0	1		1		1			1	0	0	1	F	18	Classical
Tuma 9, Varri 66, Sector 1, NJS 244	2	0	0	0									2	0	0	1	M?	40	Archaic
Tuma 9, Varri 45, Sector 4, NJS 166	0	0			1	1	0	0	0	0			0	1	1	0	U	20	Archaic
Tuma 9, Varri 56, Sector 2, NJS 106	0	0		1				1					2	0	2	0	M	30	Archaic
Tuma 9, Varri 4.1, Sector 2, NJS 20	0	0			1	1	0		1	1	1	1	0	1	2	0	F?	22	Classical

Tuma 9, Varri 25, Sector 4, NJS 97	0	0	1		1	1	0				1	1	0	0	0	0	U	35	Classical
Tuma 9, Varri 39, Sector 3, NJS 144	0	3		0		1	3	3	1	1	1	1	0	1	3	1	F?	45	Archaic/ Classical
Tuma 9, Varri 18, Sector 2, NJS 75	0	0											0	1	0	0	U	35	Classical to Hellenistic
Tuma 9, Varri 17, Sector 3, NJS 53	0	0									1	1					U	35	Classical to Hellenistic
Tuma 9, Varri 7, Sector 3, NJS 54	0	0									1	1					U	35	Classical to Hellenistic
Tuma 9, Varri 7, Sector 2, NJS 27																	U	15	Classical to Hellenistic
Tuma 9, Varri 7, Sector 3, NJS 37	0	0					2										M	40	Classical to Hellenistic
Tuma 9, Varri 59, Sector 3, NJS 216	0	0					0	0								1	F	40	Classical
Tuma 9, Varri 59, Sector 3, NJS 217	0	0															U	35	Classical
Tuma 9, Varri 60, Sector 1, NJS 220	0	0															U	35	Archaic
Tuma 9, Varri 61, Sector 1, NJS 224	0	0					0									0	U	35	Hellenistic
Tuma 9, Varri 9.1, Sector 4, NJS 42	2	2	2	2	2	2	2	2	2	2	2	3	3	2	3	1	M	45	Classical to Hellenistic
Tuma 11, Varri 8, Sector 4, NJS 65	0	3		1	2	2	1	2	1	1	1	1	3	3	3	1	M	45	Archaic
Tuma 11, Varri 2, Sector 2, NJS 21	0	0						0					0	1	1	0	U	35	Classical
Tuma 11, Varri 6, Sector 2, NJS 53	0	0			0	0							0	0	0	0	M	35	Classical
Tuma 11, Varri 12, Sector 4, NJS 83	0	0			0	1					0	2				0	M?	35	Archaic

Tuma 11, Varri 16, Sector 4, NJS 105	0	0					0	1					0	1	1	1	U	35	Archaic
Tuma 11, Varri 3, Sector 3, NJS 31	0	0			0	0							0	0	1	0	U	35	Classical
Tuma 11, Varri 9, Sector 3, NJS 54	0	0					0									0	U	30	Classical
Tuma 11, Varri 13, Sector 3, NJS 87	0	0						0					0	1	0	0	U	35	Classical
Tuma 11, Varri 14, Sector 3, NJS 94	0	0											3	0	0		U	35	Classical
Tuma 11, Varri 11, Sector 1, NJS 79	0	0	1		1	1	1	1	1	1	1	1	0	1	0	0	U	21	Classical
Tuma 11, Varri 4, Sector 2, NJS 40	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	2	M	30	Classical
Appendix 3, Varri 2, NJS 7, 13, and 4	0	0			0	1							0	0	0	1	F?	35	Classical to Hellenistic
Appendix 3, Varri 3, NJS 20	0	0						0									U	35	Classical to Hellenistic
Appendix 3, Varri 4, NJS 24	0	0			1	0	1						1	0	0	1	F	30	Hellenistic
Appendix 3, Varri 5, NJS 28	0	0														0	F	35	Classical to Hellenistic
Appendix 3, Varri 10, NJS 43	0	0									1	1				1	F	25	Classical to Hellenistic
Appendix 3, Varri 14, NJS 75	0	0			1	1			1		1	1					U	35	Hellenistic
Appendix 3, Varri 14.1, NJS 75	0	0									1	0					U	35	Hellenistic

Appendix 3, Varri 7, NJS 36	0	0			1	0	1	1	1	1	1	1	0	0	0	1	M	35	Classical to Hellenistic
Appendix 3, Varri 12, NJS 63	0	0					0	0					1	0	0	1	F	40	Classical to Hellenistic
Appendix 3, Varri 8, NJS 42	0	0					0	0					0	0	0	0	F	55	Classical to Hellenistic
Appendix 3, Varri 9, NJS 48	0	0	1		1	0	1	1			0	0	0	0	0	0	M	40	Classical to Hellenistic
Appendix 3, Varri 13, NJS 67	1	2	1	1	1	1	2	2	3	3	1	0	0	2	2	1	F	38	Hellenistic
Appendix 3, Varri 13.1, NJS 70	3	1		2	0		2	2	0	2	2	2	2	0	0	1	F	40	Hellenistic
Appendix 3, Varri 13.2, NJS 71	0	2					0	1		1	1	1	2	0	0	1	F	30	Hellenistic
Appendix 3, Varri 13.3, NJS 70, 71, 69?	0	0						2			0	2	0	0	2		F	50	Hellenistic
Appendix 2, Varri 4, NJS 19	0	2		0	2			2		0	2	2	0	2	2	1	F	45	Classical
Appendix 2, Varri 4.1, NJS 19	0	0			0	1	0	1		2	2	2				0	M	50	Classical
Appendix 2, Varri 4.2, NJS 19																0	F	40	Classical
Appendix 2, Varri 2, NJS 11	0	0		0				1			0	1	0	0	0	0	U	35	Classical
Appendix 2, Varri 1, NJS 6	0	0					0	3	2		1	1	0	0	0	0	F	40	Classical
Appendix 1, Varri 3, NJS 11	1	1	1	1	1	1	1	1					1	1	1	2	M	18	Classical
Appendix 1, Varri 4, NJS 14	0	0	0	0	0	1	1	1	1	1	1	3	2	1	0	1	M	35	Classical
Tuma 10, Varri 76, Sector 2, NJS 388	0	0				1		1		1						0	F?	30	Classical to Hellenistic

Tuma 10, Varri 36, Sector 1, NJS 230	0	0					1	1			1	1					U	19	Classical
Tuma 10, Varri 54, Sector 4, NJS 308	0	0								0							U	35	Classical
Tuma 10, Varri 52, Sector 4, NJS 298	0	0					1	0		1	1	1				0	F?	22	Classical to Hellenistic
Tuma 10, Varri 52.1, Sector 4, NJS 298	0	0											0	2	0	1	F?	45	Classical to Hellenistic
Tuma 10, Varri 52.2, Sector 4, NJS 298																0	U	40	Classical to Hellenistic
Tuma 10, Varri 53, Sector 3, NJS 306	0	0								2	1	2				0	U	30	Classical
Tuma 10, Varri 53.1, Sector 4, NJS 308	0	0								1							M?	35	Classical
Tuma 10, Varri 48, Sector 3, NJS 285	0	0			0	0	1	1	1		1	0	0	0	0	1	M	35	Classical to Hellenistic
Tuma 10, Varri 43, Sector 2, NJS 260	1	0	1										1	0	0	0	F?	30	Classical
Tuma 10, Varri 9, Sector 3, NJS 73	1	0	1	1	1	1	1	1	1	1	1	1	2	2	2	0	M	25	Classical to Hellenistic
Tuma 10, Varri 17, Sector 3, NJS 127	0	0						0					0	1	0		U	35	Classical

Tuma 10, Varri 61, Sector 3, NJS 334	0	0					2	2					3	0	0	3	U	75	Classical to Hellenistic
Tuma 10, Varri 59, Sector 3, NJS 328	0	1	1	1	1	1	2	2	1	1	1	1	2	2	2	2	F	35	Classical to Hellenistic
Tuma 10, Varri 22, Sector 3, NJS 158	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	0	F	21	Classical to Hellenistic
Tuma 10, Varri 22.1, Sector 3, NJS 157	0	0									1	0	0	2	0		U	40	Classical
Tuma 10, Varri 1, Sector 1, NJS 10	0	0									1	1					U	35	Archaic/ Classical
Tuma 10, Varri 1.1, Sector 1, NJS 9	0	0															U	35	Archaic/ Classical
Tuma 10, Varri 1.2, Sector 1, NJS 18																0	U	35	Archaic/ Classical
Tuma 10, Varri 2, Sector 1, NJS 26	1	0			1	1	2	2					1	1	0	2	F	45	Classical to Hellenistic
Tuma 10, Varri 42, Sector 3, NJS 254	0	0			0	0	1	1					1	0	0	1	F	48	Classical to Hellenistic
Tuma 10, Varri 32, Sector 3, NJS 205	0	0														0	F?	25	Classical
Tuma 10, Varri 57, Sector 3, NJS 322	0	0					0						0	0	0	2	F	40	Classical
Tuma 10, Varri 66, Sector 3, NJS 351	0	0	1		1		1	0			2	0	0	0	1		M?	35	Classical to Hellenistic

Precolonial Apollonia Burial Data

Burial ID	R Sh.	L Sh.	R El.	L El.	R Wr.	L Wr.	R Hip	L Hip	R Kn.	L Kn.	R Ank.	L Ank.	Cerv	Thor	Lum	TMJ	Sex	Sum Age	Period
Tuma 10, Varri 40, Sector 1, NJS 249	1	0	1	1	2	2	2	1	1	1	1	1	0	0	0	0	M	60	Prehistoric
Tuma 10, Varri 47, Sector 4, NJS 278	0	0	1	1	1	1	2			2	2	1	0	0	0	1	U	45	Prehistoric
Tuma 10, Varri 67, Sector 4, NJS 356	0	0			0	1	0									1	F	30	Prehistoric
Tuma 10, Varri 69, Sector 4, NJS 363	1	0	1		1	1	1	1	1				1	0	0	1	F	35	Prehistoric
Tuma 10, Varri 41, Sector 4, NJS 245	0	0	1				2	1					0	0	1	2	M	21	Prehistoric
Tuma 10, Varri 38, Sector 4, NJS 238	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	M?	23	Prehistoric
Tuma 10, Varri 14, Sector 1, NJS 101	0	0			0	1			2		0	1					M?	45	Prehistoric
Tuma 10, Varri 13, Sector 1, NJS 97	0	0					1	2	1							0	U	35	Prehistoric
Tuma 10, Varri 15, Sector 1, NJS 114	0	0								0							U	35	Prehistoric

Tuma 10, Varri 65, Sector 2, NJS 349	0	0											1	0	0	0	U	21	Prehistoric
Tuma 10, Varri 65.1, Sector 2, NJS 349																0	U	45	Prehistoric
Tuma 10, Varri 65.2, Sector 2, NJS 349																	U	25	Prehistoric
Tuma 10, Varri 68, Sector 2, NJS 360	0	1		1	1	1		1	1	1	0	1	1	1	0	1	F?	25	Prehistoric
Tuma 10, Varri 62, Sector 3, NJS 338	0	0	1	1	1	1	1	1	1	1	1	1	2	0	0	0	M	60	Prehistoric
Tuma 10, Varri 62.1, Sector 3, NJS 339	1	0			1	0							1	2	0	0	M	55	Prehistoric
Tuma 10, Varri 11, Sector 1, NJS 79	0	0	1		1	1					1	1				1	M	45	Prehistoric
Tuma 10, Varri 11.1, Sector 1, NJS 79																0	M?	30	Prehistoric
Tuma 10, Varri 12, Sector 4, NJS 76, 86 & 88	0	0														0	U	55	Prehistoric
Tuma 10, Varri 4, Sector 4, NJS 50	0	0		1							0	1					U	28	Prehistoric
Tuma 10, Varri 46, Sector 1, NJS 274	2	0		0	2	1	2	0	1		1	1	2	2	0	1	M	45	Prehistoric

Tuma 10, Varri 60, Sector 2, NJS 330	0	0			1	1	1	0			0	0	1	0	0	0	M	25	Late Bronze
Tuma 10, Varri 63, Sector 3, NJS 343	1	0	1	1	1	1	1	1	1	2	1	2	1	1	2	1	M	25	Prehistoric
Tuma 10, Varri 50, Sector 1, NJS 295	1	1	1	1	1	0	2	2	2	2	1	1	3	2	2	1	F	30	Prehistoric
Tuma 10, Varri 28, Sector 1, NJS 190	1	1	1	1	1	1	1	1	1		1	1	1	2	1	1	M	22	Prehistoric
Tuma 10, Varri 28.1, Sector 1, NJS 190																0	U	35	Prehistoric
Tuma 10, Varri 31, Sector 3, NJS 202	0	1			0	1	0	0			1	0	1	1	0	0	M?	25	Prehistoric
Tuma 10, Varri 34, Sector 3, NJS 219	0	0											0	0	0	0	F?	40	Prehistoric
Tuma 10, Varri 64, Sector 4, NJS 346	0	0	1		1	1		0			1	1	0	1	1	0	M	25	Prehistoric
Tuma 10, Varri 64.2, Sector 4, NJS 345	0	0					1										U	35	Prehistoric
Tuma 10, Varri 56.1, Sector 4, NJS 318	0	0			1	1			2	2	1	1					U	40	Prehistoric
Tuma 10, Varri 26, Sector 1, NJS 187	0	2	2	2	2	2	2	2	2	2	2	1	2	0	0	2	M	50	Prehistoric

Tuma 10, Varri 26.1, Sector 1, NJS 179	0	0					2	1	1	1			0	0	1		U	35	Prehistoric
Tuma 10, Varri 71, Sector 2, NJS 368	2	2	2				2	2		1	1	2	2	2	2	2	M?	60	Prehistoric
Tuma 10, Varri 23, Sector 4, NJS 163	1	0	0		0	1	1	1	0		1	1	2	0	0	0	F	40	Prehistoric
Tuma 10, Varri 24, Sector 4, NJS 168, 164, & 180	0	0	2	2	2	0	2	2	2	3	2	2	2	0	0	0	M	60	Prehistoric
Tuma 10, Varri 51, Sector 1, NJS 302	2	2	2	2	1	0	2	2	1	2	1	2	3	2	3	2	F	52	Prehistoric
Tuma 10, Varri 33, Sector 4, NJS 215	1	0	1	1					1	1	1	0	1	1	0	0	F?	25	Prehistoric
Tuma 10, Varri 58, Sector 3, NJS 325	0	0					2	2		2			2	2	0		U	40	Prehistoric
Tuma 10, Varri 44, Sector 4, NJS 267	2	2	1	1	1	1	1	1	1	1	1	1	1	2	2	1	M	22	Prehistoric
Tuma 10, Varri 29, Sector 4, NJS 195	1	1	2	1	1	1	1	1	1	1	1	1	0	1	1	1	F	22	Prehistoric
Tuma 10, Varri 18, Sector 1, NJS 130	2	2	2	0	1	1	0				2	2	0	0	0	0	U	52	Prehistoric
Tuma 10, Varri 18.1, Sector 1, NJS 131	0	0	1				1	1								1	M?	25	Prehistoric

Tuma 10, Varri 18.2, Sector 1, NJS 130	0	0															U	35	Prehistoric
Tuma 10, Varri 20, Sector 1, NJS 143	0	0					0	1	1		0	1	1	0	0	0	F?	20	Prehistoric
Tuma 10, Varri 8, Sector 2, NJS 70	0	0		1	0	1	2	2		2	2	1	2	2	0	1	M	50	Prehistoric
Tuma 10, Varri 27, Sector 2, NJS 183	0	0	1	1	1	1	2	2								1	U	47	Prehistoric
Tuma 10, Varri 72, Sector 3, NJS 373	0	1	0														U	40	Prehistoric
Tuma 10, Varri 75.1, Sector 3, NJS 385	0	0			0	1					0	1	0	0	0	0	U	35	Prehistoric

APPENDIX D

	Female Young	Male Young	Female Mid	Male Mid	Female Old	Male Old
Lofkënd Shoulder	1		1	1		2
Lofkënd Elbow				1	1	2
Lofkënd Wrist	1			1		4
Lofkënd Hip	1	1		5		3
Lofkënd Knee	2	2		1		1
Lofkënd Ankle		1			1	2
Lofkënd Cervical	3	1		4	1	2
Lofkënd Thoracic	1		1	1		2
Lofkënd Lumbar	2	1		2	1	2
Lofkënd TMJ			2	1	1	3
Corinth Shoulder						1
Corinth Elbow						1
Corinth Wrist	1	1		1		
Corinth Hip	1	1			1	1
Corinth Knee		1				
Corinth Ankle	1	1				1
Corinth Cervical	1		2			1
Corinth Thoracic	2	2			1	1
Corinth Lumbar	1	3			1	1
Corinth TMJ		2	4	5	3	4
Epidamnus Shoulder					1	
Epidamnus Elbow			1		2	
Epidamnus Wrist			3			
Epidamnus Hip			1		2	
Epidamnus Knee			1		1	
Epidamnus Ankle			1		1	
Epidamnus Cervical			1	1	1	
Epidamnus Thoracic			3			
Epidamnus Lumbar			2		1	
Epidamnus TMJ	1		1	1	2	
Precolonial Apollonia Shoulder		1			1	2
Precolonial Apollonia Elbow					1	2
Precolonial Apollonia Wrist						2
Precolonial Apollonia Hip	1				1	4
Precolonial Apollonia Knee	1	1			1	3
Precolonial Apollonia Ankle		1			1	2

Precolonial Apollonia Cervical	1		1	1	1	5
Precolonial Apollonia Thoracic	1	2		1	1	3
Precolonial Apollonia Lumbar	1	2			1	1
Precolonial Apollonia TMJ		1			1	2
Apollonia Shoulder	2		4	2		
Apollonia Elbow			1	1		
Apollonia Wrist				2		
Apollonia Hip			8	4	1	
Apollonia Knee	1		2	2		1
Apollonia Ankle	1		2	4	1	1
Apollonia Cervical	1	3	2	4		
Apollonia Thoracic	2	1	5	2		
Apollonia Lumbar	2	2	4	3	1	
Apollonia TMJ		2	3			
Precolonial Corinth Shoulder						
Precolonial Corinth Elbow				1		
Precolonial Corinth Wrist	1			1		
Precolonial Corinth Hip	1					
Precolonial Corinth Knee				1		
Precolonial Corinth Ankle				1		
Precolonial Corinth Cervical	2		2	1		
Precolonial Corinth Thoracic	2		2	1		
Precolonial Corinth Lumbar	1			1		
Precolonial Corinth TMJ			3	1		