THE BUSY CEMETERIES OF LATE ANTIQUE CORINTH: GEOGRAPHIC IDENTIFICATION OF MIGRANTS VS LOCALS, AND THE CHARACTERIZATION OF A 6TH – 8TH CENTURY CITY

A Dissertation

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ABSTRACT

In late antiquity, a series of historically documented invasions and natural and economic crises can be juxtaposed with increasing archaeological evidence for the strength of Eastern Mediterranean trade connections and the administrative and military hegemony of the Eastern Roman Empire. The abandonment of southern Greece to Slavic invaders, including the city of Corinth in the Peloponnese as attested in historic sources, is also contested by the growing evidence for continuity in land use. These historical and archaeological models of isolation versus economic and political connectivity bear directly on the amount and nature of migration during this time period. Though material culture is often used as a proxy for population movement and interactions, the presence of foreigners can be tested directly using the human skeletal remains from affected cities. In this dissertation, I use bioarchaeology to examine whether foreigners were present in Corinth, Greece and how they were integrated into existing social frameworks from the 6th-8th centuries AD. Anthropological mortuary analysis results in burial groups which contextualize graves within the existing social framework, and skeletal geochemistry discriminates among the skeletons of locals and those born in a variety of locations far from Corinth.

I explore how mortuary behavior reflects social structure in Late Antique Corinth using statistical analyses. Diachronic change in mortuary behavior is shown to be gradual, and coincides with the timing of legislative and administrative changes in the Eastern Roman Empire. Factor analysis results in mortuary groups which reflect shifts in the geographic location of burials and correspond with differences in economic status and other social parameters for the communities using these burial areas. Stable isotopic ratios from human tooth enamel sampled from these groups identify and characterize foreigners within this mortuary landscape.

Stable oxygen ($\delta^{18}O$) and carbon ($\delta^{13}C$) isotopic results display substantial variability. To discriminate among the possible geographic origins of these skeletons, I also analyzed a subset for radiogenic strontium isotopic ratios ($^{87}Sr/^{86}Sr$). Using hierarchical cluster analysis on paired $\delta^{18}O_{CO3}$ and $^{87}Sr/^{86}Sr$, seven clusters characterize the isotopic parameters of this sample. Two to three may represent differences in water source due to local mobility or dietary variability in the local population given the fact that $\delta^{13}C$ shows some diets incorporated a significant source of ^{13}C. Isotopic ratios also show significant migration occurred during this period. The childhood residence of at least three outliers was far from Corinth, and they likely originated in three separate geographic locations. One other group of migrants relatively enriched in ^{18}O may have traveled to Corinth from a single separate source population. Two outliers were interred together in one high status context which was the focus of considerable reuse and commemoration. The remaining migrants were buried in the same manner as local Corinthians, and some were present in high status mortuary contexts in two of the burial areas studied.

These results are consistent with historical formulations of Corinth as an important provincial capital and a target for substantial population movement in late antiquity. However, they are incompatible with population turnover resulting from invasion. Migrants were acculturated into specific communities in this city, implying that integration was likely facilitated through established social organizations. Much of this migration was the result of a prolonged process linking Corinth to some other region, rather than a single, diaspora-like event. The presence of migrants from separate geographic origins, buried within high status contexts in a separate community, also implies that a small number of foreigners may also have been involved Corinth's administration. Thus, the bioarchaeological evidence can be used in tandem with other archaeological material to interpret historical sources and provide a richer understanding of population interactions and the nature of the Late Antique city.

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NOMENCLATURE

Ancient sources cited in the text are abbreviated and reference book, chapter, paragraph, and/or line number as standardized in *The Oxford Classical Dictionary*, 3rd revised edition (Hornblower and Spawforth 2003). These abbreviations are listed here with the publication containing their translation as consulted for this dissertation. Other abbreviations used in this text refer to the compiled excavation notes available at the museum in Ancient Corinth.

NB	Corinth Notebook; excavation notes for the American School of Classical Studies at Athens excavations in Ancient Corinth, referenced by official volume number.
Cod. Iust.	*Codex Iustinianus*. Translation by Watson A. 1998. *The Digest of Justinian*. Philadelphia: University of Pennsylvania Press.
Cod. Theod.	*Codex Theodosianus*. Translation by Pharr C. 1952. *The Theodosian Code and Novels, and the Sirmondian Constitutions*. Princeton: Princeton University Press.
Chron. *Marcell*.	Marcellinus, *Chronicon*. Marcellinus Comes. Translation by Croke B, and Mommsen T. 1995. *The Chronicle of Marcellinus: A translation and commentary (with a reproduction of Mommsen's edition of the text)*. Australian Association for Byzantine Studies.
Dio Chrys. *Or*.	Dio Chrysostomus, *Orationes*. Translation by Cohoon JW. 1971. *Dio Chrysostom*. Cambridge, MA: Harvard University Press.
Hdt.	Herodotus. Translation by Godley AD. 1981. *Herodotus*. Cambridge, MA: Harvard University Press.
Hes. *Op.*	Hesiod, *Opera et Dies*. Translation by Most GW. 2006. *Hesiod*. Cambridge, MA: Harvard University Press.

Hom. *Il.*	Homer, *Iliad*. Translation by Murray AT, revised by Wyatt, WF. 1999. *Iliad*. Cambridge MA: Harvard University Press.
Jord. *Get.*	Jordanes, *Getica*. Translation by Mierow CC. 1960. *The Gothic History of Jordanes in English, with an Introduction and Commentary*. Cambridge: Speculum Historiale.
Joseph. *BJ*	Josephus. *Bellum Judaicum*. Translation by Thackeray H. 1976. *Josephus*. Cambridge, MA: Harvard University Press.
Paus.	Pausanias, *Description of Greece*. Translation by Jones WHS. 1918. *Description of Greece*. Cambridge, MA: Harvard University Press.
Pind. *Ol.*	Pindar, *Olympian Odes*. Translation, edited by Race WH. 1997. *Pindar*. Cambridge, MA: Harvard University Press.
Plin. *HN*	Pliny, *Naturalis historia*. Translation by Rackham H. 1949. *Natural History*. Cambridge, MA: Harvard University Press.
Procop. *Aed.* Procop. *Anecdota*.	Procopius, *De aedificiis*. Procopius, *Anecdota*. Translation by Dewing HB. 1914. *Procopius*. Cambridge, MA: Harvard University Press.
Sid. Apoll. *Carm*.	Sidonius Apollinaris, *Carmina*. Translation by Anderson WB. 1936. *Poems and letters*. Cambridge, MA: Harvard University Press.
Soranus	Soranus of Ephesus, *Gynecology*. Translation and commentary by Temkin O. 1991. *Soranus' Gynecology*. Baltimore: Johns Hopkins University Press.
Strab.	Strabo, *Geography*. Translation by Jones HL. 1917. *Geography*. Cambridge, MA: Harvard University Press.
Suet. *Calig.* Suet. *Iul.* Suet. *Ner.*	Suetonius, *Gaius Caligula*. Suetonius, *Divus Iulius*. Suetonius, *Nero*. Translation by Rolfe JC. 1997. *Suetonius*. Cambridge, MA: Harvard University Press.

Thuc.	Thucydides. *History of the Peloponnesian War*. Translation by Smith CF. 1928. *Thucydides, History of the Peloponnesian War*. Cambridge, MA: Harvard University Press.
Verg. *Aen.*	Vergil, *Aeneid*. Translation by Fairclough HR. 1999. *Virgil*. Cambridge, MA: Harvard University Press.

CHAPTER I

INTRODUCTION

The presence of migrants has been historically underrepresented in ancient archaeological populations. Often, population movement is considered to be untestable, allowing invasions, population replacements, or diffusion to eclipse the relatively every-day movements of individuals. In other cases, the distribution of trade items is taken as evidence for direct interactions between the people in an object's manufacturing area and the people living in the places where that object traveled. The resulting connections, however, rely on a one-to-one relationship between the movement of people and trade. In addition, either perspective fails to examine how potential migrants may have fit within their host societies, implying that the only way population movement can be studied is if it produces radical change in material culture or social structure. In this dissertation, I instead examine how potential nonlocals may have been integrated into the existing social framework at the site of Corinth, Greece in the 6^{th} through 8^{th} centuries AD. As such, I first identify how Late Antique mortuary behavior at this site reflects changes in social structure and community differences to develop a baseline understanding of this society. I then use stable isotopic ratios of carbon, strontium, and oxygen to identify those skeletons with a foreign geographic origin and distinctions in dietary carbon within these societal groups. Through integrating these analyses, the siting of migrants within the cemeteries of Corinth ultimately tests existing archaeological hypotheses regarding population movement during this time period, as well as examining the composition and development of Corinthian communities. In other words, I examine whether these migrants became Corinthians, and what this implies regarding the identity formulations of locals in this city during late antiquity.

This research is part of a growing trend to use isotopic analyses and osteoarchaeology as congruent datasets for the understanding of ancient population histories in the Eastern Mediterranean. Skeletal geochemistry and the osteological identification of sex and age at death for specific skeletons also contribute information on the life histories of individuals – information which can, in turn, be used as evidence in tests of archaeological hypotheses. Though research in this area is beginning to turn towards these methodologies, currently little comparative data is available which would allow the geographic origins of these foreigners to be precisely identified. It is also possible that small-scale mobility and the relative similarities in climate in the Aegean basin may preclude differentiation of migrants. However, Corinth is featured in at least one suggested mass population movement during Late Antiquity, the so-called Slavic Invasion (Charanis, 1950; Curta, 2010b; Davidson and Horváth, 1937; Pallas, 1981; Sanders, 2004; Setton, 1950, 1952). Additionally, the site itself was historically an important trade hub and administrative center where migrants are likely to be found. Therefore, the potential for finding foreigners in the city during this period is high, and a secondary purpose for this dissertation is to test the multi-isotopic approach for discriminating among potential sources for migrants in the Eastern Mediterranean.

1.1 Late Antique Corinth

Ancient Corinth was an important center in the Roman, and later, Byzantine Mediterranean as the capital of the province of Achaia, due in large part to its geographic prominence in maritime trade throughout the region (Athanasoulis and Manolessou, 2013; Brown, 2008, 2010; Finley, 1932; Gregory, 1979, 1993a; Slane and Sanders, 2005). However, during the transition from rule by Rome to the west to Constantinople to the east, the city's prominence was diminished, resulting in largely unexplored social and cultural changes as well as impacts to its political and trade networks.

Using archaeological evidence, scholars have proposed that the slow process of Christianization resulted in gradual change in urban landscapes and ritual traditions (Brown, 2010; Sanders, 2005; Sweetman, 2013), and trade and interaction with the Western Mediterranean dropped when these areas were not under the control of the

Roman Empire (Hammond, 2015; Slane and Sanders, 2005). In addition, imperial administration may have had little input on provincial areas such as Corinth, changing them into relatively insular, self-sufficient societies (Kosso, 2003). On the other hand, historians have traditionally interpreted literary sources for this time period in a way which characterizes late antiquity as being plagued by a number of crises: raids by hostile northerners, the first pandemic in AD 542, and a series of famines (Allen, 1979; Finley, 1932; Gibbon, 1932; Hirschfeld, 2006; Musset, 1975; Sarris, 2002). Usually, these events culminate at Corinth with the "Slavic Invasion" in AD 580, followed by mass migration and resettlement of the area by the invaders in the 7th century (Charanis, 1950, 1952; Davidson, 1952; Davidson and Horváth, 1937; Finley, 1932; Setton, 1950, 1952).

Questions have been raised about this proposed abandonment as a result of recent archaeological research. Archaeological surveys identifying continuous use of the surrounding countryside (Caraher et al., 2006; Kosso, 2003; Pettegrew, 2007, 2010; Tartaron et al., 2006) and a refined ceramic chronology (Sanders, 1999, 2004, 2005; Slane, 1994, 2008; Slane and Sanders, 2005) both extend the time frame during which Corinth shows cultural continuity. The "barbarian" invasions themselves may also have been overstated; while the Herulian invasion resulted in major restructuring in Athens in AD 267 (Frantz et al., 1988), there is little evidence of Herul- or Slav-related destruction in Corinth or further in the Peloponnese (Avramea, 2001; Slane, 1994; Vida and Volling, 2000; Volling, 2001). Archaeological evidence confirms that the area surrounding Corinth was unaffected by the 3rd century Heruls, and appears to support its sustained use throughout the following centuries, even after the so-called Slavic invasion (Brown, 2010; Kardulias et al., 1995; Pettegrew, 2007, 2010; Sanders, 1999; Slane, 1994, 2008; Slane and Sanders, 2005). This unbroken use of the countryside leads to questions about the nature of population interactions and whether they were entirely violent, or whether these populations could have integrated in a manner similar to that documented for Late Antique Italy (Balsdon, 1979; Heather, 1995, 1999; Mathisen, 2006; Pohl, 1997; Sarantis, 2010).

While the rural Corinthia of this time period has been investigated through intensive survey (Caraher et al., 2006; Pettegrew, 2007, 2010; Tartaron et al., 2006), and the contemporary archaeological remains from neighboring Kenchreai and Isthmia have been exposed to recent scrutiny (Gebhard and Gregory, 2015; Rife, 2012; Rife et al., 2007), the Late Antique urban center of Corinth itself remains mainly unexcavated under the modern village of Ancient Corinth (Brown, 2010; Sanders, 2002; 2004, 2005). Archaeological investigations have focused on the earlier city center including the marketplaces, administrative buildings, and monumental temples of the Greek and Roman city. However, after the mid-6th century rebuilding program, this area fell outside the newly constructed city wall (Gregory, 1979; Sanders, 2004). Thus, archaeological remains of these Late Antique residents are mainly restricted to mortuary and skeletal evidence (Brown, 2010; Ivison, 1996; Sanders, 2004, 2005). This research proposes to make use of this evidence in describing the Late Antique population of Corinth, and to test archaeological hypotheses of cultural and demographic discontinuity.

1.2 Bioarchaeology and Isotopic Research in the Mediterranean

This dissertation follows a long tradition of research in osteology and archaeological science at Corinth. The city was one of the original sites included in Angel's (1942) pioneering work on skeletal biology in Greece, and it continues to be used to test emerging methodologies. This contribution is due largely to the long patronage of the site, and its continuing excavation, by the American School of Classical Studies in Athens (ASCSA). Over a hundred years of excavation and research has yielded a broad corpus of material and information regarding the lives of ancient Greeks, and as this material only grows in scope, the questions to which it can be applied expand as well.

The wealth of archaeological information present at the ancient site of Corinth has inspired an increasing number of bioarchaeologists to analyze this dataset in a systematic fashion. Corinthian skeletal samples have been used to examine population demographics (Angel, 1950; Wesolowsky, 1971; 1973), health and trauma (Angel, 1972; Barnes, 2003; Burns, 1982; Fox Leonard, 1997; Rohn et al., 2009), diet (Bourbou et al., 2011, 2013; Bourbou and Garvie-Lok, 2009, 2015; Garvie-Lok, 2001), mobility (Garvie-Lok, 2009; Lê, 2006), and ancestry and social differentiation (Gejvall and Henschen, 1968; McIlvaine et al., 2014; Rohn et al., 2009). My research specifically builds on the osteological analyses of Late Antique skeletal material by Wesolowsky (1971, 1973), Angel (1942; quoted in Weinberg, 1974 and Wiseman, 1969), Burns (1982; quoted in Williams et al., 1974), and Gejvall (quoted in Robinson, 1962; Gejvall and Henschen 1968). I am also able to compare my geochemical results with the oxygen, strontium, and carbon isotopic ratios from 13th century AD Corinthian skeletons (Garvie-Lok, 2001, 2009; Lê, 2006). Additionally, comparative isotopic ratios are available from throughout the Roman Empire and its frontiers, and are a growing focus in the Eastern Mediterranean (Dupras and Schwarcz, 2001; Evans et al., 2012; Keenleyside et al., 2011; Killgrove, 2010; Killgrove and Montgomery, 2016; Leslie, 2012; Mitchell and Millard, 2009; Nafplioti, 2008; 2011; Perry et al., 2008; 2011; Prowse et al., 2007; Richards et al., 2008), which has enhanced the interpretive power of this research.

My dissertation takes advantage of the long history of excavations at Corinth by utilizing much of Late Antique skeletal material and graves excavated by the ASCSA. Although many of the individual excavation seasons or site areas only uncovered small numbers of tombs from this time period, this broad focus resulted in a considerable dataset regarding mortuary behavior. In this dissertation, I first examine the variety in human mobility expected in this sample, both from a theoretical standpoint and based on archaeological and historical evidence from Late Antique Greece (Chapter II). At the end of Chapter II, I develop hypotheses from this evidence which will be tested in this research. In Chapters III through V, I use archaeological evidence to produce an anthropological synthesis of mortuary activity at this site and its social correlates. The resulting mortuary groups and specific mortuary behaviors are then further explored through isotopic analyses. In Chapter VI, I discuss the framework for these geochemical analyses, including the isotopic ratios of carbon, oxygen, and strontium expected based on archaeological hypotheses of population movement. In Chapter VII, I use these ratios to identify and characterize foreigners within the mortuary landscape. Finally, in Chapter VIII I discuss the implications of these data for the history and social organization of the site of Corinth, using the hypotheses posed in Chapter II to characterize the existing ethos towards foreigners in the city, and how their incorporation and likely origins fed into local identity formation and community organization.

CHAPTER II

POPULATION MOVEMENT IN THE LATE ANTIQUE MEDITERRANEAN

The site of ancient Corinth overlooks the isthmus connecting the Peloponnese to mainland Greece. This narrow strip of land, referred to by the ancient author Strabo as the *diolkos* (Strab. 8.2.1, 8.6.4), is all that separates the Western Mediterranean from the Aegean, forming a natural redistribution point for goods from both regions as well as for overland trade (Strab. 8.6.20, 22). By extension, the isthmus is often considered a more flimsy barrier to ancient sea-based trade and travel than the long journey around the Peloponnesian landmass and Cape Malea at its southern tip (Munn, 2003; Strab. 8.6.20; Williams, 1993). Though overland routes from Corinth to other large cities in the Peloponnese do not provide quick or direct links for trade or information, this sea access can help account for the relative importance of the site in antiquity (Sanders and Whitbread, 1990). The ancient harbors of Corinth, Lechaion and Kenchreai, shown in Figure II.1 along with other neighboring sites, retained importance until relatively recently, when a canal connected the Corinthian and Saronic Gulfs. Earlier attempts to bridge this gap were frequent (Paus. 2.1.5; Plin. *HN* 4.5; Strab. 1.3.11; Suet. *Calig.* 21; Suet. *Iul.* 44). During the Classical period, a monumental road spanned the isthmus, enhancing communication from harbor to harbor and providing a market for overland trade where these routes intersected (Austin and Vidal-Naquet, 1977; Munn, 2003; Pettegrew, 2011; Slane and Sanders, 2005; Strab. 8.2.1, 8.6.20). In the Roman period, the Emperor Nero briefly attempted to improve this construction with a canal (Joseph. *BJ* 3.532; Suet. *Ner.* 19). The concentration of commercial facilities such as these established the city as a busy hub for trade which provided access to Italy and the Western Mediterranean from destinations to the east, such as Athens, the Aegean, and on to Asia Minor and the Black Sea (Figure II.2). Even in antiquity, these busy harbors and marketplaces came to be known as “Wealthy Corinth” and the population characterized

Figure II.1. Corinth and neighboring sites near the isthmus.

as correspondingly cosmopolitan (Angel, 1942; Hom. *Il.* 2.570; Pind. *Ol.*; Salmon, 1984; Strab. 8.3.30, 8.6.20, 23).

Strategic geographic placement ensured the city's importance in later periods, and made it a target as well. Even after the Roman general Mummius razed the city in the 2nd century BC (Paus. 2.1.2; 7.16.7-8; Strab. 8.6.23; 10.5.4), control of the isthmus was important enough to imperial concerns that Corinth was re-founded as a Roman colony and populated by Roman freedmen in 44 BC (Engels, 1990; Paus. 2.1.2, 7.16.7-8; Romano, 1993; Strab. 8.6.23, 10.5.4; Williams, 1993; Wiseman, 1979). Increasing demand for grain in the following centuries led to the rapid expansion of storage and dispersal facilities, including those at Corinth, and re-cemented Corinth's ties to eastern

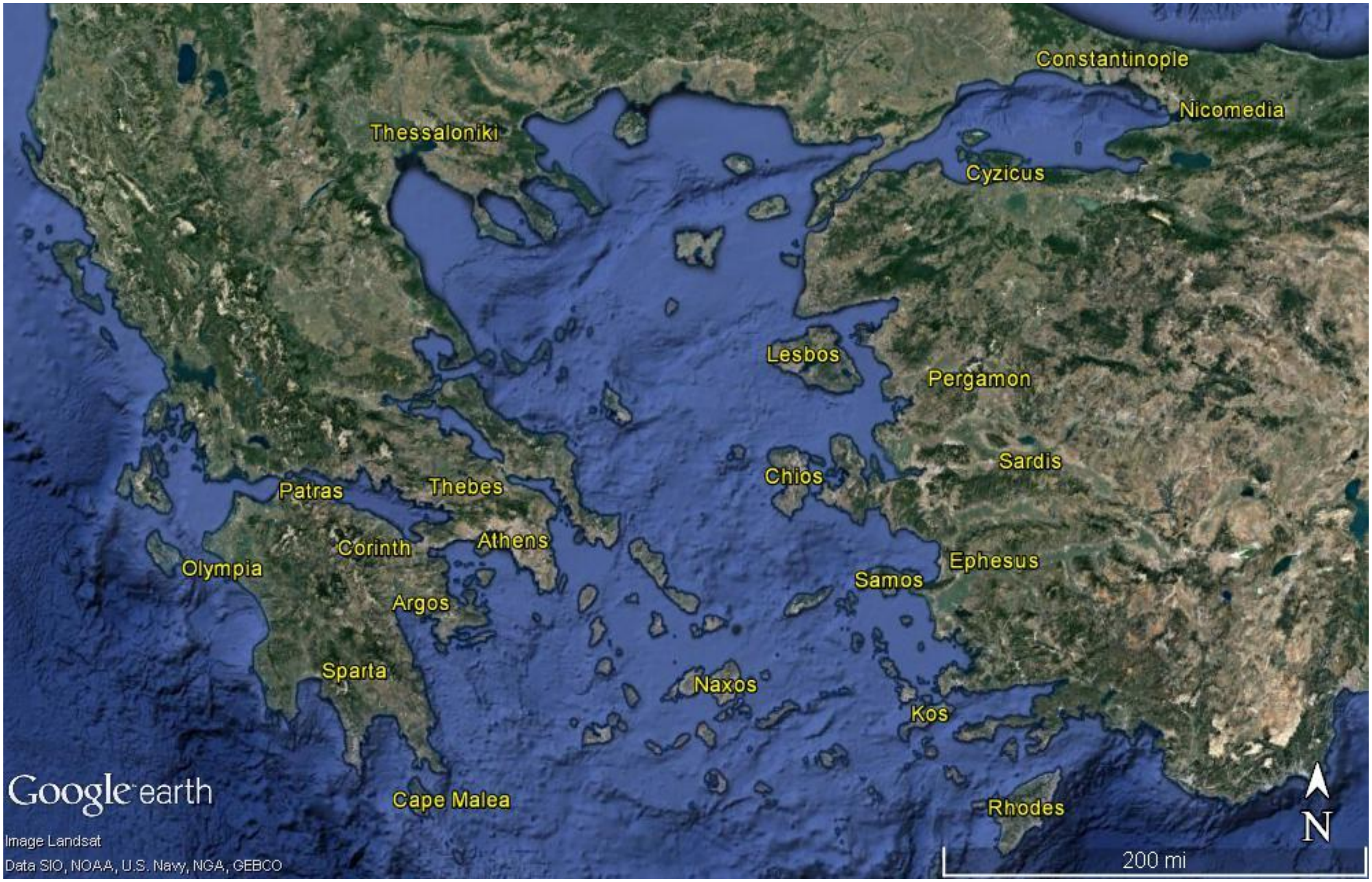

Figure II.2. The Late Antique Aegean showing sites mentioned in text.

Mediterranean trade routes (Williams, 1993). By the Late Roman and Byzantine periods, Corinth again formed an economic and political focal point. This ongoing prominence made Corinth a potential target for population movement despite changes in political regime. Similarly, the importance of connectivity throughout the region has been argued to be an integral result of Mediterranean geography (Horden and Purcell, 2000; Morris, 2003; van Dommelen, 2012).

While the model of interconnectivity helps explain the continued importance of maritime centers such as Corinth into the Byzantine period and the early Middle Ages, it is often assumed that the movement of goods was not accompanied by the movement of people. Traditional views of population interactions in the Roman Empire emphasize the homogeneity of cultural practices and the delineation of hard-won and grudgingly abandoned borders. In Greece, elite culture is thought to show continuity in ideals and behavior from the Classical period (490 BC) forward (Cameron, 1999; Millar, 1969; Rebenich, 2001). With perceptions of Greekness being driven by the Classical past, then, it is not surprising that formulations of Greek identity show little foreign influence. By the Late Antique period, foreign cultures are thought to have had little influence on natives except as a destructive, violent force from waves of invaders which effectively decimated and dispersed local populations, destroying both culture and industry in the process (Charanis, 1970; Finley, 1932; Frantz et al., 1988; Thompson, 1959, 1981).

Under this traditional view of late antiquity, while Corinthian natives would have had limited interaction with foreigners, this wealthy redistribution center would have remained a target for conquering armies as well as a necessary stopping point for north-south and east-west trade. On the other hand, recognition of the porosity of the Roman frontiers (Elton, 1996; Pohl, 1997; Whittaker, 1994; Williams, 1998) and interest in the peoples living outside the Empire's boundaries (Barford, 2001; Barrett et al., 1989; Curta, 2010a; Curta and Kovalev, 2008; Heather, 1999; Luiselli and Pensabene, 1996; Nicolay, 2007) has led to a more nuanced view of the interactions between foreigners and Roman citizens (Ando, 2008; Banaji, 2009; Brown, 1971c; James, 2008; Pohl, 1997). Under this approach, the historical particulars of each purported invasion event need to be examined.

In addition, the archaeological identification of these foreigners is also problematic. In terms of the material culture of everyday items, the identities of these populations would have remained archaeologically almost invisible, but foreigners are typically identified through the presence of specific grave goods with foreign comparanda (Curta, 2010b; Davidson, 1952; Davidson and Horváth, 1937; Robinson, 1976; Slane and Sanders, 2005; Weinberg, 1974). Current trends in anthropological archaeology caution against the use of material culture alone in discussions of cultural identity, with some researchers going so far as to suggest that self-ascribed labels such as ethnicity are not recognizable in the absence of information from ancient sources (Derks and Roymans, 2009a; Hall, 2002). Therefore, the assumption that cultural origin parallels that of imported exotics requires testing.

In this chapter, I examine the theoretical basis for the archaeological identification of migrants at Corinth. First, I discuss variety in human mobility, including the different movement types and motivations for residence changes as identified in the ethnographic literature. Using evidence from archaeology and historical sources, I discuss how these types of migrants can be identified, and the particular applicability of mortuary archaeology and stable isotope geochemistry to this pursuit. Next, I examine the likelihood that these terms, strategies, and motivations can be applied at the ancient site of Corinth, Greece in late antiquity. I argue that, as the Mediterranean has long been identified as a region where connectivity was important, and Corinth is placed at a strategic point in this landscape, this makes it an ideal location to examine human mobility. Finally, I develop a set of hypotheses for the examination of social representations of identity through Late Antique mortuary behavior. Using funerary context, the bioarchaeology of the interred, and chemical characterization of these human skeletal remains as complementary datasets, in this dissertation I propose to test the nature of population interactions at the urban site of Corinth with reference to archaeological and anthropological models of migration and population movement (Anthony, 1990; Bartel, 1995; Burmeister, 2000; Jones, 1997; Rouse, 1986).

2.1 Archaeological Identification of Population Movement

2.1.1 Theorizing migration and mobility in anthropology

Migration theory in the social sciences is largely indebted to "laws" developed in the late 19th century using British census information (Ravenstein, 1885, 1889). Ravenstein (1885) related the direction and volume of population movement to economic factors, wherein people tended to move towards towns or regions with high industrial activity and employment availability. The majority of these relocations covered a relatively short distance, so that areas attractive to migrants drew them from neighboring regions. In the emigration area, the vacuum created by these movements would then attract migrants from still further away (Ravenstein, 1885).

These findings, however, were constrained by the information available through the UK census – namely, these include place of birth and place of residence at the time of census taking, and the description of regions based on the artificial boundaries introduced by counties and nations. As a result, such studies were not equipped to address many issues important to the migration process, such as permanence or longevity of migratory movements to the same area. Post-migration decisions, including the choice to return to the emigration society after the census event, or the decision of subsequent generations to leave the area, likewise were not available. Later modifications of Ravenstein's laws, while building on the limitations of census data with ethnography, continued to rely heavily on economic motivations for migration in the establishment of long-lasting migration streams, and cemented the use of such terminology as push-pull factors in migration models (Grigg, 1977; Lee, 1966).

Similar economic or labor models of population movement also stress the importance of national or regional factors in providing the impetus for migrations, rather than expressing them as the result of the decisions of individuals. Rationale for specific relocations may include many factors, and personal relationships may be as important to possible migrants as economic incentives (Mabogunje, 1970). Even when economic advancement is the primary consideration, entire families do not necessarily relocate together, resulting in temporary residence patterns where the individuals who do move are expected to augment the welfare of those family members who stay behind (Massey, 1988; Massey et al., 1993). In this way, these labor migrations diversify family income and minimize the risk inherent in dependency on only one main income stream. Family units often decide as a group who takes advantage of these wage labor opportunities and when they migrate (Gonzalez, 1961; Kok, 2010; Lim, 1992).

Community or family connections can, therefore, result in so-called sojourners (Brettell, 2008; Gmelch, 1980; Gonzalez, 1961) or recurrent migrants (Margolis, 1995). Sojourners are usually defined as an isolated migrant, often a young, unmarried man, who engages in a succession of migration events, changing employment each time and returning to the sending society in between. These migrants are likely to send remittances to their family who remained in their place of origin even if they do not themselves return, providing one way in which modern kin groups diversify risks and maintain connections between the migrant and their place of origin (Cohen, 2011; Lim, 1992; Massey et al., 1993). Therefore, modern ethnographic research has long recognized how family connections have a predictable impact on the demographic structure and longevity of economically motivated population movements (Gonzalez, 1961; Mabogunje, 1970; Portes and Böröcz, 1989).

While it is possible that the cumulative result of the vast majority of these small kinship-oriented relocations will result in a macro-level distribution which appears to follow only economic rationale (Hendrix, 1975), labor migrations will also result in connections between host and sending communities. This contact, possibly especially when the distance separating migrants from their place of origin is short, the number of initial migrants is low, and the overall population mobility is high, often leads to further migration efforts (Anthony, 1990; Brettell, 2002; Burmeister, 2000; Calvo et al., 2011;

Kearney, 1995; Vertovec, 2001). Purely economic considerations do not account for how migrations change in composition and strength over time – these factors are instead integrally connected to the links between migrants and their homelands. In other words, once population movements become an established "stream", the migration process does not end even when economic incentives are no longer available to migrants (MacDonald and MacDonald, 1964; Massey et al., 1993; Massey and España, 1987).

Connections and the migration efforts themselves become intertwined with time, creating networks incorporating kin and non-kin into a self-perpetuating migration network which gains momentum over time (Brettell, 2008; Fawcett, 1989; Kritz et al., 1992; Massey, 1988; Massey et al., 1993; Sanjek, 2003). As cultural affinity strengthens shared economic and political ties, population movement increases proportionally and in turn provides links by which shared characteristics become even more similar (Fawcett, 1989; Gurak and Caces, 1992). Such so-called cumulative causation obscures the often weak initial associations between societies linked through the migration process, associations which are themselves often the result of historical accidents, such as colonization efforts, trading interests, or political alliances (Kritz et al., 1992; Massey, 1988; Massey and España, 1987). Interactions between the emigration and immigration area also creates a variety of motivations for new types of recurrent migrants (Margolis, 1995).

Increasingly regular migratory movement results in a kind of transnational community, where the migrants themselves become a conduit for information and material objects (Kearney, 1995; Vertovec, 2001). Furthermore, the information and assistance these migrants can provide to other potential migrants creates a feedback mechanism which binds the two societies closer over time, and develops channels for migration which tend to endure regardless of economic or social incentives (Brettell, 2002; Gurak and Caces, 1992). Assistance may take the form of transportation, information on accommodations or employment, or even job opportunities for migrants (Massey and España, 1987). In this way, the development of social networks makes migration self-perpetuating and open to a wider segment of the population within the sending community, creating what is known as chain migrations (Anthony, 1990; Massey et al., 1993; Massey and España, 1987). Migration flows, therefore, alter over time, and have distinct demographic and social repercussions on sending and receiving countries.

Recent ethnographic work has continued to explore the particular context of individual decisions to migrate, or to return to the country of origin, as well as the overall migration process. While both temporary relocations and more permanent migrations establish connections between a migrant's community in their destination country and their sending community (Foner, 2003; Horevitz, 2009), these mobility types usually differ in the strength of the link between societies and in the resulting transformation in each society from the migration process (Brettell, 2008). The length of time a migrant identifies with their country of origin is one result of this connection as is the ability of any one immigrant to assimilate (Brettell, 2008; Esser, 2004; Horevitz, 2009; Levitt et al., 2003).

Diaspora studies and approaches to population movement are particularly interested in how displacement of large groups of people from their homeland can result in transnational identities and localization strategies (Brettell, 2006; Cohen, 2001; Levitt et al., 2003). Diaspora communities usually are unable to return to their place of origin, and the resulting separation causes these exiles to creatively engage with their connection to the sending society in the creation of self-identities (Brubaker, 2005; Clifford, 1994). The particular level of openness of the immigration area to newcomers will also impact the creation or maintenance of social groups within the migrant community. Thus, recent anthropological research focuses on the environmental and cultural context of individual migration systems, especially the consequences of migration or so-called post-migration studies (Brettell, 2008; 2009; Burmeister, 2000; Foner, 2007; Vertovec, 2007).

The migration process is, therefore, dictated by socioeconomic factors existing in both the immigration and emigration areas, as well as the social context in which migrants or potential migrants live. If mobility is visualized as a multi-generational process, than the migration strategies of individuals or households will contribute to the characterization of individual waves of population movement. The presence of sojourners, especially young men, or recurrent migrants may lead to a migration stream later used by entire families. Alternatively, diasporas may result in a high demand for objects from these migrants' place of origin even though population movement between the immigration and emigration area was restricted to one event. Between waves, migrants may choose to settle permanently, return to the emigration area, or to continue moving. This dynamic situation results in networks uniting migrants and their place of origin in further migration decisions. As population movement progresses over the course of generations, the information gained during earlier migrations enables more nuanced decisions regarding migration routes and places in which settlers are welcome. Therefore, early migrations commonly target population centers with established families or migrant communities, though the process can involve the later settlement of surrounding, lesser known areas (Brettell, 2000). Understanding the contexts for and sites of migration and immigrant incorporation are therefore central to research on population movement.

2.1.1.1 Contexts for migration

Population movements can have very different social outcomes depending on the particular cities being targeted. At the same time as urban geography alters from the development of immigrant neighborhoods or changes due to the increase in population density, the integration of these migrants depends on the length of time a city has dealt with foreigners, and the existing urban ethos towards them (Brettell, 2000, 2003; Foner, 2007; Smith, 1975). The importance of the social context for immigration within its urban setting was first stressed by Tilly and Brown (1967) who identified the variety of personal relations common in cities. Soon after arriving in a new urban environment, settlers created relationships to expand their existing network beyond that of the people they left behind. This observation directly opposed the prevailing wisdom that all migrants were maladjusted and isolated within the immigration society and therefore a source of strife and social disorganization (Park, 1928).

The nature and outcome of these new relationships, on the other hand, will determine the degree to which new migrants assimilate within the dominant social organization. Foner (2007; Foner et al., 2014) builds on the use of individual cities as important contexts for integration by examining what features multicultural cities tend to share. She identifies that most cosmopolitan societies are the unique result of their own history of immigration and the development of institutions devoted to upholding diversity, indicating that while the process of migration may be global, localized aspects of population movement need to be examined in light of the economic, political, and social context in which they occur. Archaeological models of migration, therefore, are dependent on the correct characterization of how much migration activity was present at individual sites. The identification of these migrants is complicated by the particular way individual societies ascribed status to foreigners and the resulting adoption of new social identities within immigrant communities, however, so that migration research is intrinsically tied to the construction and maintenance of self-identities such as ethnicity.

2.1.1.2 Acculturation and identity formation

Ethnicities often develop as a result of population movement, especially when migrants are exposed to social inequality and differential access to resources (Barth, 1969; Burmeister, 2000; Cohen, 1974; Epstein, 1978; Phinney, 2003). As social contexts continue to change because of sustained migration, so would these identities, often including formulations of shared or fictive descent and geographic origin (Barth, 1969; Jones, 1997). Changes in the migration process will also result in identity renegotiations, with membership fluctuating to variously incorporate those individuals with shared traditions and language, or other social groups who are affected by similar policies of marginalization in the changing political climate (Derks and Roymans, 2009a). Much as migrant networks connecting transnational communities can act to insulate immigrants against harsh conditions in their new home, they can simultaneously result in isolation

(Gurak and Caces, 1992). Connections to places of origin can therefore both be an adaptive mechanism as well as preventative of assimilation. Perhaps especially when assimilation is not an option for displaced groups who are also unable to return to their homeland, a sense of connection with a past home may be cultivated or maintained, deliberately fostering cohesion within an ethnic community and distancing them from the rest of society (Clifford, 1994). These discourses of identity in diaspora communities made up of exiles, refugees, slaves, or former slaves particularly emphasize how individuals from disparate origins may connect with each other through inventing or reviving an affinity with a projected common homeland (Brettell, 2006; Cohen, 2001; Horevitz, 2009; Webster, 2010).

On the other hand, acculturation with the dominant social group often enhances access to the benefits of citizenship (Hagemajer Allen, 2003; Sanjek, 2003; Vertovec, 2011). As such, a distancing self-identity may be demonstrated selectively, such as in domestic situations rather than in public (Burmeister, 2000). Ethnicity is, therefore, best conceptualized as a changeable identity, often one of many identities present in a multicultural environment, and consisting of an amalgam of under-represented social groups which may change or disappear over time (Burmeister, 2000; Eriksen, 2007; Foner, 2014; Gans, 2013; Hall, 2002; Jones, 1997).

Ethnic identity forms an important component to the recent history of complex societies, and research on ethnicity has proliferated, from examining its origins, to policy suggestions, and health impacts (Bulmer and Solomos, 1999; Chun et al., 2003; Ekstrand, 1986; Lem and Barber, 2010; Vertovec, 2007). Recent research has even called for a broader and more historical view of the immigration process, including the consequences of migration, in order to develop systematic models of immigrant incorporation (Brettell, 2009; Vertovec, 2007). Changing constructs of self-identity, impacted by contact between culture groups and power differentials among them, are a subject of fruitful investigation in archaeological societies as well, and an important component for understanding the existing political networks in the modern world (Chapman and Hamerow, 1997; Kahn, 2013; Lucassen et al., 2010; Rouse, 1986).

Unfortunately, due to the likelihood that ethnicity would be one of many identities expressed through material culture, this process remains difficult to examine in archaeological contexts (Anthony, 1990; Burmeister, 2000; Chapman and Hamerow, 1997; Jones, 1997; Theuws, 2009). It is often possible, however, to identify migrants using geochemical analyses and to use these individuals to test archaeological hypotheses regarding the use of specific objects as markers of ethnic identity due to their association with a particular geographic provenience.

2.1.1.3 Archaeological models of population movement and identity

Early theoretical attitudes to archaeological migration had their origin in the cultural historical approach. The movements of peoples were the predominant source of change, innovations were of foreign origin, and archaeological cultures could be traced through the diffusion of artifacts. In the light of this theoretical viewpoint, migration was an important factor in any scenario modeling the breakdown of the Roman Empire and its cultural hegemony in Europe (Bury, 2009; Gibbon, 1932; Jones, 1997). One of the most enduring of these narratives features vast migratory waves originating in the steppes of Asia and sweeping over the Roman Empire. Musset (1975) portrayed this almost as a re-equilibration, where stability in the region disintegrated along with the Roman military and administration. This cultural stability was unprecedented, as was the capacity of the Empire to hold back the "barbarians," here used in the original Greek and Roman sense of the word to indicate that these people originated outside the boundaries of the Empire and did not speak the language (specifically, Greek). The normal state of the world is, instead, one of flux and migration. Using this premise as a starting point, Musset attempted a synthesis of linguistic, historical, and archaeological data to determine discrete boundaries for culture groups, defining their movements and influence on post-Roman society at a regional scale in the Western Roman Empire.

On the other hand, this treatment of the data presupposes that the individuals joined together in "barbarian" confederations were united through a common identity and ethnicity, rather than being a composite of autonomous social groups drawn together for common gain. Growing theoretical focus on the internal mechanisms of societies, and the decisions of individuals rather than collectives or corporate groups, led to the abandonment of migration-based hypotheses as being untestable and of little interest (Adams et al., 1978; Binford, 1968; Lewis, 1982). Subsequent research equated migrations with population replacement, allowing little room for acculturation, and suggested that migrations which accompanied technological revolutions or invasions may have advanced gradually. Such population movements may have spanned a large cumulative distance through means of relatively short movements each generation, in a so-called "wave of advance" which seemed to be supported by the distribution of genetic alleles in modern descendants (Ammerman and Cavalli-Sforza, 1973, 1984). By extending the framework to focus on long-term results rather than relatively quick relocations, this model was one of the first to suggest a migratory process rather than a migratory event.

Even the wave of advance model presents population movement without regard for the choices of individuals, however, or the factors that would influence a migrant's children to return to their parents' place of origin rather than to stay in an area or continue chasing economic opportunities in still more advanced regions. Furthermore, this model continued to portray mobility as being relatively rare and focused on problems, such as how the agricultural revolution proceeded, rather than examining more commonplace movements. This perception, in turn, was founded in the suggestion that the amount of mobility present in the modern era is the singular result of ease of transportation and human population density (Ravenstein, 1885; Zelinsky, 1971).

On the other hand, as more excavations discovered further evidence of the cultural history of large areas of the world, the chronological and spatial impact of individual sites expanded as well. In this growing corpus of archaeological material Binford (1968) saw the death of migrationism, wherein distinct artifact complexes were used to represent populations. Instead of this cultural historical approach, artifact complexes transition gradually into one another, resulting in the disappearance of breaks and hiatuses between occupations. While Binford used this wealth of archaeological data to focus on how change occurs within societies as a result of the adaptive context of cultural behaviors, he downplayed the impact on the material record of how societies and individuals interact in favor of this local, internal focus. The processual approach, while admitting that population movements happened, discounted their impact on culture change and instead identified adaptive strategies as the primary rationale for the development of local styles and the adoption of foreign technologies (Binford, 1968). Diffusion was usually modeled as a result of whether the adoption of traits or the trade of foreign objects were useful, and the population interactions which enable their distribution was not prioritized due to a lack of theoretical framework in which to test them (Adams et al., 1978).

Growing interest in situating these changes within a more regional framework led to the adoption of political and economic models such as Wallerstein's world systems perspective (Wallerstein, 1979). When historians and prehistorians attempted to extend the world system into the past, they were often frustrated by the inability of concepts formulated for the modern world to fit the realities of pre-industrial or pre-capitalist life (Woolf, 1990), and adaptations of modern economic criteria to ancient political systems found varying degrees of success (Champion, 1995a; Hall et al., 2011; Rowlands et al., 1987; Schortman and Urban, 1992; Sinopoli, 1994). On the other hand, these approaches emphasize the importance of material and social links between past societies, and enable regional comparisons and the exploration of the relative importance of competing connections between societies. This growing focus on the process and results of interconnectivity involves the consideration of multiple lines of evidence for interactions between societies and their strength including trade, political affiliations, and population movements (Horden and Purcell, 2000; Morris, 2003; van Dommelen, 2012).

Horden and Purcell's (2000) book, emphasizing the connectivity present in the Mediterranean throughout the history of human occupation, has been interpreted as a sign of an overarching "paradigm shift" (Morris, 2003) in interpretations of ancient trade, economy, and population interactions. Rather than requiring foreign objects to be present in order to physically demonstrate connections between geographically separated destinations, mobility is now taken as a given (Morris, 2003; van Dommelen, 2012). Evidence regarding the intensity of connections is evaluated with the understanding that much of the nature of these interactions must be extrapolated and inferred from the incompletely preserved remnants of ancient literary sources and material cultures.

For example, interactions among micro-regions, especially through sea-based trade, has been identified as one of the main factors in early state formation in the region as ready access to the sea permitted the availability of widely distributed resources (Earle, 2011; Horden and Purcell, 2000; Johnson and Earle, 1987; Polanyi, 1957; Schortman and Urban, 2012). Increasing interdependence among population centers would likely have cemented these early trade routes, promoting the importance of port cities on the mainland as these central hubs provided marketplaces for the exchange of regional goods (Horden and Purcell, 2000; Polanyi, 1957). During the Greek colonization efforts of the Iron Age, especially in the 8^{th} century BC and during the later Roman imperial period, these exchanges culminated in the expansion of large urban centers to the point that they needed to import grain to feed their population (Reed, 1984, 2003; Rickman, 1980).

However, evidence of contact between areas is difficult to establish when relying on trade goods alone (Graham, 1990). Initial interactions, such as what must have existed prior to colony foundation, may not be distinguishable from local import trends or may be otherwise archaeologically invisible (Boardman, 1980). While connections are, therefore, usually traced archaeologically through material culture thought to represent the end result of interactions, these objects should not be used as a proxy for the contact itself.

The amount of contact between peoples in the historical Mediterranean region and its consequences, much as in any archaeological discussions of the relative importance of population movement compared to innovation, thus remains a contentious topic. Early formulations tracing all culture change to a single originating society from where all architectural and stylistic innovations are spread (Bernal, 1987) are as one-sided as the contention that ancient societies should each be viewed as insular bodies, resistant to outsiders and in limited contact with foreign objects or ideas (Binford, 1968). Instead, a growing realization exists in recent work, not only of how poorly mobility may be represented in either archaeological or historical evidence, but also of the degree to which relatively localized movements of individuals may create an interlocking series of networks of influence, regardless of overarching cultural or political affiliations (Horden and Purcell, 2000; Morris, 2003). Horden and Purcell's (2000) formulation of interconnectivity as a model in particular stresses the importance of these small-scale interactions as a result of Mediterranean geography and access to the sea.

Archaeological analysis of migration from this perspective takes the basic mobility of humans as a given and focuses on identifying intensities in links between societies, how differences in these interactions would have motivated different kinds of population movement, and what result these types of movement would have had on identity formation and status negotiation (Morris, 2003; van Dommelen, 2012). Using ethnographic analogs, archaeologists examine the demographic and social impacts of migration on material culture (Anthony, 1990, 1992; Burmeister, 2000). The resulting hypotheses use proposed markers of self-identity, especially ethnicity, to test the scale of mobility and how foreigners might integrate into a wider society, while previous models focused primarily on discriminating among overall material culture complexes (Rouse, 1986). In documenting change without situating the meaning of objects within societies, these earlier hypotheses did not fully differentiate between diffusion, where transmission occurred through contact but not population movement, or acculturation, where foreign cultural elements gradually became incorporated into native material complexes as a result of personal contact (Rouse, 1986).

As incorporation of particular objects was dependent on their meaning to both the sending and receiving societies, determining whether these objects formed an outward expression of identity, and which identity they expressed, is central to archaeological migration studies. On the other hand, not all ancient historians agree that archaeology is equipped to discuss ethnic identity (Hall, 1997, 2002; Malkin, 2001b; Strobel, 2009; Whittaker, 2009). While many see material culture as an expression of the lifestyle which is a part of a group identity (Jones, 1997; Morgan, 2009), other researchers point out that ethnicity, gender and occupation are all facets of identity that might be reflected in material culture (Insoll, 2007; Theuws, 2009).

The hypotheses generated by archaeological migration models and the archaeological identification of ethnicity (Chapman and Hamerow, 1997; Hu, 2013; Jones, 1997; Meskell, 2007; Spencer-Wood, 2010) has only recently begun to be explored in mortuary settings (Buzon, 2006; Carroll, 2013; Eckardt et al., 2009; Nado et al., 2012; Potter and Perry, 2011; Stone, 2003; Sulosky Weaver, 2013; Zakrzewski, 2011). Archaeological identification of ethnic groups must also contend with multiple artifact identities as the material culture of migrants in urban contexts is rarely identical to that of their originating culture group (Burmeister, 2000; Chapman and Hamerow, 1997; Hu, 2013; Jones, 1997; Lucassen et al., 2010; Ross, 2012; Spencer-Wood, 2010). Discrimination among the many possible artifact identities or reasons for their inclusion in the material record is enhanced through use of multiple lines of evidence.

2.1.2 Analytical approaches to mobility studies

2.1.2.1 Literary sources

Though hypotheses developed from the connectivity perspective and from modern anthropological analogy and migration theory have both proved to be useful model-bound approaches in the interpretation of archaeological remains, literary sources can also be used as an independent line of evidence. Although most natural materials do not readily preserve in the archaeological record, and social organizations must be reconstructed from among post-depositional effects, historic documents often describe the movement and production of perishable goods or may provide the dates and particulars of power transitions. Other than providing evidence for lifeways in antiquity, literary sources are also an important tool in interpreting the material remains of past societies as they provide a snapshot into the actual cultural norms, religious beliefs, and ethical values reflected by the archaeological record.

In fact, the ability of researchers to access which facet of identity is being represented by the behavior preserved by the material record has been argued to be dependent on the availability of these sources (Derks and Roymans, 2009a; Hall, 2002). However, literary sources should not be considered to be universally applicable, as they were composed by individuals with specific agendas in reference to the very specific place and time in which they lived. Additionally, literacy would most likely have been restricted by class (Bowman and Woolf, 1994; Harris, 1989; Humphrey, 1991; Potter, 1999; Rebenich, 2001), and literary works would best reflect the social roles and responsibility most acceptable to members of the aristocracy. In the Roman Empire, elite rhetoric and literary devises display the author's privileged position in society through access to the existing literary culture and education (*paideia*) (Goldhill, 2001; Miles, 1999; Millar, 1969; Rebenich, 2001).

Even when referencing contemporary events, terminology may have been used in the interest of making a rhetorical point rather than to accurately express reality (Hansen, 1997). By the Byzantine period, a number of such terms were commonly used to refer to foreigners, all of which denoted a degree of prejudice against a perceived "quintessential cultural otherness" (Ahrweiler, 1998: 11). Key words, including barbarian (*barbarous*), nomads (Scythians or *Skenoi*), and infidel, combined distinct groups together despite their common use in the modern literature to denote specific cultures. The word *ethnikos* was perhaps the most general term applied to those foreign to the Eastern Roman people and state (Ahrweiler, 1998). Barbarian, on the other hand, could be used simply to refer to a non-Byzantine citizen/non-Greek speaker (though both referred to themselves at this time as Roman), or to an uncivilized person within the bounds of the Empire, and therefore denoted more of a stigma. The social context of writings using these terms needs to be considered, wherein chosen stories and rhetoric were applied because they were particularly applicable to a specific audience.

Similarly, even historic documents which discuss trade may only mention or boast of high-level involvement in the church or the state economy (Kingsley and Decker, 2001). Common Late Antique sources include imperial biographers and military historians such as Ammianus Marcellinus and Procopius, who provide information regarding imperial administration and its enemies (Cameron and Conrad, 1992; Kaldellis, 2004). Few sources exist for the political history of this period, especially from the 7th – 9th centuries AD (Cameron, 1994; Whitby, 1992). Those which do exist portray historical events from individualized points of view, often with political agendas, and should not be considered as having the same view of historiography as do modern historians (Cameron and Conrad, 1992; Jord. *Get*.; Rebenich, 2001). Formal shaping of historical accounts was a common result of rhetorical training and the desire to contextualize contemporary events within the Classical past (Rebenich, 2001). As elite education emphasized these connections, the Classical framework of prejudice and privilege needs to be addressed when interpreting these literary sources.

Other sources are ecclesiastical, and discuss religious issues and dogma. Among them survived letters collected by bishops, some composed of lofty advice to emperors, and some detailing missionary work or religious pilgrimages which have more detailed information on the provinces and the people living there (Galatariotou, 1993; Henry, 1967; Mango, 2009b; Neil and Allen, 2015). Corinth itself provided a center for the Christian community, at first through pilgrimages to visit the site of the apostle Paul's incarceration, and later expanding to allow Corinth its own bishopric (Brown, 2010; Gregory, 1993a; Rothaus, 2000; Schowalter and Friesen, 2005). Ecclesiastical administrators were often assigned to particular bishoprics such as Corinth, rather than chosen from local church leaders, though they and pilgrims both were often present only temporarily. These administrators may also have functionally overlapped with imperial officials in supplying the provinces and provisioning troops (Monks, 1953; Van Doorninck, 2015).

Thus, though many church documents reference trade, social mores, or dealings with the peoples outside the empire's boundaries, all are written from the perspective of an elevated social stratum in society, where mobility is the result of wealth rather than an economic necessity (Cameron and Conrad, 1992). For example, letters reference luxury trade items only, either to boast of their accrual or to thank the sender for their generosity (Mango, 2009b). More unbiased information may be gleaned from inscriptions including grave epithets, contemporary tax records, and legislation, especially the codices compiled and published by Theodosius in AD 438 and Justinian in the following century (Harries and Wood, 1993; Mathisen, 2001; Matthews, 2000). Other literary sources, though arguably the most direct reflections of way of life, need to be evaluated in light of their time of origin, the agenda pursued in their writing, and the individual author who often provides an elite or similarly privileged initial lens through which historical event are interpreted.

For example, the Chronicle of Monemvasia is the main source of evidence regarding the presence of Slavic invaders and their settlements in the Peloponnese (Charanis, 1950; Curta, 2010b). All of the four existing versions detail a 6th century invasion event which resulted in the extermination or dispersal of the native population, including the inhabitants of the city of Corinth. However, the veracity of the document is itself questionable. The Iberikon account, which Charanis (1950) considered to be the most trustworthy version, was itself written in the 10th century AD, centuries after the events it purports to relate, and is based on documents now lost or which cannot be verified. Moreover, its thematic organization and use of established literary formula appears to be an allusion to classic works and the myths and fables important to the literate elite (Anagnostakis and Kaldellis, 2014).

Not only is there a growing rift between the events suggested by this document and the steadily increasing archaeological evidence for the period (Avramea, 1997; Curta, 2010b; Kosso, 2003; Kountoura-Galake, 2001), or linguistic evidence for the movement of Slavic-speaking peoples (Barford, 2001; Hammond, 1976; Kaldellis, 2007), the document itself can be read as a fairly straightforward update of an early Roman work by the author Pausanias and a political justification of the actions taken by the Byzantine Emperor Nikephoros I (Anagnostakis and Kaldellis, 2014). Grim accounts of provincial life depicting invasions or abandoned land were consistently used as rhetorical devises designed to blame current emperors or previous regimes for taxation or military policies (Kosso, 2003). At best, the events reflected should therefore be interpreted as though they were recast into a framework that best suited the literary aspirations and rhetoric of the author, rather than as historic fact.

2.1.2.2 Archaeology

While ancient source material often expresses the identities and interests of their elite authors, supplementary information regarding non-elite identity or the biases in the existing version of historical events can therefore be sought from archaeology. Survey data is a useful component to any discussion of land use or abandonment in the face of invasion (Gregory, 2010; Kosso, 2003). Similarly, exotic objects found in the course of survey or excavation are valuable evidence of the degree and nature of contact among population centers when artifact provenience can be established. On the other hand, their presence may not automatically indicate that people of foreign origin were present along with these items, and if they were, they may not have originated in the same place. These objects may be integrated into the material record of a site as a result of economic activity, gifting or raiding, or through population movement.

However, trade in exotics remains a common archaeological correlate of direct population interaction. As far back as the Iron Age, foreign produced objects are present in the heroön at Lefkandi on the Greek island of Euboea, suggesting that some sort of connection was present between far-flung regions even at this early date (Morris, 2000). Finely made table ceramics (finewares) and metalwork as well as coins from foreign mints and the presence of coarsely-made ceramics (coarsewares), especially transport and storage vessels such as amphorae, are all commonly used archaeological correlates of trade connections between regions (Wilson, 2009). Unfortunately, presence of aesthetic objects alone may be more of an indication of style and status than political affiliation, and many resources that would have been heavily traded, and therefore have indicated more influential connections, are poorly preserved except through the vessels used in their transport.

Textual sources indicate that the majority of goods being traded were consumables (Wilson, 2009). Unfortunately, information itemizing nonluxury trade is lacking for late antiquity and generally not specific to the northeastern Peloponnese (Lambropoulou et al., 2001; Mango, 2009b). Common imports to Corinth during the earlier, Classical period included grain, wood for shipbuilding, metals, wine, fish, and stone for building projects (Munn, 2003; Pettegrew, 2011). Of these materials, stone is often present in the archaeological record, as are the containers for the wine and fish, but large transports of stone are mostly restricted to the earlier Roman period (Parker, 1992b; Wilson, 2009; but see Kahanov and Mor, 2014). This would indicate that interest in fineware stems from their use as yet another line of evidence into ancient life –that of their decoration and the possible figural depiction of recognizable daily activities– and their appeal as art objects for display. Therefore, their ubiquitous presence in museums, out of proportion to their relative inclusion in the archaeological record, may distort modern perceptions of ancient trade and connectivity to indicate that aristocrats would have been heavily involved in trade in order to supply themselves with imported objects. Reed's (2003) review of ancient source material demonstrates, instead, that the first traders were forced into that profession due to poverty.

This preservation bias has resulted in the compelling argument that, among ceramics, storage vessels such as amphorae best indicate the strength of trade connections as these vessels are present in the archaeological record as a result of the perishable goods they contained (Karagiorgou, 2009; Munn, 2003). In other words, if a particular amphora can be tied exclusively to the distribution of a single product from one geographical source, than the quantification of this amphora in the archaeological record at sites throughout the Mediterranean forms a proxy for the amount of trade linking these sites. However, this evaluation of the economy of perishables is complicated by reuse of these transport vessels (Bass and Van Doorninck, 1982; Leidwanger, 2007; Leidwanger et al., 2015; van Alfen, 1996).

On the other hand, the establishment of shipping routes through the state-regulated transport of basic staples could also have led to the development of consumer driven markets for luxuries and semi-luxuries (Kingsley and Decker, 2001; Mango, 2009b). Regular demand for consumables, or directed trade, would also have resulted in the establishment of recurrent or permanent markets for foreign goods in ancient trade cities. If only the state-run dimension of this import economy is to be believed, empty cargo holds or cargoes predominated by empty transport vessels would have regularly taken these routes from the marketplace back to the production center (cf., Kingsley, 2003). However, directed trade such as this would be more likely to be paired with reciprocal trade (cf., Munn, 2003). Alternatively, these ships may transported a variety of resources back along the coast in a series of shorter voyages, or cabotage, while making their way back to their home port during the off-season. In this way, merchants or ship-owners could have maintained their profession year round, and provided multiple economic functions within the Eastern Mediterranean.

In addition, amphorae cargoes did not completely fill the hold of a ship, enabling smaller items, such as finewares, metal objects, or textiles or similar organic goods to be packed among transport ceramics. Mango (2001, 2009b) suggests that these smaller items may have provided the real impetus for free-market exchange, rather than bulk foodstuffs, thanks to the higher prices per volume for cargoes of luxury items. The archaeological presence of signs of this trade would be made more likely through the repeated or return voyages of the merchants who enable the presence of these delicacies in the first place, though admittedly many resources traded across the Mediterranean would have been consumed without preserving evidence in the material record.

Shipwreck distributions along these routes may provide a separate line of evidence for these repeated trade routes, as pioneered by Parker (1990, 1992a, b, 2008). Unfortunately, the known shipwrecks are biased towards those whose cargo included nonperishable materials and which are present in portions of the Mediterranean with high sea-floor visibility, especially from leisure diving (Whittaker, 1989; Wilson, 2009). Interestingly, the number of recorded shipwrecks declines dramatically after AD 400, closely matching the growing adoption of barrels as storage containers in the Western Mediterranean (Tchernia, 2006). In the east, the persistence of storage amphorae into late antiquity may therefore partly account for the number of shipwrecks identified, though the continued relative strength of the import-export economy in this region is also a likely factor (Gibbins and Adams, 2001; Kingsley, 2009; Kingsley and Decker, 2001; Robinson and Wilson, 2011; Wilson, 2009).

Even when archaeologically investigated, the origin and destination of these ships are rarely readily apparent. On one hand, though petrology and chemical analyses as well as the identification of production centers can be used as evidence for the ultimate origin of the trade goods themselves (Karagiorgou, 2009; Wilson, 2009), transport amphorae were often reused in subsequent economic ventures. The merchants and ship-owners who handle trade goods also do not necessarily originate in the same places as they items they sell or transport. A series of middlemen often served as these professionals and would have been central to distribution patterns and the eventual presence of an item in the archaeological record far from its place of origin (Graham, 1990; Reed, 2003). These middlemen may logically originate at any point along or near to common shipping routes, though not necessarily from the same location as the goods they transport. Domestic assemblages on board ships have been used to suggest possible origins for crew (Kingsley, 2003), as have items of clothing (Katzev, 1982: 278). However, these items simultaneously provide evidence that crew members lived on board these vessels for extended periods of time and may have picked up these items at any point along their routes (Beltrame, 2015).

The presence of isolated or exotic goods in landlocked contexts, on the other hand, though indicating a connection on some sort of level, is likewise the result of more complicated processes than economic supply and demand. As mentioned, fineware ceramics in particular have been documented as piggybacking in amphora-dominated cargoes, and this may account for the wide distribution of finewares produced in the same area as agricultural centers involved in the transport of basic staples (Armstrong, 2009; Kingsley, 2009; Parker, 2008). Regional marketplaces would have formed distribution centers for these objects as well as resources, but the interactions at these ports would not have been between producer and consumer. In addition, desire to obtain exotic objects may have nothing to do with their place of origin or the identity of the consumer. For example, the establishment of interregional trade connections at Corinth led to increased export of Corinthian-produced luxury items in the Archaic period (Salmon, 1984). Corinthian ware was popular among Greek colonies as well as foreign groups such as the Etruscans (Boardman, 1980), and some ceramic forms started being made specifically for export, so that they were used as dedications and grave offerings elsewhere in the Greek world but rarely at Corinth itself (Salmon, 1984). This indicates that access to objects of aesthetic value should be taken more as an association with status than as any particular political affiliation.

Links between wealth, status, and access to exotic items likewise account for the popularity of Roman dress accessories among the semi-nomadic groups living outside the boundaries of the Roman Empire (Haselgrove, 1987). In this case, objects from a dominant culture group are thought to have been displayed by the elite members of these subordinate societies in order to demonstrate alliances, and control over prized foreign imports (Hedeager, 1987). Power differentials also influence the distribution of foreign-made objects in colonial contexts, as evidenced by their presence in grave assemblages (Bartel, 1995; Champion, 1995b; Cool, 2010; Hedeager, 1987). When comparing geographic origin as represented by the geochemical signature in human bone and enamel with grave objects excavated in Roman Britain, a local origin was documented for many individuals with particularly "Roman" (i.e., foreign) grave assemblages (Cool, 2010; Eckardt et al., 2009; Evans et al., 2006). Cool (2010) suggests that this finding is the result of efforts by the elite to ally themselves with a new political administration, and in other words, that they are compensating for not being from Rome to such an extent that they observe more stereotypically "Roman" rituals and behaviors than do those individuals who actually travelled from Italy.

Finally, there is growing interest in the archaeological documentation of the so-called hidden or invisible social classes in antiquity, including the working class, women, and slaves (Dyson, 2010; Morris, 1998; Webster, 2008, 2010). The process of identifying slaves can be particularly difficult given the propensity of their owners to limit their ability to create a separate self-identity (Roymans and Zandstra, 2011; Webster, 2010), resulting in a lack of their visibility in the material record. Their proposed archaeological underrepresentation has led to heated debates regarding the volume of slaves being brought into the Roman Empire, especially after the 2nd century AD (MacMullen, 1987; Samson, 1989). On the other hand, growing use of historical comparisons to the earlier Roman slave trade has given rise to the contention that material culture associated with slaves may be overlooked rather than invisible, as slaves involved in industry and production would most likely have created those forms and decorations with which they were most familiar (Morris, 1998; Webster, 2008, 2010). Moreover, dominant cultures tend to adopt aspects of subordinate members of society, so that interactions with war captives or slaves need to be considered as a possible source for the diffusion of material culture (Cameron, 2011).

Bartel (1995) suggested that appropriate tests for recognizing acculturated culture groups would necessitate the identification of material traits associated with "foreign" normative behaviors. Food preparation and consumption, for example, may not change despite isolation from home and mandated changes in outward behavior. This also means that objects of foreign origin likely to be brought to a region in the possession of migrants would include artifacts which similarly reflect private, normative behaviors, often those practiced within the sphere of domestic life (Burmeister, 2000). As this research examines archaeological remains of burial behavior only, comparison of the objects in grave assemblages to those in archaeological domestic assemblages at Corinth is not possible. Instead, the presence of exotics in these contexts may be expected to have symbolic associations that depend on their social reference within the mortuary landscape at this city. The use of these objects to reflect a foreign origin can be tested using the interred skeletal remains.

2.1.2.3 Bioarchaeology and archaeological science

Social bioarchaeology is another approach to the identification and study of social groups which are traditionally underrepresented in material culture or literary sources through the presence of their skeletal remains in cemeteries. In particular, the geographic origin of the people involved in mobility, the integration of foreigners into existing societies, and the sheer volume of people involved in long-distance migration are all aspects of the processes by which individuals, states, and markets interacted. Physical anthropology, though historically a peripheral and specialist concern in the Mediterranean, is one source for these data, and should contribute to archaeological debates on identity formation (MacKinnon, 2007). These data are particularly applicable given the fact that most formulations of ethnicity include a genealogical component (Burmeister, 2000; Hall, 1997, 2002; Jones, 1997) or a conceptualization of descent from a common ancestor.

In ancient Mediterranean formulations of identity, descent was often traced to a mythic figure such as Aeneas (the Romans) or Hercules (the Dorians and the Romans) (Hall, 1997, 2002; Malkin, 2001a; Verg. *Aen*.). Human variation was originally subdivided according to racial typologies to examine the origin of populations according to these myths. Skeletal biology was divided into discrete regions typified by cranial morphology, and individuals were related to these typologies to identify place of origin. In one such early use of physical anthropology, J. Lawrence Angel (1942) asserted that Corinth was a "melting pot of races." For example, Angel (1942; quoted in Weinberg, 1974) used cranial remains to postulate an "Avar" affiliation for the skeletons from Late Antique graves located in the former forum area of Corinth. He also suggested at least one woman of North African origin was buried in the cemetery north of the city around the former sanctuary of Asklepius (Angel quoted in Wiseman, 1969). However, research starting in the 1980s abandoned this approach (MacKinnon, 2007). It is possible that problems with using fictive kinship as a definitional criteria of ethnicity is a direct result of the use of the race concept in early anthropological and historical research (Malkin, 2001b), though both historians and physical anthropologists have progressed to a more individualistic and process-driven examination of ancient peoples.

Recent research in physical anthropology instead examines the assumptions of population interactions underlying these fictive relationships, rather than using skeletal morphology as evidence for the origins of groups (MacKinnon 2007). Using cranial shape to identify geographic origin is further problematic as heritability is difficult to measure for morphological variables which incorporate a number of anatomical regions and, therefore, also a number of different genes. Morphology is influenced throughout development by a combination of environmental, epigenetic, and genetic factors, with certain anatomical regions of the skull showing higher correlations with molecular distances than others (Smith, 2009). Analyses are moreover dependent on burial environment, with incomplete preservation likely to contribute to typological identification. Competing examinations of fragmentary skeletal remains interred in so-called “Avar” graves from the Acrocorinth fortifications at Corinth identified a “general Mediterranean type” rather than any relationship to northern Balkan populations based on cranial appearance (Koumares quoted in Davidson and Horváth, 1937). One alternative source of data on mobility from the realm of bioarchaeology involves the chemical analyses of human bones and teeth (Schepartz et al., 2009), which have the ability to identify geographical origin (Garvie-Lok, 2009; MacKinnon, 2007; Nafplioti, 2008). Thus, whether foreigners are present in Late Antique cemeteries can be tested using geochemical methods.

Archaeological approaches, such as those utilizing human skeletal remains, all have the advantage of going beyond the one-sided perspective available in ancient literary source material, where the point of view of the colonizer is prioritized, to examine local identity and the importance of individuals (van Dommelen, 2012). As articulated by MacKinnon (2007), physical anthropology in the Mediterranean can contribute a more individualistic and narrative based view of interactions and self-identity by its focus on individual skeletal remains. A bioarchaeological approach will moreover allow better identification and discussion of social identities of the deceased by incorporating osteological and geochemical markers of health, status, and stress in their mortuary context (Goldstein, 2006). Bioarchaeological data and skeletal geochemistry of the Late Antique human remains at Corinth are therefore appropriate datasets with which to identify migrants and test archaeological hypotheses of acculturation within the framework of the connectivity model.

2.2 Mobility and Population Movement in the Ancient Mediterranean

2.2.1 Reasons the ancient Greeks moved

Though large scale, long distance migrations dominate discussions of mobility, they are unlikely except during the colonization period of Greek history in the Mediterranean (van Dommelen, 2012). These discussions also do not usually include habitual economic, political, and subsistence-motivated activities. Although daily interactions are bound to be enhanced by geographic proximity (Douglas and Kramer, 1992), relatively short distances were probably often traveled for the purpose of changes of residence at marriage or travel for employment opportunities (Anthony, 1990; Kok, 2010). Using ethnographic analogy, categorizations of mobility can be subdivided to indicate the scale of movement, its permanence, and the resulting demographic, social, and material culture effects that can be expected in an archaeological context (Anthony, 1990; Burmeister, 2000). These classifications emphasize the roles of individuals and households, rather than entire societies, and can be tested using both material culture and the data available from the skeletal and chemical analysis of individuals (Burmeister, 2000; Morris, 2003; Sanjek, 2003; van Dommelen, 2012). These various causative factors and the resulting types of population movement expected in Late Antique Greece are discussed individually.

2.2.1.1 Resource accrual and economic advantages

More diffuse resource or subsistence strategies are particularly inclined to result in frequent, often seasonal, movement within a region (Anthony, 1990). Seasonal mobility strategies are regularly employed by migrant workers (van Dommelen, 2012), or farmers or herders who are required to make seasonal relocations in order to make use of the large area of land needed for cultivation or grazing activities (Alcock, 1993; Chang and Koster, 1994; Kardulias, 2015). Likewise, intra-regional trade is necessary when areas tend to specialize in one crop or product (Horden and Purcell, 2000). At an early period, farmers might regularly have traveled after their harvest in order to exchange their surplus for useful goods from nearby areas easily reached through minor sea travel (Hes. *Op.* 584-694). Intraregional relocations of this sort may also have traversed large areas, as may mobility relating to marital changes in household, and similarly commonplace movement patterns probably characterize the majority of migrations in the past (Lewis, 1982). However, it is also likely that low-level interactions by individual producers would have been augmented by high commerce, or directed trade operated by middlemen, since the necessity of importing foodstuffs to sustain particularly large and socially complex urban centers as established in the Classical period continued into late antiquity (Kingsley and Decker, 2001; Laiou and Morrisson, 2007; McCormick, 2001). In fact, state institutions built around this reliance is thought to have led to the maintenance of earlier Roman economic structures into the 6th century AD (Laiou and Morrisson, 2007) if not later, despite overall economic decline in late antiquity (McCormick, 2001). These complimentary trends in resource accrual and distribution most likely resulted in interlocking trade networks which situated Late Antique cities in local, regional, and interregional population movements that were framed on earlier economic and political structures.

Though most of the provincial population was made up of independent farmers by late antiquity, these producers depended on local markets connected to regional centers and made use of a wide variety of amenities provided by the state in urban settings (Laiou and Morrisson, 2007: 37). Even if this period was characterized by an increasing density of rural at the expense of urban settlements (Christie and Loseby, 1996; Hodges and Bowden, 1998; Liebeschuetz, 1992, 2001), not all urban amenities were relocated to large villages in the countryside (Bagnall, 2005; Trombley, 2001b). In Egypt, for example, most craftsmen were only located in cities as were the majority of trade facilities (Alston, 2002: 334-9; Bagnall, 2005), though more professions are attested on the rural epigraphs in Anatolia (modern Turkey) (Trombley, 2001b). Craftsmen also likely traveled to take advantage of seasonal markets (Bagnall, 2005; Trombley, 2001b). Thus, citizens may have regularly traveled from farmsteads to city, taking advantage of the institutional framework for trade including roads, public buildings, and markets.

In Greece, port cities in particular formed natural redistribution points, and gave rural inhabitants access to regional markets and luxury items (Morrisson and Sodini, 2002: 207). Recent archaeological investigation of rural farmsteads in late antiquity in the northeast Peloponnese identified the presence of imported amphorae thought to have contained luxury goods such as wines or flavored olive oil (Gregory, 1993b; Hjohlman, 2005; Pettegrew, 2007, 2010). Hjohlman (2005) suggested on this evidence that the Late Antique countryside could be both self-sufficient and connected to interregional trade through regional distribution centers such as Corinth. In fact, the people utilizing the countryside may also often have been residents of these port cities. Alcock (1993) used archaeological survey data to suggest that intensive land use for agricultural purposes was possible without large or permanent accompanying structures or settlements. Instead, these landowners may have moved seasonally between urban residences, rural land workings, and other outposts. In this way, large tracts of land could have been used for cultivation of exports rather than merely producing resources for local consumption.

Pastoral activity results in similar seasonality in residences, although the archaeological evidence for animal husbandry in Greece is limited and this activity was looked down upon by the Classically-informed elite (Alcock, 1993; Halstead, 1996; Kardulias, 2015; Whittaker, 1988). Drawing from ethnoarchaeological analogy, Kardulias (2015) argues that pastoralism would have been particularly viable for the arid, rocky terrain of the Peloponnese, and these herders may have commonly shifted between insularity in tending their animals and connectivity to diversify their economic interests. This formulation of herding strategies is consistent with the ethnographic concept of a multi-resource pastoralist (Chang and Koster, 1986; Salzman, 1972), wherein the groups dependent on animal herding also spend significant portions of time in more urban environments or traveling in order to augment income with other sources. Given the long ethnohistorical record of pastoralism in the region (Chang, 1993; Chang and Koster, 1986, 1994; Chang and Tourtellotte, 1993; Koster, 1997), and its advantages given the fact it would have been one way to make use of small islands or other niches with limited access to potable water (Kardulias, 2015), this subsistence strategy was also likely increasingly utilized in Late Antique Greece (Laiou and Morrisson, 2007: 30; McCormick, 2001: 36).

Some animal herders may even have been almost completely nomadic. During the Byzantine period, nomadic peoples following an autonomic, tribal structure and pastoralist economy existed semi-independently within the state, despite general mistrust of their way of life and a consistent institutionalized drive to become, at the least, semi-settled (Ahrweiler, 1998). These seasonal and nomadic movement strategies resulted in connections, however tenuous, throughout their regular territory, but completely nomadic pastoralist activities would be unlikely to result in permanent residents at a city such as Corinth or burials in its cemeteries.

Both pastoralists and agriculturalists would have depended, however, on access to regional distribution centers, where marketplaces were located and taxes collected (Laiou and Morrisson, 2007). Within these markets, professionals were necessary to redistribute products and supply exotic luxuries and other imports back to local producers. Both traders and craftsmen were organized in guilds which protected their activities and mediated with the state, reflecting the central position of these middlemen to life in Late Antique Greece (Laiou and Morrisson, 2007: 32; McCormick, 2001). The state also relied on trade in bulk commodities to feed the population of large cities such as Constantinople (Kingsley and Decker, 2001; McCormick, 2001), resulting in a privileged position for the *naukleroi*, ship-owners, and *emporoi*, traders, who benefited from the indispensable nature of cargoes full of grain (Laiou and Morrisson, 2007: 34). Therefore, the framework for incorporating and controlling trade through official channels bears directly on the status of these professionals within Late Antique society.

Leading up to late antiquity, state involvement in the grain supply of Rome, or *cura annona*, is well documented (Casson, 1980; Rickman, 1980). The distribution of agricultural surpluses was legislatively controlled, and the empire granted privileges to shippers who served the *annona* for significant periods of time. On top of these enticements, more lucrative luxury items could be stowed among the state-bound cargoes (Kingsley, 2009; Parker, 2008), leading to ever-increasing incentives for merchants to engage with local markets. By the Late Roman Empire, a number of voluntary associations and official, state-run organizations had developed to serve and control this burgeoning social class in their target markets (Kloppenborg, 1996; McCormick, 2001; Rickman, 2008). These groups provided membership based on mutual interest instead of shared geographic origins or kinship, and worked as mediators between individuals and the state (Wilson, 1996). Guilds of ship-owners were present in the Eastern Roman Empire into at least the 6th century AD in relation to the *annona* and offered substantial tax incentives for members (Laiou and Morrisson, 2007: 34).

Voluntary associations may thus have been integral to the livelihood of merchants and ship-owners, and would also have provided them with a shared identity and social group. However, their presence at Corinth remains theoretical, and by definition these organizations only serve a local civic population (Kloppenborg, 1996), so that documented Late Antique cases in other cities (McLean, 1996) can only suggest ways in which these professionals may have been organized. In the later Roman Empire, these organizations were increasingly based around a shared occupation (Kloppenborg, 1996; McCormick, 2001; Perry, 2006). The framework for the responsibilities and services provided by these associations, on the other hand, were set by earlier Roman economic frameworks.

Earlier in the western Empire, including Italy, nonlocals thought to be involved in trade organized into guilds referred to as *collegium peregrinorum* or *consistentium Callevae* (Frere and Fulford, 2002; Noy, 2010a). In the case of Roman Britain, the use of the collective term *peregrini*, foreigners, is thought to be used specifically to denote that these individuals were from a wide variety of origins (Noy, 2010a). Even after the fall of Roman hegemony in the provinces, voluntary associations may have survived as a “legacy” of Roman society (Granier et al., 2011). In the Eastern Mediterranean, these associations may have been couched within existing religious organizations and subsumed within the Christian church by late antiquity. In third and fifth century churches on Delos, for example, McLean (1996) has suggested that the way in which the cultic space of churches was incorporated within meeting spaces is analogous to that of other, earlier voluntary associations on the island. As the state issued many tax exemptions to the church, it may also have been increasingly profitable for merchants to operate as its agents rather than as truly unaffiliated middlemen (Laiou, 2002; Whittaker, 1983). However, entrepreneurs taking advantage of local and regional markets would still have been likely to share membership in guilds or other voluntary associations to mediate with the state and help alleviate the risk inherent in the shipping lifestyle (McCormick, 2001: 88). Their recognition is further complicated by the variety of terms and names which refer to voluntary organizations; for example, in Greek, a variety of terms such as *thiasoi*, *koine*, *orgeones*, and *eranoi* were used which linguistically predated and may have equated the Latin *collegia* (Kloppenborg, 1996).

As voluntary associations would also likely have resulted in heightened incorporation of foreign members within the host societies with which they mediated, these organizations may not have been accompanied by any specific material culture correlates other than inscriptions. In particular, while many of organizations arranged burial of their members (i.e. *collegia funeraticia* or *collegia tenuiorum*) in a common burial area marked with an epitaph, these graves were otherwise undifferentiated from the rest of the cemetery (Granier et al., 2011; Kloppenborg, 1996; Noy, 2000, 2010a; Perry, 2006; Toynbee, 1971). Thus, it is possible that membership in organizations, possibly within the venue of the church, may have resulted in a number of archaeological invisible migrants in trading professions.

It is also possible that their lack of recognition is a result of differences in how trade was regulated in the Eastern Mediterranean. In fact, state involvement by the Eastern Roman Empire in the *annona* may have been less than that exerted by Rome (Kingsley and Decker, 2001). While Constantinople did require large grain imports for military and civilian consumption, and appears to have used resources remitted as taxes for provisioning soldiers (Karagiorgou, 2001), the state did not monopolize trade from primary production centers to the same degree as in earlier periods. Instead, its patronage resulted in the regular movement of ships carrying grain produced in Egypt and the Black Sea, wine and olive oil from southern Turkey, Cyprus, and the Levant, and olive oil from throughout the Aegean to its northern and eastern frontiers (Kingsley and Decker, 2001; McCormick, 2001). One such documented site of amphorae production for use in the *annona militaris* was in the southern Argolid of the Peloponnese at Halieis, and the olive oil for these containers is thought to have been similarly produced throughout the region, including Corinth (Karagiorgou, 2001). Procopius mentions imperial granaries built throughout Greece during the 6th century (Procop. *Aed.* 4.2.14), and inscriptions document their presence at Corinth specifically, suggesting grain produced in the region was also taxed and transported via the city's ports to Constantinople or for use by the army (Kosso, 2003). Logically, this trade would have required a wide range of professions involved in transporting and regulating the *annona*.

Some of these travelers may have only stayed a short time in cities involved in the *annona*, and may have effectively lived on board their ships. Vessels equipped with domestic assemblages that would have been necessary for ship-board life on the long-distance journeys necessary for interregional or international trade are present into the 7th century AD and may have been from a variety of origins (Beltrame, 2015; Kingsley and Raveh, 1994). The name of a merchant owner of one such vessel (Dor G) wrecked off the coast of modern Israel, as inscribed on two balance scales or steelyards found on the ship, implies an Egyptian origin for this individual (de la Presle, 1993; Kingsley and Raveh, 1994). However, these inscriptions also describe his place of origin as Rhion, and the only documented Eastern Mediterranean city bearing that name is in the Peloponnese near Patras - though it could have been a colloquial name (meaning promontory, headland, or bluff) for his origins as well (de la Presle, 1993). On the other hand, copper vessels from the domestic assemblage of a nearby wreck (Dor F or A) show manufacturing techniques typical of Byzantine metallurgy, and are of the same type as flasks found while excavating the shops at Sardis (Kingsley and Raveh, 1994). A similar eastern Aegean or even Black Sea origin has been suggested for metal objects present on the Yassıada A shipwreck found between Turkey and the island of Kos (Katzev, 1982).

Not only do these assemblages imply that shipping crews traveled a great deal, the presence of the steelyards suggests that much of the cargo they transported was high volume, such as what would be necessary for the *annona*.

Other professions, such as regulatory officials, were also present and may have provided overlapping or shared functions within the church and state. A steelyard on board the 7th century Yassıada A shipwreck bears an inscription stating “Georgios, Elder Ship-Captain” was its owner (Sams, 1982). This dedication may be interpreted to state that this person was both a church cleric and the owner of the boat (van Alfen, 1996; Van Doorninck, 2015). Its presence on an implement designed to regulate a high volume of trade goods, and on a ship which may have been carrying provisions for the conflict with the Arabs in the Levant, also imply a connection between the *annona militaris* and ecclesial office. The patriarch of Alexandria also controlled a fleet of provisioning ships (Monks, 1953), and it is possible that smaller bishoprics did as well. At the least, the church was responsible for much of the civic building in Late Antique cities (Christie and Loseby, 1996; Laiou and Morrisson, 2007: 27; Lavan, 2001; Liebeschuetz, 1992) , and one of the few examples of ship-board transport of building stone during this period was destined to adorn a church until it sank off the coast of modern Israel (Kahanov and Mor, 2014). Likewise, decorative marble was likely imported to 6th century AD Corinth for use in basilicas (Walbank and Walbank, 2006).

Taxation and state or church demand, however, did not completely account for the entirety of agricultural surplus. Based on the transport of amphorae produced in the Eastern Mediterranean to the Western Mediterranean and the presence of western imports in Egypt, Kingsley and Decker (2001: 13) consider it more likely that all citizens were involved in the food trade to some degree, with “bulk foodstuffs … shifted both regionally and across longer distances on a regular basis.” While standardized containers (particularly early forms of Late Roman Amphora 2 or LR2) thought to have originally contained olive oil predominate in quantified pottery assemblages from military sites along the Danubian frontier, these amphorae were also found throughout the Mediterranean and in Late Antique Britian, implying that surplus would have been available after submitting the military *annona*, and this would have been traded freely (Karagiorgou, 2001).

The transport amphorae originally involved in imperial provisioning may also have been reused for use in cabotage of surplus goods to regional markets (Leidwanger, 2007; Leidwanger et al., 2015). Use of ships for directed trade may likewise have been seasonal, allowing them to be hired out for more localized transports during the rest of the year. At least two of the wrecks at Dor, Israel, for example, were carrying architectural material assumed to have been acquired from a nearby coastal ruin (Kingsley and Raveh, 1994). Even the large Yassıada A ship contained amphorae in her cargo which had been reused, and the weights on board ranged from the larger, imperial standards to those smaller, provincial units likely used for small-scale trade (Bass and Van Doorninck, 1982; Sams, 1982; van Alfen, 1996). Kingsley (2001) further points out the marks (*tituli picti*) or graffiti designating state regulation on contents and merchants responsible for cargoes are lacking on later Palestinian-produced amphorae, implying a demand-based supply of semi-luxury goods. Cabotage and other smaller scale transports would have resulted in more localized activity of merchants and ship-owners staying for longer periods of time in regional distribution centers.

The technological revolution in ship construction also implies that directed trade was of reduced importance in later periods. Though Laiou and Morrisson (2007: 34) suggest that owners of smaller ships were only conscripted by the state into the *annona* after the mid-6th century, smaller, cheaper and easier to construct merchant vessels were favored throughout late antiquity, suggesting wider use of these vessels by a growing class of entrepreneurs (Kingsley, 2009; Steffy, 1994; Trombley, 2001a; Wilson, 2009). While the state and the church commissioned perhaps the largest cargoes during this period, hold capacity decreased overall away from the size of the large Early Roman *annona* vessels. This shift marks changes in state-based regulation of trade as well as an increased interest in money-making ventures, as the majority of profit available from trade would be manifest in luxury items rather than bulk foodstuffs, and a cargo hold full of medicines, spices, clothing, and precious metals, while taking up less space than a shipment of grain, would also be much higher in value (Mango, 2009b). Movement of these items is well-attested, and merchants are resultantly considered to be some of the wealthiest Late Antique classes, with state-employed ship-owners and ship-masters having the most social standing among the individuals who profited off of shipping (Trombley, 2001a).

Based on this consumer-oriented view of Late Antique trade, demand for these necessities would have also created a market for non-local semi-luxury foodstuffs such as olive oils, wines, sauces, and honey as well as luxury items such as textiles. One poem by Sidonius Apollinaris describes Achaia as famous for its honey, olives, and bronzes (*Carm.* 5.40-50). The silk trade is also considered to have been well-established in the Peloponnese by the Middle Byzantine period, or after the 9th century, and may have begun as early as the mid-6th century AD (Jacoby, 1992, 1994; Oikonomidès, 1986). Trade in such organics may account for the return cargoes for ships bringing eastern amphorae filled with wine, olive oil, or sauces to Corinth. Documented luxury imports in the Eastern Mediterranean during this time period included fine tableware ceramics and lamps, live birds, cooking utensils including ceramic and metal cookpots, glass vessels, silver plate and coins, clothing and other high end textiles, spices, wine, papyrus, and even camels (Mango, 2009b). Medicinal ingredients, commonly prescribed and also often used in cooking or as perfumes and in pigments, were widely traded as well, and notoriously expensive (McCabe, 2009). Buckles and other items necessary for a soldier's kit may have been provided to new recruits from state-run production centers in cities near prominent mining centers, leading to their wide distribution throughout military encampments and fortifications (Mango, 2001, 2009c).

Even based on transport and storage amphorae data alone, ample archaeological evidence exists regarding the Late Antique import and export economy. Cypriot, Southern Turkish, and Northern Syrian kilns produced Late Roman 1 (or LR1) transport containers for use primarily in the wine trade from the late 4th to the first half of the 7th centuries AD (Decker, 2001; Williams, 2005). Similar containers produced for Palestinian wine began circulating in the late 4th century AD, and the popularity of this export was possibly related to the region's proximity to the Christian Holy Land (Kingsley, 2001, 2003). Regardless of the reason, Late Roman 4 (LR4 or Gaza amphorae) and Late Roman 5 (LR5 or Palestinian amphorae) continued to be common throughout the Eastern Mediterranean until the Arab conquest. Olive oil is considered the primary product carried by LR2 containers, which were widely produced in Cyprus, on islands in the Aegean, and in the Peloponnese (Hjohlman, 2005; Karagiorgou, 2001). Micaceous water jars (mwj), often referred to as Late Roman Amphorae 3 (LR3) were primarily produced in western Turkey, especially around Ephesus, and appear to have been distributed along with finewares throughout the Aegean (Vaag, 2005), though many ceramicists retain a more generalized eastern Aegean origin for mwj and other micaceous cooking wares (Slane, 2008).

Though this movement of goods necessitated a large number of temporary visitors involved in their physical transport, control of these trade routes and regulation of the *annona* would likely have resulted in more sustained population movement as well. Still more temporary visitors may also have traveled as religious pilgrims, though these would also have likely returned to their place of origin (Avramea, 2002; Elsner and Rutherford, 2005). Thus, though many travelers would have spent little time in individual port cities, others would have stayed longer and may be considered migrants. Late Antique trade likely resulted in both recurrent migrants such as shippers, who stayed little time in individual port cities, and sojourners who may have settled in the area for a longer duration. By the later Byzantine period, for example, sojourners, such as merchants, from political allies took advantage of established foreigner enclaves to stay within the capital city of Constantinople (Laiou, 1998; Reinert, 1998).

Other sojourners likely included officially sanctioned administrators. The Eastern Roman Empire sent out tax collectors and governors to its provinces (*Cod. Theod.* 8.8.4, 8.8.9; McCormick, 1998), or ecclesial agents may have served either the bishopric or state in provisioning provinces or armies (Monks, 1953; van Alfen, 1996; Van Doorninck, 2015). Though literary texts and legislative codices designate that these officials or merchants were only allowed to stay in foreign towns for a limited amount of time, it is unclear how strictly these terms were enforced (Laiou, 1998; *Cod. Theod*. 8.8.9). Mercenaries and conscripts in the army may also have been stationed in redistribution centers; since military service was the main venue for upward mobility in government administration, and provided a means to social assimilation, it was especially common for foreigners to fill these rolls during the Roman and Byzantine periods (Charanis, 1959; Garsoïan, 1998; McCormick, 1998; Schneider, 1996). Shifting employment opportunities caused by trading or employment in the army may have resulted in mobility over a large area, or caused a migrant to settle in a series of locales (Ahrweiler, 1998; Brettell, 2008).

Mobility and semi-permanent residence patterns are, therefore, an expected response to the search for specialized employment, especially in trade, as well as a means by which farmers and herders maximized land use and exchanged their products for necessary goods. With traders or mercenaries, employment opportunities connected travelers to their hosting, employing societies while the travelers themselves provided a conduit for exotic items or other resources between the host society and their place of origin. Similarly, nomadic movement created networks as nomads interacted with the more settled people in the areas through which they moved, and also mediated connections and acted as middlemen for resource exchange between disparate areas much as traders do. Any of these mobility strategies would also have led to the opportunity to gather information on immigration targets which would have enhanced the decision making capabilities of later migrants.

2.2.1.2 Political control and exile

In the ancient Mediterranean, scholars usually tie economic connections to politics (Laiou and Morrisson, 2007). In late antiquity, trade is thought to have been divided between the eastern and western portions of the Mediterranean when the Roman Empire was split between rule by Rome and Constantinople. After Justinian's reconquest of portions of the Western Mediterranean in the 6th century, economic connections between this area and the rest of the Eastern Roman Empire are thought to have reopened as well (Laiou and Morrisson, 2007; Reynolds, 2010). Trade is even considered one of the driving forces behind early Greek colonization efforts during the Iron Age (Graham, 1990), so that some colonies (themselves referred to as *emporia*) would have been established as outposts contributing to the control of trade routes. The founding city state would have maintained political and social control over these dependent cities, thereby recreating its social structure and presumably maintaining similar values and customs (Hansen, 1997). While the foundation of economically motivated settlements such as *emporia* may be tied to the concentration of political power and domination by the elite (Champion, 1995a; Rowlands et al., 1987), the word "colony" itself implies the type of political and military domination of foreign areas more common to the Roman Empire than to the earlier Greek dispersals (van Dommelen, 2012). This would indicate that motivations for population movement at different periods in antiquity fluctuated between economic and other bases, and terms should not be used across time periods in universal fashion.

By definition, colonization denotes the extension of political control over an expanding geographic territory, and the establishment of settlements, even of trade outposts, would have increased the influence of a founding state and culture. In the Roman Empire, militarized control of territories such as Greece through colonization was particularly common. Freedmen and decommissioned soldiers often settled in colonies in newly subdued provinces, creating situations where, theoretically, the settlers would have stronger ties to the Empire than to the surrounding, possibly hostile, natives (*Cod. Theod.* 7.15.1, 7.20.3; Paus. 2.1.2, 7.16; Strab. 8.6.23). These new territories were overseen by a succession of foreign officials such as governors, judges, and tax collectors who also would be temporarily dispatched to provinces other than those in which they were born or currently living (*Cod. Theod.* 8.8.4, 8.8.9). Veterans were especially encouraged to live on the frontiers, as they were considered to provide a buffer for the empire from the more militant nomadic groups outside the border (Barrett et al., 1989; Elton, 1996; Swan, 2009). During the Roman Empire, these frontier communities have been suggested to form a sort of diaspora, where these multiple communities of a dispersed population are connected by their linkages to their place of origin (Clifford, 1994; Derks and Roymans, 2006; Roymans, 2011). Newly formed Roman enclaves could be visualized as helping to establish waypoints in migration streams (Anthony, 1990) by enabling exploration of and expansion into previously unsettled territories.

Simultaneously, as these military colonies already maintain this kind of transnational identity, localized to the place in which these veterans settle, these communities could be considered to be particularly open to acculturation between Romans and the non-Romans these communities were designed to separate (Barrett et al., 1989; Elton, 1996). This use of a militarized presence to dominate regions was ideologically different than the warfare expected from nomadic invaders, who were instead expected to raid Roman settlements without staying themselves. Archaeological hypotheses specify that only the hybridized communities of the former would be expected to result in cultural diffusion (Bartel, 1995). In a city such as Corinth which was not on the frontiers, contact with these areas through the *annona* may still have led to reciprocal trade, creating a material culture presence not equaled by the flow of people.

Raids themselves, on the other hand, would not have resulted in either material culture or settlers though it may have led to the stationing of a garrison of Imperial troops in the area. Within the provinces far from the frontier, official garrisons may also have been stationed within existing cities to safeguard the *annona*. Coinage used as their payment is one possible sign of the permanent settlement of these foreign-born militias or other regulatory bodies in the provinces they governed (Randsborg, 1998), as veterans were usually given both land and money with which to work it (Hendy, 1985; *Cod. Theod.* 7.20.8, 11). Before the 7th century establishment of semi-autonomous, localized *themes* in the Byzantine army, military companies were usually composed of recruits from throughout the empire (Charanis, 1953; Haldon, 1990, 1993). After this point, the citizens within each theme were responsible for their own protection under the direction of a *strategos* or supreme regional general in charge of the local militia. This likely correlated with increasing militarization of the local population and reduction or abolition of wages for military service as a result of the failing gold reserves of the empire (Haldon, 1993; Hendy, 1985; Morrisson and Sodini, 2002; but see Curta, 2005a). In fact, the presence of small-denomination coins in Greece after the 7th century AD may still be interpreted as the result of activity by the Eastern Roman Empire's fleet, which operated separately from the land-based *thema* troops (Curta, 2005a). In late antiquity, this trend toward an anumismatic society is coupled with monetary devaluation and the increasing difficulties the Empire had in maintaining and equipping the troops fighting on the frontiers (Haldon, 1993; Hendy, 1985), making archaeological evidence for foreign troop placement problematic.

In antiquity, other diasporas were the result of similar geographic separation and inability on the part of the transplanted population to return to their place of origin, due to exile, war, or other state-mandated relocations of entire families. In the 7th century AD, when modern Palestine fell out of Byzantine administration, large numbers of refugees fled the region for Sicily and mainland Italy (McCormick, 1998). Similar refugee populations may have originated in Armenia in eastern portions of modern Turkey (Charanis, 1963; Garsoïan, 1998).The families of elites were particularly likely to flee areas heavily impacted by crisis or war, especially when the region was taken over by a hostile nation, and the later Roman government was also willing to help transplant lower socio-economic classes.

Forced population displacements may have also been common in order to take control of territory or resources in previously subdued areas. Enforced transportation can incorporate both population movement due to slavery (Grey, 2011; MacMullen, 1987; Scheidel, 2011), through imprisonment after wars (van Dommelen, 2012), or displacement due to exile or political domination (Brettell, 2008). Early Roman slaves were either captured during military campaigns or bought on the frontiers from the often nomadic societies living outside the boundaries of the empire (Champion, 1995b; Harris, 1999; Scheidel, 1997, 2005, 2011). By late antiquity, slaves continued to be sourced along the fringes of the Roman world, some of whom were still captured in war (Grey, 2011; Scheidel, 2011). However, a large portion of the slave population at this time was taken from within the local population. Children of slaves were owned by their parents' owners, and citizens, such as abandoned children, or those individuals who sold themselves or their families to pay off their debts (Grey, 2011), could also become slaves. On the other hand, slaves were able to obtain their freedom, at which point they became integrated into society as a low-class citizen. As compared to slaves, freedmen were of a similarly lower social class than the rest of the Roman citizenry, but with greater power over the fates of themselves and their families (Grey, 2011).

These freedmen often did organize based on shared geographic origin into voluntary organizations. Freedmen may moreover have associated with other ex-slaves despite disparate origins due to this shared history of incarceration, sense of dislocation, and position in society (Mouritsen, 2010; Webster, 2010), creating a kind of fictive kinship linking members together (Wilson, 1996). One service of these associations (leading to scholars referring to them as *collegia funeraticia*) traditionally included funds for their burial, commemoration activities, and sometimes a shared burial location (Kloppenborg, 1996; Noy, 2000, 2010a; Perry, 2006; Toynbee, 1971). As a result, membership in these organizations would have created a community which could be recognized using mortuary archaeology; though burial behavior of members would most likely match that of the dominant society, their graves would be likely to be located together. Recognition of these locations as belong to a freedman/slave association as opposed to a merchant/trader association may be reliant on status correlates, as both may have grouped together foreigners from diverse origins.

Other population movements were mandated or enabled by a governing body due to territory loss or gain (McCormick, 1998), possibly such as the displacements due to the Slavic invasion in the 6th century AD (Charanis, 1950), or to make use of land which is perceived as underutilized, thereby creating a new tax base in already existing territory (Kosso, 2003). Musset (1975) considers that the introduction of foreigners, sometimes prisoners, to repopulate areas devastated during conflict has its roots as far back as the first century AD. During the 6th century, the church historian Evagrius attests to the transplantation of 10,000 Armenians to Cyprus in order to populate untenanted land (Charanis, 1959, 1961, 1963). This population movement aligns with historical evidence of famines and a pandemic which may have resulted from a climatic event precipitated by a volcanic eruption in AD 536 (Baillie, 1994; Hirschfeld, 2006).

It is apparent, therefore, that population movement may have been one result of depopulation events such as famine, plague, or war as these transplants would have repopulated the tax base of the empire and provided a necessary production class in the region. The city of Corinth is likely to have been as affected as other major population centers during this period; the rats carried on ships between port cities such as this one are the likely vector in the spread of the bubonic plague (Allen, 1979; McCormick, 2003), and dendrochronology shows that the entire Northern Hemisphere experienced a cooler, drier climate for at least half a decade following AD 536 (Baillie, 1994; Baillie and Munro, 1988). Many scholars consider that these crises may have depopulated land throughout the Balkans and Greece, enabling the Slavs to settle on untenanted land with or without the sanction of the Eastern Roman Empire (Paparrigopoulos, 1843; Setton, 1950; Soltysiak, 2006). Transplants may thus have been present in fairly large numbers at Corinth, and these migrants would have had fewer incentives to acculturate. They also may not have been present in the city’s cemeteries, and instead have used burial plots near to their settlements on agricultural land.

The founding of colonies or other transplantations of a whole section of an existing society would have resulted in permanent or semi-permanent changes in residence, as these migration strategies are more common when covering long distances (Brettell, 2008; Gonzalez, 1961). However, migrants often return after relocating even the longest of distances due to the maintenance of ties between them and their place of origin (Anthony, 1990; Brettell, 2008; Burmeister, 2000; Gmelch, 1980). In cases of colonization, ties between the founding city and its colony would have enabled if not necessitated movement between them. This community or family connection could also result in sojourners or chain migrations (Brettell, 2008), though in the ancient world, such return trips would most likely have been somewhat restricted to sojourners with access to a ship. On the other hand, long distance migrations such as enforced transportation (Sanjek, 2003) or refugee relocations (Brettell, 2008) were not mediated by an existing migrant network as chain migrations would have been, and were most likely permanent. However, even if it was impossible for immigrants to return to their place of origin, Anthony (1990) points out that initial settlements such as colonies or refugee communities may have functioned as a base from which subsequent migratory expeditions extended, possibly into unsettled/uncolonized territories. These subsequent population movements would have functioned as continuations of the original migration process.

2.2.2 Mobility and Greek identity

2.2.2.1 Framework of study: Hellenization vs barbarization

Regardless of the scope or permanence of migrations in the ancient Mediterranean, human population movement provided fertile ground for identity negotiation and renegotiation. Formulation of an overarching "Greek" identity is closely tied to the height of the ancient Greek colonial movement and the Persian Wars, and is often expressed with regards to the dichotomy apparent in the presence of foreigners or opposition with invaders, a polarity of us-vs-them which is often found in contemporary sources (Hall, 2002; Malkin, 2001b; Strab. 8.6.6; Thuc. 1.3). In addition, this identity is often over-emphasized as scholars focus on the perceived hegemony of the colonizing city and the resulting "Hellenization" of diverse areas in the Mediterranean under one, monolithic, usually "Hellenic" identity (i.e. Semple, 1931; see Morris, 2003 for a critique of what he calls "Mediterraneanization"). This approach also ignores any collaboration between migrants and native societies which may have led to reciprocal interactions and "barbarization," i.e., the process of becoming other than Greek (Bartel, 1995; Descoeudres, 1990; Graham, 1990; van Dommelen, 2012).

Ancient sources generally contribute to this focus, dichotomizing Greek against barbarian and valuing barbarization negatively. This representation is due in part to the identity of most ancient writers in the aristocracy, when actual Greek behavior, as seen in iconography and archaeology, was much more receptive to foreign elements even in the Classical period (Hagemajer Allen, 2003). Still other research has emphasized the variety within ancient Greek culture, arguing that even within Greek city states, subcultures, countercultures, and ethnicities would have existed, subverting the view of a fully assimilated citizen body (Dougherty and Kurke, 2003; Hall, 1997; Malkin, 2001a). These formulations of "Greekness" during the Classical period remain pertinent after Roman conquest, as later elite legitimize their positions through connections with the representations of the "self" and the "other" in classic sources. Throughout the Roman Empire, Greek culture and language became synonymous with high culture, and claims to ownership of this culture was central to the formulation of identity in mainland Greece and Asia Minor during the 2nd century AD (Goldhill, 2001). Spawforth (2001) even goes so far as to claim that modern understandings of Hellenism are themselves dictated by what the Romans idealized as Hellenic. Rome formed a burgeoning market for Greek antiquities, with the settlers of Corinth even resorting to grave robbing to fill the demand (Strab. 6.23), thereby equating modern Greece with the artworks and philosophy of the classical Greek past.

2.2.2.2 Identity in later periods

The influence of Classical Greece was further emphasized during late antiquity and in the Eastern Roman Empire, as the empire's capital shifted from Rome in the west to Constantinople (modern Istanbul) in the east, and Greek became the official administrative language of the empire (Ando, 2008; de Blois, 1984; Kaldellis, 2007; Millar, 1969). Creative engagement with the classical past is especially clear in later sources which, though often taken at face value as historical documents, may more likely represent contemporary updates of myths and fables (Anagnostakis and Kaldellis, 2014) or the literary pretentions of an erudite member of the elite (Miles, 1999; Millar, 1969). These deliberate associations between the Classical past and contemporary populations allow parallels and comparison between population interactions and migration processes at work during the Greek, Roman, and later periods in the Mediterranean, especially as the elites so involved with the rhetoric of past generations are simultaneously responsible for the policies regarding trade, migration, and citizenship during their own time periods.

In particular, the concept of the "barbarian other" maintained legitimacy due to the nature of Roman conquest. Though the height of negative portrayal of barbarians in art may have occurred in the 2nd century AD, Romans continued to use them as a countermodel to quintessentially Roman society and behavior throughout late antiquity (Schneider, 1996). The rhetorical use of this construct was widespread as a device identifying how to be a good Roman (Heather, 1999; Miles, 1999), and their popularity no doubt increased as the empire grew and contact with other societies became more common.

Roman expansion efforts were accompanied by militarized control in which colonies were established as important governing centers for control of new territories – in other words, these were colonies in a very modern sense of the word (van Dommelen, 2012). These colonies established a series of frontier zones where acculturation freely occurred, creating societies that have been suggested to more closely resemble the foreign barbarians than the Roman elite (Derks and Roymans, 2009a; Elton, 1996; Whittaker, 1994; Whittaker, 2009). As the Roman Empire incorporated the frontiers within its borders, the natives underwent a change in status which echoed their perceived threat to the empire's status quo: potentially hostile "barbarian," to affiliated *foederati*, to Roman citizen (Mathisen, 2006; Pohl, 1997; Sarantis, 2010). Recent research has focused on these "other Romans" (Barford, 2001; Barrett et al., 1989; Curta, 2010a; Curta and Kovalev, 2008; Nicolay, 2007; Sarantis, 2010) with the result that interactions can be better attributed to underlying social pressures.

As the empire expanded, an increasing proportion of the Roman army was composed of regiments from these provinces (Barrett et al., 1989; Liebeschuetz, 1990; Roymans, 2011; Swan, 2009). Some of the most compelling evidence for population movement within the empire derives from these militia members, who were often enlisted with others of similar origin, and therefore retained a distinct ethnic presence in their new homes (Noy, 2010a, b; Roymans, 2011; Saller and Shaw, 1984). Military service itself became an accepted avenue to citizenship, and the ability of the army to incorporate foreigners in the Empire's social structure was maintained in later periods (Ahrweiler and Laiou, 1998; Charanis, 1959; Musset, 1975). In the Eastern Roman Empire, military service was the main venue for social advancement for the Armenians (Charanis, 1959; Garsoïan, 1998), and resulted in a considerable number in the imperial aristocracy by the 10th to 12th centuries AD (Garsoïan, 1998). Military units were also increasingly regionally sourced and provisioned after the conversion to the *theme* system in the 7th century AD (Charanis, 1953; Haldon, 1993).

While the military actively recruited residents of disparate frontier areas into discrete units based on perceived skill sets (Millett, 1999), at this time Christianity was also a source of cultural uniformity and foreign incorporation through religious conversion (Ahrweiler, 1998; Charanis, 1959). The popularity of Christianity was enhanced through its endorsement by the imperial elite and it became the mandated religion of the Roman Empire by Theodosius I in AD 392 (Ando, 2008; Brown, 1971c). Codified law further blurred the distinction between the administrative roles of the church and the state, with increasing numbers of laws directly addressing church business or the behavior and social capabilities of the clergy (*Cod. Iust.*; *Cod. Theod.*). Ecclesial authority was even occasionally used to subvert the power of the emperor using ideological commitments to competing Christian dogma or heresies to rally support against imperial policies (Charanis, 1974; Haldon, 1990; Valeva and Vionis, 2014).

The patriarchs of Rome, Alexandria, and Constantinople were in almost continuous opposition throughout late antiquity, and after AD 451, the Levant also had its own church centers in Antioch and Jerusalem (Charanis, 1974). This power structure operated semi-autonomously from the emperor and his military, and the emperor in Constantinople likely vied with powerful members of the church in the administration of the provinces. While the economic history of late antiquity suggests that Corinth's connections may have increasingly concentrated on the Eastern Mediterranean, political and administrative shifts may have brought a number of officials to the city from Rome, as well. In the early 6^{th} century, for example, bishops throughout Greece courted the Pope in Rome in a bid for greater autonomy from Constantinople (Charanis 1974; *Chron. Marcell.*).

State-run conflicts against barbarians at that time also received support from the church, with the connotation of "godless" attached to the term barbarian to lend legitimacy to these wars – unless, of course, these foreigners converted. During late antiquity, the church embarked on many such large scale evangelic missions to convert and thereby "save" the barbarians (Ahrweiler, 1998). While nomadic groups were typically vilified by the Byzantine state as a result of the inherent difficulties in administrating to mobile peoples (Ahrweiler, 1998), after their conversion to Christianity, conflicts against them became idealistically difficult to uphold as their inclusion in the church provided protection.

The rhetoric of who is "Christian" versus "barbarian" is therefore tangled in historical sources with issues of political administration of the provinces. Groups of migrants may have converted to one doctrine of Christianity or another soon after arriving in Roman or Byzantine territories in order to better assimilate, but it is not clear whether complete assimilation, as represented by conversion, was necessary or even valued (Musset, 1975). Though Ahrweiler (1998) presents historical evidence that the Slavs became officially Christianized in the 9^{th} century by the Emperor Michael III, mass conversion was unlikely, and some individuals may have converted earlier while others remained pagan. Other researchers consider that this conversion, or the political event it represents, happened slightly earlier in the 9^{th} century AD, under Nikephoros I (Dunn, 1977; Herrin, 1973).

Coincidentally, the same sources arguing for the spiritual triumphs of Byzantine emperors also document the purported reconquest of the Peloponnese from the Slavs back to imperial administration. This concurrence leads to questions of what political triumph is actually being represented, especially given the fact that these historical sources were written centuries after the events they claim to document and follow established literary formula (Anagnostakis and Kaldellis, 2014). The issue of whether and how much cultural transfer is implied by religious conversion is subsumed in imperial rhetoric and therefore a subject that should be treated with caution. It is clear, on the other hand, that many foreigners who wished to become a part of the Late Roman and Byzantine world did so through visible involvement in the Christian church, and that most migrants to Late Antique Corinth would most likely have adhered to this dominant behavior.

Also during late antiquity, a series of invasions into Italy and northern Greece contributed to the perception that godless foreigners were a considerable threat to Roman culture (Ando, 2008; James, 2008). These incursions decimated cities, and in the Western Roman Empire were the forerunners of the *Völkerwanderung* or population movements which resulted in replacement of Roman rule by a series of Germanic successor kingdoms (Musset, 1975; Wirth, 1997). However, these foreign groups were not as much interested in destroying or raiding the Romans as taking them over. After Alaric and the Goths sacked Rome in AD 410, they settled in the area, and when the last Western Roman emperor was deposed in AD 476, the Huns established a kingdom in his stead (Heather, 1995). The Ostrogoths who controlled Northern Italy under King Theoderic established ties to the Roman Empire itself to lend their rule legitimacy; even the Byzantine emperor was portrayed as “other”, and painted in the “Orientalized” style (Heather, 1999). Archaeological evidence from these invaders would therefore be apparent in the introduction of foreign objects and behaviors, as well as acculturation by the invaders within the established culture. As a new dominant political power, decisions by these new rulers tied them to the previous administration in the area, and governance and culture of the existing population was likely uninterrupted.

It is even possible that the “barbarian invasions” themselves were overstated in scope by contemporary historical sources, with integration of relatively small groups of migrants being more common than destruction by large war parties (Elton, 1996; Whittaker, 1994). Even early research does not claim these armies were large, merely that there were a lot of them (Musset, 1975). Archaeological survey in central Greece north of Corinth and the isthmus supports population continuity through the 6th century AD, and not any lasting effects from the Slavic invasion (Bintliff, 1991). The perceived destructive power of these foreigners may have more to do with hysteria regarding their heretical religious views and the difficulty of administrating to nomadic peoples.

Whittaker (1994) further suggests that the foreign invasions were deliberately overstated by the elite, as propaganda against foreign cultural influences much as in the early Empire. Whether these individuals were invaders, as well as their impact on cities in the Eastern Empire, are therefore similarly obscured. Ethnic labels are the result of centuries of historiography, and in the case of the Germanic rulers of Italy, often referred to a composite of peoples drawn to each other for political or territorial gain rather than to any cultural affiliation (Musset, 1975). Similarly, the subject of identifying the Slavs as a culture group outside the boundaries of the Roman Empire remains hotly debated and a subject of fruitful archaeological discussion (Barford, 2001; Curta, 2005b). The possible identities and origins of these foreigners remain as obscured in historical sources as it is archaeologically, with no apparent consensus on where a culture group arose, its geographical range, or the length of time a term referred to an autonomous group, though the "bewildering array of ethnonyms" (Derks and Roymans 2009b: 4) present in the Roman frontiers may instead be a result of the dynamic process of ethnicity formation and renegotiation, and the rediscovery and adoption of these names by later groups of people (Derks and Roymans, 2009a; Whittaker, 2009).

Through archaeological and linguistic evidence, it is apparent that a group of people, today referred to as the Slavs, entered and settled in Greece, especially the western portion of the mainland and the Peloponnese, at some point during this time period, and are documented there well into the Middle Ages (Avramea, 2001; Curta, 2001, 2010b; Hammond, 1976; Vida and Volling, 2000; Volling, 2001). At some point they became integrated enough with local populations that they spoke Greek, though they left a legacy marking their long association with the region in the form of Slavic place names (Dunn, 1977; Herrin, 1973; Kaldellis, 2007). The manifestation of their arrival in the form of an invasion, however, appears to be dependent on the selective use of archaeological data to fill in the gaps left in the historic record, rather than a critical reading of either the historic or archaeological material. Moving forward, it will be more useful to first test whether foreigners are present through geochemical analysis. In the following section, I examine possible sources for migrants, sojourners, or travelers at Corinth specifically, to identify the setting within which foreigners may have found their way to the city in the first place.

2.3 Models for Population Movement in Late Antique Corinth

Population movement in Greece during the transition to administration by the Eastern Roman Empire is indelibly linked with the possibility of Roman military and economic decline and the realities of the barbarian threat (Brown, 1971c; Gibbon, 1932). As critical analysis of material culture fills in the gaps in the archaeological record, cultural continuity within regions as well as the strength of trade connections between regions can be tested using artifact comparanda at individual sites such as Corinth. The intensive archaeological excavations in this ancient city have resulted in a detailed ceramic chronology and a variety of archaeological hypotheses to explain the presence of exotic artifacts. The implications of these hypotheses on human mobility can be tested in turn using the large cemetery population excavated in the same areas.

2.3.1 Existing evidence for Late Antique population movement at Corinth

The probability of population movement during this period is high, even in a city at the edges of Roman administration. Imports were brought to the region in storage and transport amphorae, and other similar semi-luxuries may have been exported from Corinth in reused amphorae. Corinth may also have participated in the regional supply of olive oil or grain to the *annona militaris*. Temporary residents and recurrent migrants may have been motivated to visit the city based on the economic incentives signified by this trade. Visitors from the surrounding province may also have journeyed to Corinth to take advantage of its marketplaces allowing regional redistribution. Those sojourners who stayed longer due to increased involvement in trade or commerce in the city may have been organized in voluntary associations which would have protected their interests. Other sojourners may have included administrators or mercenaries sent by the Empire or the church in a regulatory capacity and to oversee this trade, and evidence of these officials may be present in the coin used by the Empire to pay their salaries. Still more temporary visitors may have come to the city as pilgrims, or even as raiding invaders. Finally, permanent relocations are also possible during this time period, such as through the slave trade, or through migration of whole families following in the wake of sojourners or recurrent migrants. Population movements at an even larger scale may have occurred as a result of government intervention and the deliberate relocation of groups of people to untenanted agricultural land, or through refugee movements with settlers looking for more advantageous or peaceful living opportunities.

2.3.1.1 Archaeological evidence for Corinth's Late Antique trade connections

Figure II.3 summarizes the maritime and overland routes from sites with a documented trade connection with Corinth during this period (connections data from ORBIS version 2, http://orbis.stanford.edu, Scheidel and Meeks, 2002). At Corinth, archaeological remains of trade are dominated by fineware ceramics and amphorae, though quantifiable pottery deposits from the Late Antique period are limited (Slane, 2003). The presence of standardized containers (Karagiorgou, 2001; van Alfen, 1996; Van Doorninck, 2015) in these deposits implies Corinth was involved with the *annona*, and the city also imported wine and possibly olive oil from the Levant. Other recognizable imports included cooking pots, metal, including coins and household implements, and jewelry. In depth provenience information for the minor objects from Late Antique Corinth is also currently underway, and promises to augment this dataset considerably in the future. However, as Figure II.3 shows, currently these data document

Figure II.3. Cities with connections to Late Antique Corinth and the routes between them (connections data from ORBIS version 2, http://orbis.stanford.edu, Scheidel and Meeks, 2012).

a focus on the Eastern Mediterranean, particularly the Aegean (Hammond, 2015; Slane, 1990, 1994, 2003, 2008; Slane and Sanders, 2005). The middlemen transporting these goods may logically have originated anywhere along these routes, and not necessarily just at their end points.

The snapshot which currently exists regarding Corinth's trade connections in late antiquity is primarily based on ceramic assemblages excavated under the auspices of the American School of Classical Studies (ASCSA), which are mainly located on the western side of the city and outside the Late Antique city walls. These site locales include the Sanctuary of Demeter and Kore on the northern slope of Acrocorinth (Slane, 1990, 2008), east of the Theater to the west of the city center (Slane, 1987, 2008; Slane and Sanders, 2005), near the Baths of Aphrodite to the north (Slane and Sanders, 2005), and in Panayia Field (Hammond, 2015; Sanders, 1999; Slane and Sanders, 2005). The long use throughout this time period of the area southeast of the Roman commercial center, referred to as Panayia Field by the excavators, has been further noted and chronologically explored by Hammond (2015). While transport vessels are notoriously difficult to source, given their reuse and the fluorescence in forms, especially in Aegean globular amphorae (Poulou-Papadimitriou and Nodarou, 2014; Poulou-Papadimitriou, 2001), growing lists of production centers, kiln sites, and comparative fabric and chemical analyses enable the identification of a number of imports in these deposits. Thus, trade in and consumption of foreign-sourced agricultural products is well-documented for the communities utilizing the nearby cemeteries.

The earliest deposits in these areas, dating to the 5th century AD, contain fineware ceramic imports from North Africa (North African Red Slip or AfRS), Athens, the western coast of Turkey (Phocaean red slip ware or PRS, also known as Hayes' form Late Roman C or LRC), and Cyprus (Cypriot Red Slip or CRS otherwise known as Hayes' Late Roman D or LRD) (Slane, 2008; Slane and Sanders, 2005). They also provide evidence for a wide range of commercial connections with both the Western and Eastern Mediterranean at this early point from transport and storage containers.

Amphorae from North Africa, Portugal and possibly Spain and Sicily, are present along with Aegean transport vessels, LR1 and 2, Gaza amphorae and Palestinian amphorae.

Starting in the second half of the 5th century, these ceramic assemblages begin to show a decline in trade activity with the Western Mediterranean, as North African amphorae are missing, though connections to this region remain in the form of finewares (especially AfRS and local imitations of AfRS) (Slane and Sanders, 2005). This trend intensifies later, as transport amphorae from this region are only represented by isolated finds. Though AfRS continues to be imported, the full range of forms of this fineware are not found at Corinth, indicating a more intermittent or sporadic import network for this product (Hammond, 2015). Imports from the Levant (especially LR1, Palestinian, and Gaza amphorae) are also present, but the majority of ceramics indicate intensification of Aegean networks, intra-regional trade, and local production, as indicated by the concentration of amphorae and other pots manufactured from so-called Corinthian cooking fabric and regionally manufactured cooking pots, possibly from the Argolid (Hammond, 2015; Slane, 2008; Slane and Sanders, 2005). Finewares from Athens and Boiotia augmented this regional network as well. Other imports include mwj, probably from western Turkey along with cooking pots with similarly micaceous fabric and PRS, and amphorae possibly originating in Thessaloniki (Hammond, 2015; Slane and Sanders, 2005).

In the 6th century AD, the Western Mediterranean may have had renewed contact with Corinth as trade connecting these regions is thought to have reopened as a result of the Emperor Justinian's military conquests (Laiou and Morrisson, 2007; Reynolds, 2010). Grain from North Africa was diverted from Rome to Constantinople, and Corinth was on two of the major routes by which *annona* shipments would have journeyed (Hammond, 2015). However, the majority of ceramics, especially finewares, were sourced in the Eastern Mediterranean despite renewed access to these western markets (Hammond, 2015; Slane, 2008; Slane and Sanders, 2005). This trend continues into the following centuries. By the end of the 6th century AD (Assemblage 3, Slane and Sanders 2005), along with AfRS, PRS, and Boiotian Red Slip finewares, imported amphorae were mainly restricted to vessels produced in the Eastern Mediterranean. At this time, local ceramic manufacture also appears to have strengthened, as Corinthian imitations of lamps and other ceramic products appear to have taken the place of comparable imports from Athens and North Africa (Slane and Sanders, 2005). As imports continued to include finewares and the containers used to transport commonly used perishable goods, this provides support for the suggestion that the region was self-sufficient but prosperous, providing a demand for exotic luxuries and semi-luxuries (Hjohlman, 2005).

Throughout the 7th century AD, Corinth's connections to Aegean trade networks were well-established, and common ceramic imports to the city include coarse and fineware from the eastern Aegean or the west coast of Turkey. Assemblage 4 (Slane and Sanders, 2005) includes many ceramics manufactured from the Aegean micaceous fabric, along with glazed white ware, Saraçhane amphorae type 22, and regionally produced ceramics such as LR2. It is possible that Corinthian involvement in trade with Cyprus, southern Turkey, and the Levant was limited after the Arab conquest of the region, though North African, Cypriot, and Palestinian imports are also present (Slane and Sanders, 2005). In Panayia Field, these 6th and 7th century finds are accompanied by a few imports that may have been manufactured in Crete (Hammond, 2015).

Hammond (2015) suggests, however, that the presence of Aegean cookpots and imports at Panayia Field are the result instead of occasional acquisitions of these ceramics by ships moving through the area along major distribution routes from the Levant which continued after the area is typically thought to have been cut off from Aegean trade networks. Similarly, the low frequency of diagnostic fragments of mwj, and the isolated nature of Asia Minor types of lamps and finewares, may indicate only occasional large cargoes of foodstuffs reached Corinth from western Turkey. The popularity of PRS and micaceous cooking pots may instead have led to their addition as secondary cargoes on ships carrying Palestinian wine amphorae (Hammond, 2015). The so-called fruit amphora, manufactured locally starting in the second half of the 5th century AD, may have been a local evolution of LR2 (Slane and Sanders, 2005) and may have been exported or used for regional transport of consumables. The presence of this amphora in late assemblages may explain the lack of similar vessels from Cyprus (such as Late Roman Amphora 13 or LR13) (for LR13 development see Demesticha, 2005), and may indicate competition with that region. It also appears that Corinth had contact through trade with the Adriatic, Constantinople, and the Balkans, especially Thessaloniki, and the Danubian frontier (Slane and Sanders, 2005).

Grave assemblages may have also contained imports in late antiquity. Graves north of the city center contained numerous small pitchers and so-called lekythoi, probably used for oil dispensing, and many of these appear to have been manufactured from Boiotian fabric (M. Hammond, pers. comm.). Lamps from graves and Attic finewares provide evidence for a trade connection between Corinth and Athens as well, and the development of Attic and local Corinthian imitations of North African lamps also suggest that North African aesthetic motifs continued to be influential in ceramic production into the 6th century AD (Garnett, 1975; Karivieri, 1996; Perlzweig, 1961; Slane, 1990, 2008; Slane and Sanders, 2005). Corinth did not produce its own fineware ceramics during late antiquity, instead importing AfRS through the 6th century AD along with PRS, and occasionally CRS to augment its regional imports (Slane and Sanders, 2005).

Other imports for which the provenience is less obvious include jewelry, such as ivory, bone, and gems (Davidson, 1952). Many of these objects, such as ivory items and one engraved gem possibly used as a magical amulet, may have originated in Egypt (Davidson, 1952; Rodziewicz, 2009). Weapons and other specialized metal objects were probably produced near the major mineral deposits exploited during this period, especially those objects which may have been issued to soldiers in the army as part of their kit (Mango, 2009c). Mines which produced aluminum and copper were present along the northern and western coast of Turkey, iron by Athens and Thessaloniki, and tin in southeast Turkey (Laiou and Morrisson, 2007: 28). Thirteen metal production centers are documented in the Eastern Mediterranean near these sites, and weapons were manufactured at Irenopolis, Antioch, and Sardis (Mango, 2009c). One sword hilt excavated from a burial at Corinth along with a fire-starter and other military accoutrements has comparanda from Pergamon, near Sardis on the western coast of Turkey (Weinberg, 1974). Pergamon is also geographically near the suggested production area for PRS and other ceramics made from micaceous fabrics, indicating that the region may have exported finewares in addition to metal consumables and military equipment, rather than foodstuffs, to the western Aegean. Mango (2001, 2009c) suggests that additional unworked metals such as copper may have been a substantial component for Late Antique cargos, and were worked into household appliances or other small items after reaching their final destination.

The presence of these metal objects connected to military service implies that a military garrison may also have been present in Corinth. As members of the Eastern Roman Empire's army were recruited from a number of populations along the frontiers and were issued these items as part of a set kit, their origin is unlikely to match that of their official gear (Mango, 2001, 2009c). Many of these soldiers may instead have originated further east in the Armenian provinces, the major port city of which is Trapezus (Charanis, 1963; Garsoïan, 1998).

The numismatic evidence at Corinth has traditionally been used mainly as a *terminus post quem*, with gaps in the numismatic record commonly though problematically interpreted as evidence for episodic abandonment of the city or the Acrocorinth citadel (Charanis, 1955; Curta, 2005a; Sanders, 2004; Setton, 1950). However, this dataset also has the potential to identify economic and political connections during the Roman and Byzantine period as monetary distribution is often related to military or imperial spending efforts, and identification of which mints supplied coins which reached the city may highlight military supply or official *annona* routes (Hendy, 1985; Howgego, 2009; Randsborg, 1998). Over 3000 coins from ASCSA excavations were cleaned and catalogued in 2009 and 2010, thanks mainly to the Kress Foundation, and reevaluation of this material is sure to provide rich information on life in the ancient city.

Problems with this dataset remain in the identification of mints for small-denomination coins, which are particularly common during late antiquity on mainland

Greece (Curta, 2005a), as well as the possibility of so-called barbarian imitations of established imperial mints, which are difficult to differentiate (Grierson, 1982; Hendy, 1985). However, publications of selected hoards from Corinth offer insight on distribution patterns involving the ancient city. For example, coins from one late 4th century AD hoard from the Gymnasium area at Corinth included some minted in Aquileia, Siscia and Constantinople, though the majority were struck in Rome and Thessalonica (Dengate, 1981). Coins from a 5th century AD hoard from Corinth were instead minted overwhelmingly in the Eastern Mediterranean (Mattingly, 1931). These hoards provide interesting comparisons to two 6th century AD hoards from the Gymnasium, where non-residual mints included mainly Constantinople, Antioch, Nicomedia, and Thessaloniki, with only a few coins minted in Carthage, Rome, or Cyzicus (Dengate, 1981). One other hoard from the 11th century AD indicates very different later political or economic connections, as all coins from this hoard were minted in Italy (Dengate, 1981). These findings appear to reinforce the ceramic evidence that Late Antique Corinth was heavily involved in Eastern Mediterranean networks, both trade and political, in contrast to significant interactions with Italy and the Western Mediterranean in the preceding and subsequent centuries. Little archaeological evidence exists connecting the bishopric of Corinth with the Pope in Rome, for example, despite a possible early 6th century alliance between these areas (Charanis, 1974; *Chron. Marcell.*).

It is possible that Corinth was already strongly involved in eastern trade networks following the sack of the city by Mummius which diverted Italian imports to Patras. Another causative factor in this decline in western imports to Corinth may have been the declining demand for salted fish and fish products by the 5th to 6th centuries AD as evidenced by the drop in production centers around the Straits of Gibraltar, a market Corinth had been strongly involved with in previous periods (Munn, 2003; Wilson, 2009). By late antiquity, Corinth was invested in trade networks centered on the Aegean, though decorative elements on locally produced ceramics implies other portions of the Peloponnese may still have been linked to southern Italy. Pickersgill (2009) suggests that at the site of Sparta in the southern Peloponnese, the red paint dripped, painted or splashed onto vessels and the common use of rouletting and cogging has its closest parallels in Italy, and are motifs rarely found on products made in Athens or Corinth.

The Arab conquest of the Levant, Cyprus, eastern Turkey and North Africa in the early 7th century AD may have disrupted the eastern- and southern-most extent of these trade connections, as trade in items such as Palestinian wine or table wares produced in Cyprus was curtailed by political relationships between the Byzantine and Sassanid Empires (Armstrong, 2009; Trombley, 2001a). As a result, in the 8th century AD, trade in the southeastern Mediterranean operated without interaction with Constantinople, and tangentially also resulted in the decline of identifiable Levantine or Cypriot products in cities in the Aegean (Armstrong, 2009). Without these commonly used chronological indicators, archaeological identification of 7th-9th century AD settlements has been problematic, leading to the traditional assumption of population decline or abandonment at many sites, especially in Greece (Kountoura-Galake, 2001).

2.3.1.2 Invaders, mercenaries, and administrators at Corinth

The richness and geographic situation of Corinth would have made the city a major target for invading armies, several waves of which are thought to have swept through Greece during the Late Antique period. The first incursion was that of the Heruli, who are thought to have sacked Athens in AD 267 and later devastated cities in the Peloponnese, including Corinth (Broneer, 1954; Frantz et al., 1988; Williams and Zervos, 1982, 1983). On the other hand, attribution of destruction layers at Corinth and other major urban areas to the Heruli have lately been brought into question through the application of updated stratigraphic chronologies (Avramea, 2001; Kosso, 2003; Slane, 1994, 2008; Slane and Sanders, 2005). In the centuries following the Herulian invasion, Greek cities were considered to be under a “constant threat of attack” (Frantz et al., 1988:13) from a variety of northern groups including Alaric and the Visigoths, the Goths, the Huns, the Slavs and/or Avars in AD 580, and finally the Bulgars in the late 7th century AD (Charanis, 1970; Frantz et al., 1988; Musset, 1975; Setton, 1950).

The 6th century event, usually referred to as the "Slavic invasion," may have resulted in the abandonment of Corinth, and is therefore of considerable interest for this research. According to historic sources, especially the so-called Chronicle of Monemvasia, the Slavs settled throughout the Peloponnese in Greece, including the land surrounding Corinth, while the native Greeks are thought to have fled to live as refugees in the mountains or on the island of Aegina (Charanis, 1950; Fowden, 1988; Hood, 1970). Ancient sources document a Slavic presence in the area well into the Middle Ages, where they eventually became integrated enough with local populations that they spoke Greek (Dunn, 1977; Herrin, 1973; Kaldellis, 2007).

However, some researchers have questioned whether this was a violent invasion, or whether a series of famines or plagues had devastated the native population to the extent that foreigners, possibly originating in the Carpathian Mountains, had been invited into the Roman Empire to repopulate the area, as there is no archaeological evidence of a break in land use in the countryside around Corinth or its city center in the 6th century (Brown, 2010; Kosso, 2003; Paparrigopoulos, 1843; Pettegrew, 2007, 2010; Sanders, 1999, 2004; Slane and Sanders, 2005). Recent survey work on so-called "isles of refuge" in the Corinthian and Saronic Gulfs, for example, has shown that marginal areas such as these islands have been occupied sporadically since the Bronze Age, including during late antiquity (Gregory, 1986a; Kardulias et al., 1995). This use moreover appears to coincide with periods of economic expansion, when land was at a premium, rather than during times of economic stress or under threat of invasion (Kardulias et al., 1995). Archaeological survey data from the province of Achaia as a whole has also been interpreted to support its continued presence in the tax base of the Eastern Roman Empire (Kosso, 2003), though Kosso appears swayed by arguments that urban areas such as Corinth were targeted by raids and depopulated.

On the other hand, the ancient historian Procopius records a massive earthquake, closely followed by plague, in the 6th century AD in Corinth, which may have provided a situation where population relocation and repopulation was warranted (Procop. *Aed*. 4.2; *Anecdota* 19). The very trade connections that led to economic prosperity in the city would also have transported the Bubonic plague there during its outbreak in AD 542 (McCormick, 2003; Sarris, 2002). Refugees of the Byzantine Empire's conflict with the Sassanian Empire from Armenia, the Levant, and Cyprus may have been potential settlers for these decimated areas on mainland Greece, as exiles from these areas are present at this time in western Turkey, Sicily, and Italy (Charanis, 1963; McCormick, 1998). The Slavs may also have taken advantage of these newly untenanted areas in an official or unofficial capacity (Soltysiak, 2006).

Archaeological evidence from the urban center of Corinth has also been historically interpreted as showing a break in cultural activity following the Slavic invasion, with historical accounts seeming to indicate that the entire region had been taken over by the Slavs (Charanis, 1950, 1970; Davidson, 1952; Finley, 1932). On the other hand, this evidence is primarily numismatic and thus equates the Byzantine monetary economy with the presence of its citizens (Curta, 2005a; Hendy, 1985; Sanders, 2004). Instead, it is possible the population, reduced in size by plague and famine, simply did not support a large, centralized urban center (Palinkas and Herbst, 2011). Alternatively, as the function of cities is thought to have shifted during this time period from a place to live to a place of refuge, this reduction in the size of the city would be expected as the majority of the population resided outside the walls and the majority of civic money was spent on walls and fortifications or churches (Hodges and Bowden, 1998; Liebeschuetz, 1992; Morrisson and Sodini, 2002). Archaeological excavations in contemporary city centers to Corinth have identified similar trends in continued use and reuse, with reduced spending on commercial or civic buildings, such as what would be expected during an economic downturn (Brown, 2010; Christie and Loseby, 1996; Lavan, 2001).

In burials dated to the Late Antique period in Corinth, a number of foreigners have been identified based on grave morphology and the inclusion of certain key artifacts such as weapons or belt buckles, though much debate revolves around the question of the cultural identities of the actual skeletal remains (Charanis, 1952; Davidson, 1952; Davidson and Horváth, 1937; Ivison, 1996; Pallas, 1954; Setton, 1950, 1952; Weinberg, 1974). Parallels for the artifacts have been discovered throughout the Roman world, as well as similar grave assemblages in Greece, leading to the popular assumption that these graves belong to members of a class of mercenaries, possibly Slavic in origin, that were stationed throughout Greece during this time period. The possibility that the kit issued to new soldiers was imperially dictated, and supplied through imperial factories, also complicates the association of these military objects with ethnicity (Mango, 2009c).

This identification is problematic in chronology (Sanders, 2004), as well as in cultural affiliation (Barford, 2001). As noted, although the Late Roman army employed mercenaries from many frontier areas, the relationships of these "wandering soldiers" (Weinberg, 1974) to any particular geographic origin is difficult to establish given the fact that military service usually led to cultural integration (Charanis, 1959; Laiou, 1998). Similarly, modern consensus on the origin and material culture of the Slavs is also lacking, with leading researchers highlighting the fact that the Slavic ethnicity is derived from modern linguistic distributions and that ancient descriptions of the Slavs are more indebted to stereotypes about barbarians than to actual culture contact (Barford, 2001; Curta, 2005b, 2010b; Halsall, 2007). Modern historical reconstructions of Late Antique invasions by these ethnic groups, on the other hand, are dependent on biased ancient sources, many of which are themselves also secondary accounts, and which attribute with varying credibility a 6^{th} century invasion event (which sometimes devastates the Peloponnese, including Corinth, and sometimes does not even enter Greece) to such foreign groups as the Huns, Bulgars, Cotrigurs, Onogurs, Slavs and/or Avars (Barford, 2001; Charanis, 1950; Curta, 2010b).

Problems inherent in these identity attributions further complicate the question of population movements in antiquity. Ethnicity assignments are contentious in Greece as in the rest of Europe due to its close ties to issues of national identity, national pride, and ethnic purity (Brather, 2000; Curta, 2010b; Kohl, 1998; Wood, 2008). Addressing the question of a "Slavic" presence in Corinth is therefore politically charged, where "Slavs" could be destructive invaders, helpful army conscripts, or individual migrants depending on the inclinations of the researcher or the historical source deemed of most interest. Such an approach does not incorporate the social context of these migrants at this city, as the degree to which existing social interactions required foreigners to assimilate or group together for support would have an impact on identity formations (Brettell, 2000; Foner, 2007). Therefore, this research takes the archaeological identification of migrants with reference to how the remainder of the population at Corinth was buried as the first step in the discussion of population assimilation or of internal change in native populations.

2.3.2 Hypotheses and research design

Archaeological and literary evidence can thus be used to characterize life in Late Antique Corinth in very different ways: either the city was or it was not an important center vital to the imperial administration of the Eastern Roman Empire. In this dissertation, I use these characterizations to develop two models correlating how these differences in urban setting would have resulted in different types of population interactions. To test individual hypotheses of whether foreigners were present, and how they may have been incorporated into either of these societies, I use mortuary archaeology and skeletal geochemistry. First, I identify grave groups which relate to the city's social groups or communities based on shared mortuary behavior. Second, I use oxygen, carbon, and strontium isotopes in tooth enamel to identify non-locals within these burial groups and to document dietary variability, which may be an indication of status differentiation or cultural differences. While much of the discussion of Late Antique population movement relies on the supposition that people and archaeological objects would have moved along the same routes for the same reasons, here I use the presence and integration of these foreigners in the city cemeteries as an independent characterization of Late Antique connectivity in the provincial capital of Achaia.

To test whether shared burial practices imply social integration, I also use mortuary analysis to examine behavioral change over this time period. Shifts in ritual practice coinciding with the arrival of migrants would indicate a lack of social integration of these individuals, while the association of specific aspects of mortuary treatment with sex, age, or status instead supports a more integrated urban environment. As many individual tombs were used for multiple, sequential burials over a protracted period of time, and multiple burial locations are present in this dataset, these analyses further test whether shared mortuary behavior correlates with geographic origin during this archaeological period.

I use two models, each including multiple testable hypotheses, to interpret these measures of biological and cultural identity. The "Isolation" model (**Model One**) follows the traditional view of population interactions in late antiquity. Corinth is expected to be relatively insular and self-sufficient, with little Imperial input on provincial administration. Under this "Isolation" model, foreigners would only have briefly visited the city unless a major invasion or political takeover occurred. Alternatively, if Late Antique population interactions are better characterized through connectivity (**Model Two**), more foreigners would be expected in a large port city such as Corinth. The integration of these foreigners would be dependent on the historical setting for population movement and whether migration events were controlled or influenced by the state. These hypotheses regarding the presence of foreigners in Late Antique Corinthian society are further elaborated below (see also Table II.1).

2.3.2.1 Model One: Isolation of the Corinthians

Given Corinth's distance from Constantinople and isolation from active battlefront frontiers of the Empire, it was relatively insulated from administrative oversight. While the Eastern Roman Empire and its army actively attempted to control the foreign states and allied *foederati* to the north, and engaged in open conflict against the Sassanid Empire to the east, the Peloponnese required relatively low maintenance or regulation and could be expected to operate at least semi-autonomously. Overall expectations are for limited population movement during this period, with most foreigners present only temporarily, and neither settling in the area nor represented in the city's cemeteries. This model also operates under the assumption that economic and political isolation of this city would have resulted in few incentives for interregional migration except as a result of territory expansion. In other words, it prioritizes mass migrations, as opposed to individual migration decisions by individuals or families, as the only population movement likely to be recognized using skeletal geochemistry.

Though exotic objects were likely available through luxury trade, their present in the archaeological record was likely a result of middlemen rather than through direct or protracted population interactions. Trade connections which did exist were a result of required contributions such as taxes to the state, possibly in the form of grain and olive oil to the *annona* funneled through Constantinople, but the majority of trade routes bypassed Corinth. This oversight would have simultaneously enhanced the city's isolation and limited market-driven trade and distribution of surplus agricultural produce. Members of the merchant class would have sold small, valuable items transported alongside *annona* cargoes (Mango, 2009a) to local shops while collecting staple foodstuffs for state-directed trade, and would not have stayed long enough to be integrated into Corinthian society. This traditional view of Late Antique population interactions includes the possibility that foreign invaders or raiding parties may have interacted with locals due to a lack of imperial investment in fortifications or infrastructure, and therefore, this model can be broken down into three hypotheses.

1A. No invasions occurred and there was no influx of foreigners.

Expectations: no foreigners are likely to be identified geochemically. Mortuary behavior will change slowly over time according to aesthetic and religious popularity, and will not show any abrupt changes. Changes that do occur are those documented throughout the Eastern Roman Empire, both historically and archaeologically. Exotic objects such as weapons or jewelry were placed in the grave as a result of their symbolic reference to status or profession. Mortuary clusters and spatial placement of the deceased will be associated with other archaeological correlates of social hierarchy, biological identity, or profession. Dietary distinctions as displayed in $\delta^{13}C$ value are expected to mirror status distinctions.

1B. Northerners took control of the area and its natives

If the “Slavic invasion” was the Eastern Roman Empire’s term for a relatively peaceful political transition that occurred in the Peloponnese as a result of neglect or disinterest by Constantinople, this would suggest that the political history of mainland Greece for this time period was similar to the succession of “barbarian” kingdoms described for Late Antique Italy. In other words, a group of migrants would have taken control of the city at the same time as they acculturated within native Eastern Mediterranean traditions and culture. These northerners would have been unlikely to retain an identity based on their foreign origin, due to their desire to portray themselves as native, and contact with and subsequent migrations from the emigration area are unlikely. This turnover of political power may have occurred around the date recorded for the so-called “Slavic invasion” in AD 580.

Expectations: foreigners would be identified geochemically in graves dating to the late 6th century AD only. Any foreigners will also share a single geographic origin. As the rulers of these successor kingdoms are considered to originate to the north and possibly in the Balkan area, oxygen isotopic ratios of these foreigners should be significantly lower (or lighter) than those of Corinthian natives (Bowen, 2015; Bowen and Revenaugh, 2003). These foreigners acculturated within native society and display dominant local traditions, and this migration would have remained an isolated event.

While some mortuary traits may have been introduced by these migrants, the majority of behaviors would conform to established regional traditions. After the political takeover, foreign objects may have been placed in graves by locals attempting to assimilate into the newly dominant culture group, however, it is more likely that the new rulers attempted to legitimize themselves as “Romans,” as attempted by the Ostrogoths, Goths, and Huns in Italy (Heather, 1999). Therefore, I expect these migrants will not display distinct mortuary behavior, though they may be buried in a distinct burial area. In general, funerary ritual and styles practiced throughout the Eastern Roman Empire will likewise be displayed at Corinth, much as in hypothesis 1A, and observance of this behavior will be dependent on existing social hierarchies. If foreigners are present in mortuary groups, they will be associated with archaeological or dietary correlates of high status.

1C. Northerners invaded Corinth in AD 580

In AD 580, an invasion event caused the original inhabitants of Corinth to abandon the city. As suggested by the Chronicle of Monemvasia (Charanis, 1950), these invaders are identified as Slavs who traveled south from the Balkan region north of Thessaloniki and settled throughout the Peloponnese immediately following the invasion.

Expectations: If Corinth was invaded by a foreign power, this resulted in population turnover, and any graves placed in the area surrounding Corinth after AD 580 would belong to the Slavic occupation. Invaders would display a nonlocal isotopic signature indicating a northern origin, with geochemical results similar to those expected under hypothesis 1B. Additional waves of migrants may also have arrived from the same emigration area after the initial invaders took control of Corinth. This population turnover would be accompanied by a distinct change in mortuary behavior. Mortuary behavior subsequent to the invasion will not match trends found in the majority of the Eastern Roman Empire and may represent the observance of non-Christian burial rituals. Though later generations may include additional migrants, the majority would display isotopic ratios consistent with the local range. However, mortuary traditions will be consistent with behaviors introduced by the original invaders. As food preference and/or preparation may have differed for these northerners (Killgrove and Tykot, 2013; Lightfoot et al., 2012; Soltysiak, 2006), invaders and their descendants may display a diet relatively enriched in C_4 plants such as millet as compared to the earlier inhabitants of the area. Groupings by distinct mortuary behavior will likely first identify invaders, with these individuals most likely buried together, possibly in a separate cemetery location than that used by the displaced population.

2.3.2.2 Model Two: Widespread population movement and interaction

Model Two emphasizes sustained connectivity in the Eastern Mediterranean over time, and calls for viewing the Aegean basin in particular as one networked unit. Recent formulations of trade in late antiquity emphasize the strength of the import-export economy in the Eastern Mediterranean, implying that the network of trade connections developed during earlier periods remained strong in the Eastern Roman Empire despite its decline in the West. This trade network was partially state-mandated, as it distributed taxes in the form of bulk foodstuffs throughout the empire, but may also have provided entrepreneurial opportunities (Kingsley and Decker, 2001; Mango, 2009b). Under anthropological migration theory, any foreigners residing in the city as a result of these economic incentives would have been dependent on institutions and established migration networks supporting their activities.

In other words, the middlemen who took advantage of trade opportunities may logically have originated from coastal areas throughout the Empire. Their activities, on the other hand, including the length of time they stayed in any single market city, were dependent on the degree of regional administrative regulation and the development of associations to protect their interests against competing state and civic institutions. As an integrated port city in the Aegean and Eastern Mediterranean networks, Corinth would have been a target for these visiting merchants and ship-owners, and foreigners regulating or mediating their activity would be expected to reside there. Their integration, however, would be dependent on state involvement in provincial governance as well as the historical setting for population movement in this particular urban context.

The presence of a migration process rather than a migration event, wherein foreigners are present in the city's cemeteries throughout late antiquity, would be strong evidence for the presence of institutionalized mechanisms of integration, especially if these migrants are present in mortuary contexts identical to those of locals. On the other hand, the presence of sojourners integrated into Corinthian society through these voluntary associations may also have led to the establishment of migration streams connecting Corinth to other geographic locations. These migration streams may have continued despite a lack of direct trade connections between these two areas. It is also possible under this scenario that migrants may be present who do not acculturate; these foreigners are likely the result of a single diaspora-like event and their relocation may have been assisted or mandated by the state. This group of migrants would not make use of institutionalized migrant associations but instead would be likely to remain an insular community within Corinthian society. Two hypotheses account for these relative differences in the history of the migration process and the institutionalized mechanisms of integration present in Late Antique Corinth.

2A. Economic connectivity leading to a melting pot society

In the event that these connections resulted in interregional demand-based markets for semi-luxuries, economic advancement through trade entrepreneurship would have been possible. As Corinth would have been integrated into this burgeoning market, the city would have developed into a regional distribution center with free market exchange. It would also have hosted a wide variety of organizations and services related to this focus. Many of these professions would also have been available primarily to migrants as representatives of the interests of foreign-born middlemen or the aristocracy in Constantinople. This situation would thus result in an open society with many migrants. Acculturation would have readily occurred and identity would have been dependent on status, profession, and immediate kinship ties rather than on being born a native Corinthian.

Moreover, members of the merchant class may have been present from a variety of origins, and their ability to function in a city far from their home was likely dependent on their membership in voluntary associations which functioned like modern migration networks. These groups would have provided a community and fictive kinship ties, and even the guarantee of appropriate burial and commemoration when members were far from home. Other recurrent migrants would have been ship-owners or operated in intra-regional trade networks. Contact between these initial settlers or travelers and their home society would likely have resulted in subsequent migration events, establishing migration streams. Merchants, as middlemen and entrepreneurs from a variety of origins, would be unlikely to share origins with the foreign objects they traded. At the very least, however, identification of the possible origins of the merchants may elucidate trade routes whereby luxuries and semi-luxuries made their way to the city.

Expectations: foreigners would be identified displaying a variety in isotopic signatures, rather than demonstrating a shared geographic origin. As contact between these settlers and their home society would likely have resulted in subsequent migration events, chronologically later burials, especially those placed close to sojourner's graves or later interments utilizing the same tomb structure, may display the same foreign isotopic signature as that of earlier migrants. Mortuary behavior will follow stylistic and religious trends found throughout the Eastern Roman Empire. Groups of distinct mortuary behavior, spatial placement of the deceased in the cemetery, or the placement of more than one corpse in the same tomb may pertain to identity insofar as voluntary associations were likely to offer funeral services to members. These mortuary groups would include, but not be limited to, foreigners. Interment placement may also relate secondarily to social hierarchies and professions, in which case they will be associated with archaeological and biocultural correlates of status and sex.

2B. State regulated population movement leading to a multicultural society

In the event that the state was highly involved in economic and military administration in the region, foreigners at Corinth would be regulated as well. The Roman and Byzantine Empire controlled the supply of basic foodstuffs through the *annona* (especially the *annona militaris*), and transported groups of people to underpopulated areas in order to boost production and expand the tax base. Mercenaries and other army members, governors, and tax collectors could all also be expected to be transported to the city as a result of state mandated movements. However, many of these sojourners may not have remained in the city to be buried there, given legislative regulations on the amount of time officials were allowed to stay in the provinces they administered (*Cod. Theod.* 8.8.4). Traditionally, only veterans were awarded unoccupied land near their military posting (*Cod. Theod.* 7.15.1, 7.20.3, 8, 11). However, any residence would lead to the accumulation of information regarding the city which may lead to later migrations. These migrants may not have integrated into Corinthian society to the same degree as population movement instigated by consumer-driven markets. The large numbers of people moved during mass relocations, and the regulation of population movements overall, would have resulted in a cosmopolitan city where foreigners are less acculturated to local behavioral norms, including mortuary behavior, than would be found under hypothesis 2A.

Expectations: foreigners would be identified geochemically, and distinct groups of migrants would share geographic origins. These groups would most likely also be archaeologically visible in the form of distinct mortuary behavior. Mortuary groups as well as spatial placement of the deceased may be the result of migrant segregation, as they may have implemented foreign burial rituals and placed distinct objects in graves. Mass relocations to Corinth to increase the tax base of the city would have been chronologically restricted events involving relatively low-status laborers. Thus, only initial migrants would display a foreign isotopic signature, though the burial behaviors they introduced would likely be practiced by their local children. All of these graves would lack mortuary correlates of high status. On the other hand, if governors or other imperial officials disregarded legislative regulations and settled permanently in Corinth, isotopic ratios would identify few nonlocals from their place of origin, and these individuals would be interred in high status graves. The likelihood that mortuary groups may also pertain to social hierarchy, age, sex, or profession among local Corinthian burials will also be tested.

2.3.3 Discussion

In summary, mortuary distinctions in Corinthian cemeteries can be expected to covary with the presence of foreigners if large groups of migrants enter the city as a result of invasion or mandated population movement. However, acculturated foreigners may also be integrated into existing mortuary groups as a result of smaller scale migration events (see Table II.1). In the latter situation(s), the Eastern Roman Empire likely had less regulatory of a role in population movement and Corinthian administration. Diachronic change in mortuary behavior is a likely result regardless of population interaction, so the first step in this research will be to examine how this activity changed over time, and how it relates to existing social organization at this site. The identification of whether behavior change occurred in tandem with the arrival of migrants, whether these nonlocals were buried with mortuary correlates on the extremes of the status spectrum, their presence in the same graves as locals or in close proximity with natives, and whether these foreigners originated in one geographic location or had a range of origins will be used to discriminate among these hypotheses.

However, it is possible that these outcomes may be oversimplifications of Late Antique behavior. The transportation of slaves, for example, may complicate the interpretation of mortuary groups and isotopic data as the archaeological correlates for slave and freedmen communities in Late Antique Corinth have not been identified. Any slaves or freedmen may have been buried together in a manner similar to that expected for merchants or other trade professionals. However, they will be unlikely to have been buried in graves displaying mortuary correlates at the high end of the status spectrum.

Table II.1. Hypotheses for mortuary correlates of population movement.

	Expectations: Mortuary Behavior — Abrupt Change?	Mortuary Behavior — Behavioral Groups Indicate…	Isotopic Geochemistry — $\delta^{18}O$ and $^{87}Sr/^{86}Sr$ (geographic origin)	Isotopic Geochemistry — $\delta^{13}C$ (diet)
Model 1: Isolation				
1A. No invasions occurred	No	• Temporal change • Status and/or family groups	• Local values only	Values probably correspond with status distinctions
1B. Political coup by foreigners	No	• Temporal change • Status and/or family groups • Shared foreign origin likely leads to shared burial location	• Shared values • Migrants buried in groups corresponding with high status • Non-local values only in graves dated to a restricted period	Correspond with status distinctions
1C. Slavic invasion in AD 580	Yes, before/ after invasion	• Temporal change • Foreign origin • Status and/or family groups	• Shared values • Migrants present in burials after invasion event, but otherwise not period-specific	Dietary change after invasion event
Model 2: Widespread Population Movement				
2A. Migrants integrated	No	• Temporal change • Status and/or family groups • Voluntary assoc. / class membership	• Values indicate a variety of origins among migrants • Migrants will be dispersed in more than one mortuary group	Values probably correspond with status distinctions and may also differ with geographic origin
2B. Migrants segregated	Yes, for a subset of graves	• Temporal change • Status and/or family groups • Foreign origin	• Shared values in mortuary groups, both possibly spatially isolated • Non-locals only following one migration event	• Correspond with status distinctions or geographic origin • Migrants' values may be shared with low status group

Among those high status graves, on the other hand, foreign administrators who settled in Corinth will likewise confound discrimination among models, as this finding will simultaneously correspond with a society where foreign migrants were aristocratic rulers attempting to make use of the existing bureaucracy, as well as one where mobility only operated under imperial control and governors were sent to the city. In this case, a large quantity of migrants from the same source population, especially if buried in nearby graves, will imply that these foreign administrators were filling a power vacuum and were not officially affiliated with the Eastern Roman Empire.

Other difficulties may arise in identifying population movement in that any groups who relocated to take advantage of untenanted rural agricultural land may not have been buried in the cities. It is possible that these migrants were responsible for new settlements being established outside of the boundaries of existing cities, resulting in little if any sign of these population movements in the urban or suburban cemeteries of Corinth. In Late Antique Anatolia, Trombley (2001b: 230) has suggested that economically-motivated Arab migrants may have targeted the countryside, creating an ethnically mixed rural population not present in the "cultural milieu or 'bottleneck' of the cities." It is possible that the political climate in a provincial capital like Corinth would have resulted in similar restrictions on foreigners, especially if imperial regulation was high in this city (Hypothesis 2B).

Discrimination among hypotheses is also dependent on characterization of mortuary variability and local $\delta^{18}O$ and $^{87}Sr/^{86}Sr$ signatures. Using isotopic ratios, I can identify migrants based on their dissimilarity from the "local" signature displayed by natives. The mortuary context of those skeletons identified as foreign can then be used as a proxy for their adherence to Late Antique behavioral norms in Corinth. This level of analysis is possible regardless of whether the geographic source for these non-local values has been determined. On the other hand, heterogeneity in local isotopic ratios may reflect high levels of local mobility, making the identification of nonlocals more challenging. High local mobility may have been practiced by multi-resource pastoralists, seasonal horticulturalists, farmers coming to the city to sell consumables, or craftsmen servicing the region around the city. These subsistence strategies also have been one cumulative result of increasing isolation of the city, as that suggested under Model 1, if the region became more dependent on locally produced agricultural yields and household goods. In Chapter VI, I return to this issue and provide a range of values for potential emigration areas within the context of isotopic distribution maps of the Mediterranean. It is probable that the local values for a number of cities in the Eastern Roman Empire will overlap, but I hope that using a multi-isotopic approach may enable finer provenience information than would otherwise be available.

These hypotheses also aid interpretations of material culture recovered from non-funerary contexts. The movement of large numbers of people or significant proportions of a single society would most likely be accompanied by the movement of objects. Thus, while merchants and the objects they carry would not necessarily originate in the same location, it is more likely that invasions or mandated population movements (found in Hypotheses 1B, 1C, and 2B) may share geographic origins with new aspects of material culture. It is also likely that contact between Corinth and the emigration area, even if the number of migrants was low, would have resulted in trade as economic networks tend to grow up around and bolster migration networks. I suggest that the identification of who moved, rather than what moved, will be informative as to whether supply and demand based on aesthetic desirability of objects led to their presence at this site, or whether the distribution of these objects may have been associated with other social or political processes.

CHAPTER III

MORTUARY BACKGROUND

Both ancient Greeks and modern researchers correlate distinctions in the treatment of the dead with meaningful differences in ideology, group membership, and societal structure (Barnes, 2003; Binford, 1971; Chapman et al., 1981; Chesson, 2001; Dickey, 1992; Duday, 2009; Hagemajer Allen, 2003; Hdt.; Kamp, 1998; Kurtz and Boardman, 1971; Parker Pearson, 1982; Rohn et al., 2009; Saxe, 1970). For archaeologists, individual burials can form incredibly valuable closed deposits suitable for study from a variety of theoretical viewpoints. Mortuary remains can be used to provide evidence of ritual activity or the identity of the deceased and additional attention is often paid to graves thanks to the possibility of finding complete, often richly decorated, ceramics and jewelry.

The variety of information available from graves has led to competing reliance on separate lines of evidence. Classical burial literature tends to focus on the objects found in graves (Blegen et al., 1964). Anthropological mortuary theory, on the other hand, draws on ethnographic analogy and studies graves and grave objects within their depositional and social context. This approach stresses the fact that each grave represents the end result of a range of ritual and social actions surrounding the death of an individual. The social identity of the deceased is one potential influence on the form and manner of their burial, as are the social or religious conventions surrounding death in their community (Binford, 1971; Brown, 1971b; Charles and Buikstra, 2002). The anthropological approach uses mortuary remains as a means of studying underlying social phenomena such as social identity.

Unfortunately, not all social relationships will be faithfully reflected by differences in mortuary treatment. For one thing, not all funerary behaviors will be represented by the archaeological remains preserved in grave contexts (Duday, 2009; Parker Pearson, 1999). The objects present in the grave can be likewise expected to have a variety of functions and meanings within the burial context, and not simply be associated with the interred's social persona in life. It is a truism that the dead do not bury themselves and, thus, the objects present in a grave were chosen by the friend, relative, or burial professional performing the funerary rituals (Brown, 1995; Härke, 1990; Parker Pearson, 1982). The anthropological approach minimizes this bias through the use of osteological remains in context with period- and site-specific mortuary analysis in order to identify behaviors which can be associated with individual social identities apart from societal trends and values (Buikstra, 1977; Chapman, 1987; Chapman et al., 1981; Härke, 2000; O'Shea, 1984).

Using an anthropological approach, rather than focusing on the grave objects, allows this project to focus on the particular social underpinnings of local expressions of funerary behavior during late antiquity at Corinth. Previous research into identity using mortuary evidence was hindered by problems in chronology and comparative data. Archaeologists used funerary objects with foreign comparanda to suggest select tombs were anomalous and belonged to foreigners (Davidson, 1952; Davidson and Horváth, 1937; Ivison, 1996; Weinberg, 1974). However, the progression of burial practices is poorly understood for this period at Corinth and these tombs have not been examined in context with contemporary graves (Sanders, 2004). Recent reevaluations of the ceramic and numismatic data provide evidence for a gradual shift in grave morphology that left a variety of tomb types in contemporaneous use (Sanders, 1999, 2005). Corinthians now appear to have used the same cemeteries and individual tombs for burials and commemoration over a protracted period of time. The development of these new archaeological chronologies enables an anthropological synthesis of mortuary behavior at Corinth rather than the simple identification of suggested anomalies and exotic behaviors.

In this chapter, I use an anthropological approach to examine evidence for mortuary behavior at Corinth from the 6th through 8th centuries AD. First, I review the use of anthropological theory in the determination of the social dimensions of burial behavior. Second, I examine the existing evidence for Late Antique burial activity, focusing first on historical sources detailing funeral rituals and regulations for the Eastern Roman Empire before moving on to the archaeological context of the Late Antique cemeteries in Corinth. This framework forms the theoretical and historical background for the anthropological analyses detailed in Chapters IV and V.

3.1 Theoretical Approaches to Mortuary Analysis

One problem with the attempt to identify anomalous graves in these cemeteries is that the range of normal mortuary behavior is poorly understood for late antiquity. Since a variety of grave forms and interment options were available to the bereaved during this period, a wide range of factors likely influenced choices in mortuary behavior. Though some burials may represent deviants, these can only be identified after describing the chronological context and the social factors involved in Late Antique mortuary variation.

The social dimension of mortuary variability has been emphasized since the 1960s and 70s (Brown, 1971a; Chapman, 2003). Under this approach, the method of burial for an individual is viewed as a result of their social persona, defined as the composite of their recognized social identities, as their living relatives choose to represent them (Binford, 1971). While all aspects of the social persona may affect mortuary behavior, social affiliation of the deceased is of most interest to this study. Social affiliation describes an individual's identity within their peer group and can be influenced by corporate membership, kinship, geographic origin, ethnicity, status, and profession. With regards to funerary behavior, these components influence treatment of the body, grave form, grave goods, and the placement of the deceased (Binford, 1971; Carr, 1995; Goldstein, 1976, 1981; Metcalf and Huntington, 1991; Saxe, 1970; Williams, 1999; Zakrzewski, 2011).

In particular, the spatial organization of cemeteries is thought to reflect the organization of the society as a whole (Goldstein, 1976, 1981; Morris, 1987, 1992; Saxe, 1970). Early examinations of mortuary variability stressed the correspondence between social complexity and cemetery usage and visibility (Chapman, 1981, 1995; Charles, 1995; Morris, 1987, 1992). This research suggests that the living laid territorial or political claims through association with a distinct group of ancestors, i.e., through monumentalization or strategic placement of tombs. However, Goldstein (1981) stresses that placement of the dead, and the spatial relationship of their tombs to one another, may also represent other social dimensions such as status, kinship, or class. Family groupings of graves within existing cemeteries, for example, indicate a multi-generational interest in the surrounding area. Funerals and commemoration rituals may likewise legitimize other aspects of land tenure by establishing ties between a lineage group and its particular, exclusive burial area (Goldstein 1976, 1981; Saxe 1970). Other shared identities, especially class or social affiliations, may create a kind of corporate group membership within societies otherwise organized using lineal descent. These groups may also be spatially represented in cemetery organization (Goldstein 1976, 1981).

In the Roman Empire, historical precedence for the association of burial placement with corporate group membership is present in the funerary services commonly provided by voluntary associations. This function of these groups has even been emphasized to the point where many scholars suggested burial was the primary purpose for a subset of these associations, referred to as *collegia funeraticia* or *collegia tenuiorum* (Kloppenborg and Wilson, 1996; Perry, 2006). It is more likely, however, that this aspect of mortuary behavior reflects membership in a community based around these associations and which also resulted in other shared social and religious activities (Kloppenborg, 1996; Sano, 2012). As membership in voluntary associations would have been one way in which foreign merchants could protect their interests in port cities, similar organizations are likely in Late Antique Greece, though these groups may have been more closely tied with religious cults than in the earlier Empire. Thus, spatially isolated burial areas tied to corporate group membership could be used as evidence for continuity in the use of voluntary associations through this time period (Granier et al., 2011).

Along with grave placement, corporate group membership may also influence which tombs are used for additional burials (Chapman, 1981, 1995; Chesson, 2001; Goldstein, 1976, 1981; Metcalf and Huntington, 1991). Already existing graves could be expected to be used and reused within family groups or ethnicities to emphasize social relationships. In southern Greece, patrilineal kin groups used the same ossuaries or multiple interment graves from the 13th through the 19th centuries, at which time municipal cemeteries were established (Saitas, 2009). Tzortzopoulou-Gregory (2010) documented a similar family-based use for multiple interment tombs in modern cemeteries in the northeastern Peloponnese and suggested a parallel use for the multiple interment tombs present in the archaeological record from late antiquity to the present. These practices have even been suggested to derive from Classical Greece (Barnes, 2003; Davidson, 1952; Rife et al., 2007; Roebuck, 1951).

Alternatively, the burial of more than one individual within the same tomb has been suggested to result during periods of increased mortality (Davidson, 1952; de Waele, 1935: 357; Roebuck, 1951: 164; Tzortzopoulou-Gregory, 2010). Bubonic plague spread along trade routes throughout the region, affecting Egypt through Constantinople by AD 542, and reaching Britain by AD 664 (Allen, 1979; Hirschfeld, 2006). Allen (1979) suggested a mortality rate of one out of three people for this pandemic, possibly as high as one out of two in dense urban centers. However, the treatment of the bodies of the deceased in multiple interment tombs at Corinth does not appear to be consistent with plague (Sanders, 2004, 2005). The majority of tombs do not show evidence of mass burial and instead support a narrative of subsequent interments and periodic reuse (Leven, 1995). Where chronological information is present, burials are successive, and tombs often show signs of having been sealed and then re-opened for later burials (Wiseman, 1969). In a multiple interment due to plague, these interments would be expected to be simultaneous.

Secondary burial practices are yet another way in which personal and group identity may be expressed (Chenier, 2009). Secondary burial comprises rituals where mourners manipulate and display the corpse over an extended period of time. Prior to final burial, the deceased's body is often allowed to decompose in a primary burial or disposal location. This process is thought to echo the transformative affect death has on the individual and that their loss has to the community (Chenier, 2009; Chesson, 2001; Fedwick, 1976; Hertz, 2004). In the Eastern Orthodox liturgical tradition, which is descended from Byzantine liturgies, death is particularly described as a transformative state wherein the process of decomposition removes flesh corrupted by sin, freeing the deceased for the coming resurrection (Fedwick, 1976). Corpse treatment through temporary initial interment in coffins or charnel houses is ethnographically documented in Greece into the modern period (Ariès, 1974; Danforth, 1982; Saitas, 2009; Tzortzopoulou-Gregory, 2010). Mourners gather disarticulated remains from their initial resting place in a bundle and place them in a communal bone chest or semi-subterranean ossuary with the bones of other family members (Danforth, 1982; Saitas 2009).

Communal burials such as these emphasize social identity. Placement of ossuaries has been suggested to reinforce corporate relationships to specific areas much as would any monumental structure (Charles and Buikstra, 2002). In addition, at the time of secondary burial in Greece, objects of clothing and adornment are removed from the bones (Danforth, 1982; Saitas 2009). These practices deliberately obscure or erase the personal identity of the deceased (Chesson, 2001; Chenier, 2009), and, by emphasizing the communality of death, the deceased themselves are turned into a generalized class of ancestors (Bloch and Parry, 1982). All of the dead are invested in the community's welfare and all lend the qualities they had in life to the identity of their descendants (Chenier, 2009). Therefore, not only does the use of communal interment sites imply an ongoing relationship between the living and the dead, it also implies that these communal sites are places of active social identity formation for the living.

Other aspects of graveside commemoration, such as gravestones, often preserve Christianized references and iconography. Such Christian symbols are ubiquitous in the Late Antique cemetery, and their presence echoes the close association between Late Roman and Byzantine administration and the Christian church which led to the institutionalization of Christian burial (*Cod. Iust.*; *Cod. Theod.*). On the surface, this religious regulation of funerary ritual might appear to homogenize mortuary behavior. Ivison (1996) suggests that ecclesial and administrative intervention in late antiquity limited the number of ways any one individual could be buried, to the extent that burial specialists were required. These professionals, such as grave diggers, would have minimized any individualizing influence exerted by the bereaved family. However, though many funerary aspects may appear to be shared, not all behaviors surrounding burial and treatment of the deceased were regulated equally.

Regulation of public actions may be driving this perception of homogeneity in burial practices. Behaviors surrounding the actual funeral, such as the inhumation of the body, may be more controlled by common notions of societal rights and responsibilities, i.e., an “idealized lifeway” (Metcalf and Huntington, 1991). In late antiquity, religion determined the form of this idealized lifeway. The presence of migrants may also have heightened the ability of the Christian church to provide social cohesion. In modern migrant populations, a number of foreign origins may be represented, resulting in a lack of shared experiences on which a community can be built (Jonker, 1997). Jonker (1997) suggests that one shared institution, often religion, can resultantly be relied upon to provide cohesion as well as handle any future events of community involvement such as funerals. By the 8^{th} century AD, most members of the Eastern Roman Empire shared membership in the Christian church, providing a common set of conceptions on what correct behavior entails throughout the Eastern Mediterranean. Public responses to death likely fall under this religious purview despite the coexistence of multiple social groups or ethnicities, and the resulting endemic variations in corpse treatment.

On the other hand, private reactions to individual deaths and elaborations of ritual may have been less regulated. While the corpse was never unclothed in the grave, a wide range of clothing styles and adornments were acceptable according to Byzantine descriptions of burial customs (Kyriakakis, 1974). Early church fathers looked with censure on the sumptuous, elaborate clothing provided to wealthy corpses as compared to the relatively simple linen shrouds and wrappings of monks and the poor. Other displays of the social identities of burial occupants might include relatively minor changes in grave form, commemoration, or the use and deposition of distinct types of objects in the grave.

While the presence of grave goods are often taken as a direct reflection of identity, profession, and status, their function and meaning are dependent on their context of use in the funerary rituals when deposited, and may not represent social reality (Härke, 1992, 1997; Pader, 1982). The term grave goods itself combines multiple artifact types, which may have had multiple original meanings and purposes. Often, the term implies these items were given to the deceased for their use in the afterlife, and that all objects present in a grave were the property of the deceased. It is more common in recent research to divide these objects based on their presumed function, so that articles of clothing or adornment are separated from objects of ritual significance or ceramic items. Even these *a priori* distinctions might presuppose social meaning, such as status, and many of these categories may still not be detailed enough. For example, in the case of ceramic vessels, object shape or form is related to its use, and the presence of a perfume flask in a grave context may have a different connotation than that of a cooking pot or storage vessel.

The presence of objects of exotic origin may likewise suggest foreign origin for the interred skeleton, though the value of these imports and the difficulty in obtaining them may instead indicate a high social status of the deceased (Peebles, 1971). There is an expectation in funerary archaeology that expensive items, such as jewelry or other exotics, would have been retrieved prior to burial unless the family was particularly wealthy or elite and, therefore, able to justify the loss of such a valuable item. On the other hand, the corpse was publicly laid out prior to burial in the Greek and Roman tradition called the *prothesis* (Kyriakakis 1974; Kurtz and Boardman 1971; Toynbee 1971). This process offered an opportunity for the surviving family to renegotiate their perceived status in the community through their funeral spending (Bloch and Parry, 1982; Metcalf and Huntington, 1991; van Gennep, 1960). This agenda would have been severely undermined by stripping the corpse of clothing and small, valuable trinkets at the gravesite.

The presence of grave objects may also obscure the identity of the deceased in other ways, such as through ascribed status. In Late Antique British graves, children were buried wearing jewelry in a manner normally only found adorning adult, married women (Cool, 2010). This author suggests that in these cases, this jewelry may have been included to recognize the potential lost in these early deaths. Similarly, in contemporary burials in northern Europe, women and children were buried with weapons despite being neither warriors nor mercenaries (Härke, 1990; Nicolay, 2007; Whitley, 2002). If death is a transformative process, changing the social and biological identity of the deceased (Bloch and Parry 1982; Fedwick 1976; Metcalf and Huntington 1991), the objects used in funerary rituals undergo a similar transformation. As these artifacts form a symbolic purpose, and symbols are inherently multivocal (Turner, 1967, 1995), the meaning of these objects in a grave context may draw from different aspects of identity, belief, and social organization than would be implied by their presence at the side of a living person. The inclusion of objects which usually mark a particular profession or status for a living individual might, therefore, represent other social processes or identities in a grave context. Many objects present in tombs may also have provided service in the preceding funerary rituals, especially ceramic vessels (Sanders 2004). These artifacts are unlikely to vary in form given their shared, ritual function, but their relative value, decoration, or style may be a similar indication of mourner preference or identity.

3.2 Late Antique Mortuary Behavior

Christian dogma and imperial law dictated the form of funeral rituals and the disposal of the dead by the 6^{th} c AD, but they did so within a framework of traditional mortuary practices. Legislative codes designated the amount that could be spent on funerals according to the status and wealth of the deceased and who could be allowed to conduct funerary rites (*Cod. Iust.* 1.11.7). Laws also protected tombs as property which could be inherited (*Cod. Iust.* 1.11.7.5-6; *Cod. Theod.* 9.17), and tomb placement was even regulated to fall away from residential areas, outside city boundaries (*Cod. Iust.* 1.11.8). This practice clearly followed earlier Roman traditions, wherein burial was ideally practiced outside city walls. Many other mortuary rituals were also popular prior to Christianization, and were adopted and validated under Christian dogma in a slow process which mirrored the Christianization of mainland Greece itself (Poulou-Papadimitriou et al., 2012; Sweetman, 2013). Transitions in funerary behavior can, therefore, be considered one aspect of the changing social and economic pressures under which some traditions remained while others were abandoned (Sanders, 2004). Extramural burial was one such abandoned practice; as the churches which were increasingly being built inside cities accumulated the relics of dead saints, later burials were prioritized near these sanctified areas (Ariès, 1974; Brown, 2010; Cantino Wataghin, 1999; Poulou-Papadimitriou et al., 2012).

In this section I briefly review contemporary evidence for Late Antique burial practices, especially imperial legislation and regional mortuary archaeology. As many ecclesiastical sources on funerary liturgy are from later periods, I also discuss the potential for continuity in Greek burial practices – in other words, whether these sources are useful in the interpretation of Late Antique mortuary archaeology given the arguably strong regional tradition based on pagan and classical institutions.

3.2.1 Continuity in historical mortuary ritual reconstructions

Most research on modern Eastern Orthodox and especially Greek funerary traditions holds a view of extended continuity in endemic burial practices from the Classical period through to the 20th century and beyond (Abrahamse, 1984; Kurtz and Boardman, 1971; Rush, 1941). Legally, tombs continued to be used for either family or household use (*Cod. Iust.* 1.11.7.6). Nominally early practices, such as the *prothesis*, or laying out of the body for viewing and visitation, the funeral procession where the body is carried on a bier to the final grave site (the *ekphora*), and even the form and emotion conveyed in the ritual laments sung during this process are all described in modern ethnography and the biographies of saints and emperors (Abrahamse, 1984; Alexiou, 1974; Danforth, 1982; Dio Chrys. *Or.*; Fedwick, 1976; Kyriakakis, 1974).

Even the first services after death performed by the family paralleled earlier Roman practices (Kyriakakis, 1974). At this time, the deceased was taken from their death bed, their eyes closed, and their body arranged to resemble sleep. Late Antique and later accounts of death rituals record that corpse arrangement was always supine, the arms crossed across the torso, legs straight, and the mouth shut (Abrahamse, 1984; Kyriakakis, 1974). In order to maintain this position, the jaw was tied closed with a cord or ribbon around the head, the hands tied in place across the stomach or chest, and the feet bound together (Dio Chrys. *Or.*). The corpse was then washed and anointed with oils, much as in previous periods (Kyriakakis, 1974).

Other Byzantine elements of dressing and adorning the corpse may also have a similar Roman or Classical origin (Abrahamse, 1984; Kyriakakis, 1974). After washing, the body was covered, either with simple linen wrappings or with clothes, and displayed outside the home so that friends and relatives could visit with the deceased prior to their burial (Kyriakakis, 1974). The corpse was then taken to the burial site, often in a procession, where graveside rituals including feasting or a small meal of boiled grain shared among the family (Fedwick, 1976). At some point the body was lowered in to the grave with the head to the west so that they faced east, usually supine (though some bishops or priests may have been buried in a sitting position), and rarely with any grave furnishings other than a "pillow" of tile or stone (Kyriakakis, 1974). Many of these customs could even be argued to be comparable to death scenes depicted on Geometric (8^{th} century BC) vase decorations (Garland, 2001; Kurtz and Boardman, 1971).

However, variations for each of these individual behaviors also existed which differed based on social class, age, and ecclesial involvement of the deceased (Abrahamse, 1984; Fedwick, 1976). By law, burial expenditures depended on the rank of the deceased and the circumstances of their death, and since these costs covered the preparation of the body, rent or purchase of the place the body was buried, and the cost of transporting the body to the burial site, all of these factors likely varied (*Cod. Iust.*

1.11.7.14.3, 1.11.7.37). In addition, five classes of funeral services were available based on the Byzantine liturgical tradition, including one for the adult laity, one for monks, another for priests, yet another for children, and a final service for the "dead in general" or *panikhida* (Fedwick, 1976).

In general, the services surrounding the death of a priest or political figure were proportionally grander than those for a normal member of the laity, and as only the deaths of important people were typically described in historical biographies, the typical funeral and adornments of a regular citizen must be extrapolated from these sources (Abrahamse, 1984). For example, if no relatives or heirs were present, then burial services were taken care of by others, presumably professionals, and the appropriate expenditure for the funeral was covered by selling off the deceased's property (*Cod. Iust.* 1.11.7.14). Sources also document the adornment of wealthy corpses, especially emperors, in elaborate clothing and jewelry, and priests could be clothed in their vestments, some of which were expensive and luxurious (Kyriakakis, 1974), despite legislative proscriptions against such excess. In this, the state and the church were in agreement; The Justinian Codex proclaims that "one ought not to bury ornaments and such like with the body, as the uneducated do" (*Cod. Iust.* 1.11.7.14.5), and the monastic community may only have provided their members with linen shrouds to wrap the body (Abrahamse, 1984; Kyriakakis, 1974). However, even lower, "uneducated" classes may have attempted to garb their dead in new clothes that were as expensive as they could afford to buy (Kyriakakis, 1974).

The proscription against burial within city boundaries likewise originated in Classical Greece and continued into the Roman period (Cantino Wataghin, 1999; Ivison, 1996; Kurtz and Boardman, 1971; Toynbee, 1971). Legislation against the placement of tombs inside city walls is reported in the Digest of Justinian, compiled in the 6th century AD (*Cod. Iust.* 1.11.8; Mathisen, 2001). However, this rule did not find strict adherence, and Cantino Wataghin (1999) suggests its 9th century AD repeal represented a delayed acceptance of an already wide-spread custom. Even in the Classical period, graves near the future site of the Kraneion basilica east of Corinth are located within the fortified area of the city (Carpenter, 1929). Grave placement in early periods was prioritized away from major population concentrations and along major thoroughfares to maximize visibility. This concern with the living's ability to find and interact with burial sites remained an important factor in tomb placement, construction, and grave markers throughout the Roman period as well (Toynbee, 1971). In the 6th century, laws specified that even after the land a grave was placed on changed hands, access and use of family tombs needed to be permitted by the new owners (*Cod. Iust.* 1.11.7.10-12). In the later Byzantine period, additional graveside rituals were practiced in addition to the ritual performed immediately following death (Fedwick, 1976). Thus, though monuments outside the grave were not included among the required funeral expenses (*Cod. Iust.* 1.11.7.37), they would have formed an essential function in enabling mourners to find particular gravesites for later reuse and commemoration activities.

In fact, later sources document an enduring preoccupation with the deceased for years after their burial that is tied to Eastern Orthodox spirituality (Abrahamse, 1984; Ariès, 1974; Danforth, 1982; Fedwick, 1976). In this religious tradition, death is seen as an intermediary state and cemeteries a place of temporary rest (Fedwick, 1976). The bones and relics of particularly holy members of the community are treasured as a tangible connection between the living and the dead, and both unnatural bodily preservation and complete decomposition are seen as corporeal manifestations of sanctity (Abrahamse, 1984; Fedwick, 1976). Since sin was thought to manifest in the body, the flesh of a saint (who did not sin) was not corrupted and did not decompose. On the other hand, decomposition can then also purify the sin from less sanctified deceased, readying them for the resurrection (Danforth, 1982; Fedwick, 1976: 159). This means that under the Eastern Orthodox tradition, graves were frequently disturbed in order to verify the presence of the deceased among the saints (Abrahamse, 1984), to retrieve relics for later veneration (Ariès, 1974), or to assist the dead in their hope for resurrection by cleaning and caring for their material remains (Danforth, 1982; Fedwick, 1976).

3.2.2 Variability in Late Antique mortuary behavior in Corinth and the surrounding region

Many of these practices attested in historical sources can be used to interpret mortuary archaeology. Human skeletal remains, when preserved, are expected to show the same corpse treatment described in the biographies of saints. Limited manipulation of the corpse occurred and the presentation of the body is very similar to its appearance at time of death. Cremation, popular during the Early Roman period, is not documented at Corinth after the 4th century AD (Slane, 2015). Preference for inhumation continues into the modern era, and is thought to be a result of the Christian belief that the body needed to remain intact in order to achieve full resurrection (Ivison, 1993: 7). Non-Christian burial treatment, such as that suggested to be practiced by the Slavs (Avramea, 2001; Barford, 2001; Curta, 2005b, 2010b; Vida and Volling, 2000; Volling, 2001), may have included cremation, but its lack in most Late Antique cemeteries in Greece is related to the Christian concern with maintaining as life-like an appearance as possible in the body of the deceased.

Differences in liturgical services for children compared to adults (Fedwick, 1976) also appear to be reflected by differences in grave form, as only children were buried in amphorae. Rife (2012: 180) suggests that the use of whole vessels and other sealing techniques may be the result of a desire to better protect the graves of dead children than those of adults. Both children and adults were generally placed in the grave with their heads to the west as described in historical biographies; however, slight variation occurs in orientation (Sanders, 2004) as well as in the deportment of the limbs. For example, during the late 4th to mid-6th century at the nearby site of Isthmia, early grave orientation was approximate, though by the late 6th century, the head of the grave more closely matched true west (Rife, 2012: 181). For adults, the corpse was often laid in a subterranean chamber; similar shaft-accessed chamber tombs were typical of mortuary behavior in the region around Corinth (Poulou-Papadimitriou et al., 2012; Rife, 2012). In the majority of cases, the corpse must have been lowered in to the grave head first through an entrance hole at ground level in order to permit the body to be oriented with the head to the west (Wiseman, 1969: 84). The body position in the grave was supine, the arms crossed over the chest where preserved, which is consistent with historical accounts of a shroud or wrapping linens being used to hold the limbs in place.

However, it is possible that any cords holding the limbs or head in place may have slipped, and this variation in position may also be preserved in the grave. Graves were also often reused in successive burial events, which would also have disturbed the bones of previous interments if enough time had passed for decomposition to occur. Still other complications with orientation arise from the proximity of graves to each other, and to existing structures. When burials within or near to churches became preferred, graves were placed first along walls and later interments often took their orientations from the space available within the buildings (Ivison, 1993).

The Byzantine liturgy and historical sources also indicate that visitation of tombs continued after the initial funeral and burial event, and material evidence for these commemoration rituals is present in the archaeological record. Mourners periodically placed lighted lamps on and next to the tomb when they visited gravesites (Abrahamse, 1984; Fedwick, 1976; Kyriakakis, 1974). This use of lamps is another example of continuity in burial practices, though they were also used in other ritual and secular contexts (Broneer, 1930; Garnett, 1975; Karivieri, 1996; Perlzweig, 1961; Slane, 1990, 2008). Other enduring graveside rituals in late antiquity may have included funerary feasting and the pouring of libations of wine, oil, and perfume onto the corpse or into the tomb through special openings (Poulou-Papadimitriou et al., 2012; Roux, 1973; Stikas, 1962, 1964, 1966). The small ceramic pitchers used in late antiquity to anoint the deceased and deposited by the corpse also have parallels in the glass and ceramic unguentaria used in earlier burial rituals (Sanders, 2004). Feasting, on the other hand, may explain the presence of tableware ceramics in cemeteries along with large marble "sigma tables" possibly used during ritualized communal dining (Broneer, 1926: 51; Poulou-Papadimitriou et al., 2012; Roux, 1973; Sanders, 2004: 180; Scranton, 1957: 139-140).

In order to find these graves, they needed to be visible. Relatively simple graves made of tile or cut into the ground and only covered with earth were common throughout this period and into the later Byzantine Empire (Ivison, 1993). These interments may have had wood or other grave markers that are not archaeologically preserved. Others were marked with inscribed gravestones, and many large graves incorporated a vaulted masonry ceiling which would have been at least partially visible above ground. These structures may have been deliberately evoked by the stuccoed mounds covering other, entirely subsurface, tomb structures (Poulou-Papadimitriou et al., 2012).

Along with these community events, more personalized interaction with the deceased was often enhanced through the inclusion of their names on Late Antique epithets (Kent, 1966). On the other hand, despite the inclusion of multiple individuals in later tombs, associated gravestones often only indicate one name (Poulou-Papadimitriou et al., 2012). It is possible that only the latest interment was marked, and to that end many tombstones appear to have been reused as later inscriptions partially obscured earlier names and epithets (Fritzilas, 2009; Kent, 1966). It is also possible that these tombstones may have only related the name of the family leader, as a proxy for marking collective, family identity. In modern Greece, tombstones often only relate a surname, or that of the family patriarch, rather than listing every person interred in a family grave (Tzortzopoulou-Gregory, 2010).

The practice of marking graves with the name of the deceased also declined over this time period as collective burials in one tomb structure became more popular, providing tacit support to the suggestion that these structures were family tombs (Ivison, 1996: 108; Poulou-Papadimitriou et al., 2012), i.e., the “hereditary tombs” mentioned in 6th century AD law (*Cod. Iust.* 1.11.7.5-6). Late 6th to 7th or 8th century AD graves at Isthmia were more likely to have tombstones than earlier Late Antique graves, but they were also more likely to be single interments (Rife, 2012: 181). These burials would, therefore, not have been able to depend on family associations to mark their graves. Failing to record individuals’ names would have emphasized the deceased as part of an established community or kin group which transcended death, rather than their personal status and achievements in life.

Tombstones also provided information related to burial practices (Walbank, 2010; Walbank and Walbank, 2006). The tomb's builder was often listed separately from the person who purchased the site for burial (Kent, 1966), providing evidence for the guild or class of mortuary professionals discussed in Late Antique legal codices (Ivison, 1996). Some of these professionals were tasked with making sure the corpse was correctly arranged (Kyriakakis, 1974) as well as constructing the tomb (Ivison, 1996). The funeral industry would also have incorporated, at a minimum, stone workers for tombstones and potters for small ceramic containers and lamps (Sanders, 2004). Both of these types of objects were likely locally made (Fritzilas, 2009; Hammond, 2015; M. Morison, pers. comm.; Walbank and Walbank, 2006).

Even tombs themselves were commodified; gravestones often preserve their price, set at 1.5 gold pieces (*Cod. Iust.* 1.11.7-8; 4.47.12; *Cod. Theod.* 9.17; Ivison, 1996; Roebuck, 1951; Walbank and Walbank, 2006). It is possible, however, that only particularly elaborate or expensive graves noted the price, and epithets doing so are only associated with grave types requiring relatively more effort to build (Roebuck, 1951: 166; Walbank and Walbank, 2006). Walbank and Walbank (2006: 283) suggest that 1.5 gold pieces would only have been affordable by particularly wealthy citizens and those employed on a government salary, implying that the vast majority of the citizenry would have required less expensive grave plots.

It has been suggested on the basis of this commoditization of the funeral industry that funeral practices were regulated more by economic factors than social ones (Ivison, 1996). One piece of evidence used in this debate is the method by which epithets relayed time of death: within "indiction periods" (Kent, 1966). This method of describing date referenced the 15 year tax cycle in the empire, and was required on legal documents and transactions starting in the mid-6th century AD (*Cod. Iust.* 4.47; Walbank and Walbank, 2006). The use of indiction period, as well as the fact that many tombstones may have been pre-fabricated, with blanks left for the name of the interred and their profession, suggests that these inscriptions were a common form of legal document demonstrating ownership (Walbank and Walbank, 2006). Furthermore, these gravestones did not specify a particular year within the 15-year period when death occurred, nor did they reference the specific indiction period (Kent, 1966). In other words, the information on gravestones implies that grave site would no longer be remembered after a maximum of 15 years had passed, and after this time, the identity of the tomb occupant would no longer be relevant to passersby (Ivison, 1996). After all, official historical grave liturgies are only designated for the third, sixth, ninth, and fortieth days after death and on its one year anniversary (Abrahamse, 1984).

As longer commemoration would require a more permanent way to record date, inscription evidence alone suggests grave sites only needed to be remembered for a short period. Scholars have suggested, therefore, that grave location was opportunistic, and the marking of tombs was a way to stake claim to a location and warn against disturbing or violating the interments already occupying the space for a limited amount of time (Ivison, 1996; Walbank and Walbank, 2006). Tombs may then have simply been treated as real estate. After a period of commemoration, any tomb could be resold and reused, possibly by individuals with no connection in life to previous interments (Ivison, 1996: 106-7). However, grave plots were regularly inherited along with other possessions (*Cod. Iust.* 1.11.7.6), and the nature of tomb reuse and treatment of the deceased during this time period may better support alternative hypotheses where tomb placement and reuse was chosen as a result of social factors such as kinship or corporate group membership.

The variety in grave forms and the number of tombs available for reuse are two pieces of evidence supporting the suggestion that burial placement was not simply opportunistic, implying that the family of the deceased could choose among a range of options in corpse disposal. Graves of relatively simple construction with single interments were used congruently with more elaborate graves with multiple interments, and vice versa (Poulou-Papadimitriou et al., 2012; Roebuck, 1951; Wiseman, 1967a, b, 1969).

Relatively simple tile-covered graves are present regionally from the 4th through the 6th centuries (Rife, 2012). Their use is attested at least into the 7th century AD in the cemetery by the Asklepieion, as in this area these graves overly other tombs containing ceramic vessels datable to the early-mid 7th century (NB 126, 136; grave objects dated as Slane and Sanders, 2005). It is likely that the generalized version of this form was used throughout late antiquity. At Corinth, it is possible that no break occurred in the use of this grave type and relatively small differences in grave construction may be useful chronological determinants. Later graves at Isthmia were more likely to show irregularities in construction, such as the use of smaller or no cover tiles, and the use of small stones instead of fragmentary tiles at the head and foot of the grave (Rife, 2012). Other variants of this form, including the use of a separate roof tile for the floor of the grave cut, was used in the earlier Roman cemeteries along the Classical city wall (NB 552, 553, 555) and in the later Byzantine period throughout the city (Ivison, 1993). Laying the deceased on a tile floor may be a forerunner of the so-called "cephalic" burials where the head was propped with tiles and stones, documented in Corinth in the 13th century AD (Ivison, 1993).

Other, more elaborate, rock-cut chamber tombs were also present in the same burial area. In the cemetery adjacent to the Asklepieion and the Gymnasium at Corinth, examples of both types were present with stuccoed earthen mounds over top of them (Roebuck, 1951: 163; Wiseman, 1967a, 1969). Inscriptions were often set into these mounds, and oil lamps placed on and around them (Wiseman, 1969), indicating these structures helped mark burial sites. As a result, graves of relatively simple and relatively elaborate construction were both a focus for ongoing commemoration activity. However, only the relatively elaborate tombs were selected for reuse. In these cases, the mounds covering these graves was partly removed, the tomb opened, and the newly deceased lowered down into the tomb overlying existing burial events (Wiseman, 1969). The mound overlying the tomb was then repaired. Intriguingly, the fill of these mounds incorporated lamps, possibly even the same ones which had been used to commemorate previous burials in the same grave. This practice appears to have focused on specific tombs and to have spanned a long period of time, as the bones of previous burials were often disturbed during the process of reuse and enough time must therefore have passed for these corpses to decompose. These behavioral elements of selectivity and commemoration suggest that tombs were reused for much longer than 15 years, and that their location was important for longer than that necessitated under tax law. It also implies that the interred shared the same community, possibly as members of the same family, as well as shared the same grave.

Family use of collective burial sites and tombs is also well-attested in earlier Roman periods (Toynbee, 1971). At Corinth, chambers hollowed out of the clay and bedrock were commonly reopened to insert cremations (Slane, 2015; Walbank, 2010). Still larger chamber tombs, or "columbaria," often contained multiple sarcophagi sunk into the floor, flanked with niches for cremation urns (Shear, 1931; Walbank, 2010). Each sarcophagi usually contained multiple interments, and burial often continued in the chamber itself, resulting in deposits densely packed with a large number of commingled skeletal remains overlying the chamber floor (Pallas, 1975; Rife et al., 2007; Shear, 1931; Ubelaker and Rife, 2008; 2011). Inscriptions on stone plaques sunk into the tops of tombs or left standing over them occasionally specify their use by one family (Shear, 1931; Toynbee, 1971). These collective burial practices are similar to Late Antique multiple interments, and continuity in other aspects of corpse disposal is also likely. For one thing, many of these early graves are present in the same areas as Late Antique graves, and many of the Roman chamber tombs were reused at least to the end of the 5th century AD for burial (Pallas, 1975; Rife et al., 2007; Roebuck, 1951; Shear, 1931; Walbank, 2010; Walbank and Walbank, 2006; NB 122, 126, 136, 207, 232).

Later Byzantine use of individual tomb receptacles for multiple burials is also attested. Structures used for collective burial such as the Byzantine "Shaft Tombs" described by Ivison (1993) were also similar to the Late Antique practice of lowering the deceased in to a subterranean chamber through a small opening at ground level. In Byzantine shaft tombs, multiple primary burials were placed in a deep grave that could only be entered with help from a ladder or a rope. These later graves, however, were much deeper and usually only present in churches, implying that the practice of collective burial had expanded at that point to include more people than just those in the immediate family or social group. By the Medieval period, these collective interments appear to have morphed into “great common graves” (Ariès, 1974: 22) where the corpses of the sick and the poor were deposited when the family could not afford its own tomb.

Continuity may be overstated for other burial rituals, however, such as secondary burial. Post-depositional processes including tomb reuse may be misinterpreted as archaeological evidence of deliberate ritual exhumation (Ivison, 1993). While these tombs may have been emptied as a result of ongoing cemetery management (Ivison, 1993), most graves were reused in late antiquity without first removing earlier interments. It is possible that these graves would have instead been emptied as a result of deliberate desecration, in the case of population displacement or religious conversion as occurred during the alteration of churches to mosques after the Ottoman conquest (Ivison, 1993). Ivison’s (1993) careful examination of Byzantine burial practices in the Eastern Mediterranean from 950-1453 AD lead him to conclude that the majority of attributions of large graves with multiple interments to ritualized secondary burial activity were false and due to later burial activity in the same cemetery. The gradual accumulation of multiple primary burials within the same tomb could also lead to the disturbance of skeletal elements from previous burial events, further contributing to a false impression of frequent use of secondary burial.

In many cases, careful excavation and osteological analysis can be used to distinguish between the accidental bone mixing that occurs when a grave is reused or disturbed as opposed to the deliberate removal of entire sets of remains or body parts for the purpose of secondary burial rituals. Evidence in favor of a tomb’s use as an initial interment site includes the discovery of a large number of small bones, such as tarsals, carpals, or patellae (Rife, 2012: 199; Ubelaker and Rife, 2008, 2011). The presence of these bones when larger, more recognizable bones have been removed from a grave is usually considered the result of their lack of recognition during secondary burial rites.

While this practice was rare, it has been documented at the nearby site of Isthmia in late antiquity (Rife, 2012: 199-201). At this site, reburial was practiced for both individual corpses as well as in "massive depositories" similar to earlier Roman chamber tombs.

Secondary burial can also be obscured by cemetery maintenance, as when corpses were exhumed later in the Byzantine period to relieve crowding (Ivison, 1993). However, as these tombs were often located around family-specific burial chapels, this process could be considered a variety of secondary burial practiced by grave diggers and caretakers. In earlier periods, exhumation of the deceased by non-family members was legally regarded as defilement and property trespass (*Cod. Theod.*; *Cod. Iust.*). Violators were fined, and often subject to curses, some of which are preserved on gravestones as warnings (Kent, 1966; Ivison, 1996; Roebuck, 1951).

Given the transitional nature of mortuary ritual during this time period, and the wide range of traditions drawn on by Late Antique Corinthians, it is not surprising that archaeological investigations have uncovered many variations in the material remains of burial activity. In these analyses, I use the terms "grave" or "tomb" to refer to the container or structure in use as a burial monument or receptacle. I use "burial" to describe the individual event wherein the grave was used. In this way, I can discuss whether graves containing multiple individuals were the focus of multiple burials, and how burial events within one grave may have differed.

3.3 Cemeteries Excavated by the ASCSA in Corinth

As shown in Figure III.1, Late Antique cemeteries are located at strategic points around the perimeter of the city (de Waele, 1935; Gregory, 1979; Ivison, 1996; Meleti, 2013; Roebuck, 1951; Sanders, 2004) and near churches (Carpenter, 1929; Ivison, 1993; Pallas, 1970, 1972, 1976; Scranton, 1957; Shelley, 1943). Excavated areas with large numbers of graves include the Asklepieion and Gymnasium complexes to the north of the city, the Kraneion basilica to the east, the sanctuary of Demeter and Kore to the south, and otherwise surrounding the exterior of better preserved eastern and northern

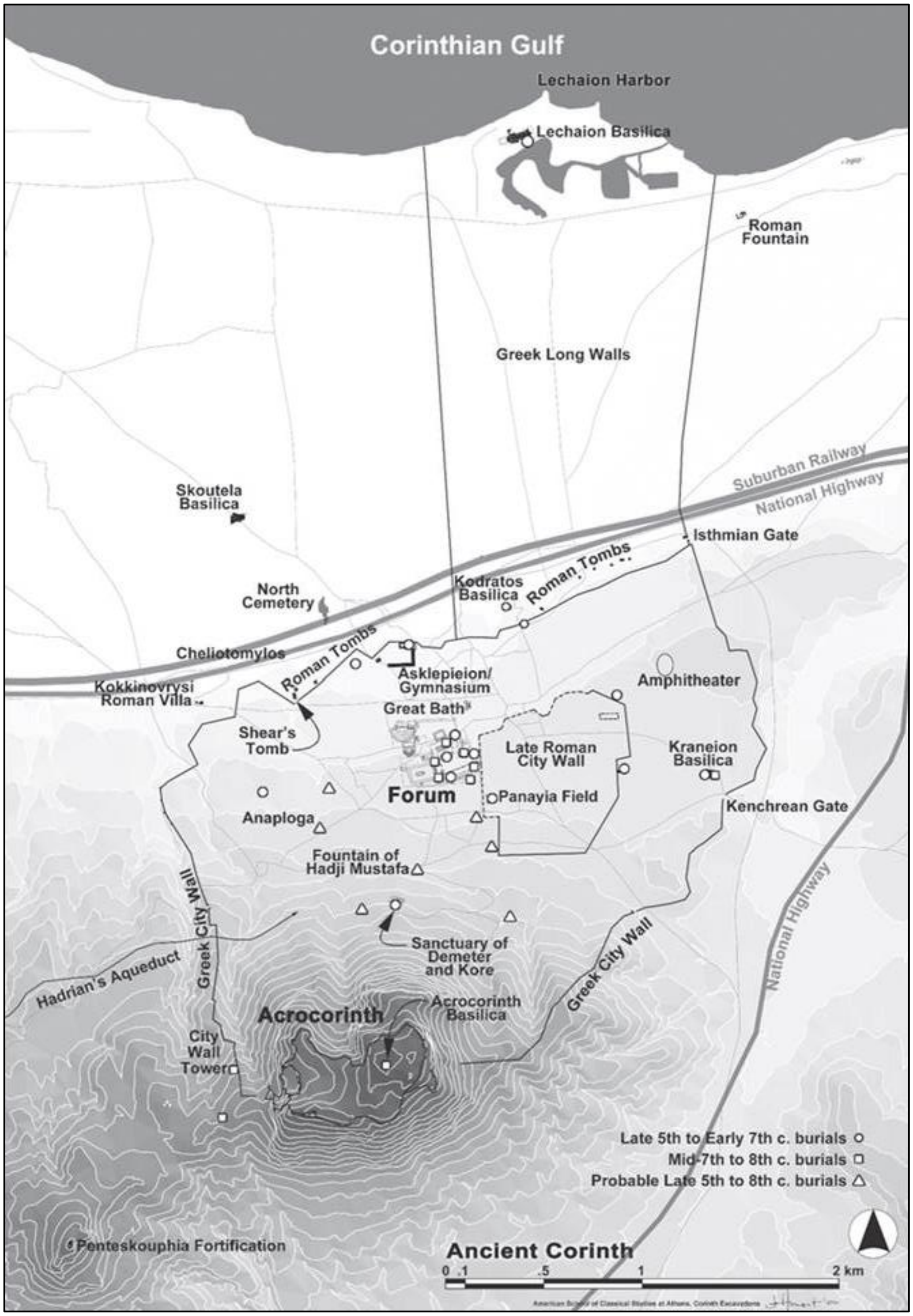

Figure III.1. Site of Corinth with locations of Late Antique graves marked (reprinted from Poulou-Papdimitriou et al., 2012, Figure 2.3, p. 386). Photo: courtesy of J. Herbst. American School of Classical Studies at Athens, Corinth Excavations.

portions of the city walls. Graves are also concentrated in the former forum area, with tombs built into or the deceased placed within former architectural features (Scranton, 1957). Their presence supports the suggestion that this area was abandoned during late antiquity after late renovations of the city wall reduced its fortified area (Sanders, 2004). As a result, mortuary evidence has formed an important component in hypotheses of reduced urban activity and development (Gregory, 1979; Ivison, 1996; Sanders, 2004; 2005). However, the presence of isolated burials in Panayia Field, within the suggested reduced wall circumference, provides evidence that this dictum was not always followed (Brown, 2010; Sanders, 1999). The spatial separation between cemeteries provides a challenge to examining the development of mortuary ritual at Corinth.

To facilitate this synthesis of mortuary behavior, I examined Late Antique graves located throughout Corinth excavated by the American School of Classical Studies in Athens (ASCSA). However, only two locations provided the majority of the data for statistical analysis: outside the north city wall west of the Asklepieion, and in the forum at the center of the Roman city (Figure III.1). From these areas, both fully described burials and curated human skeletal remains were available for research. Other excavations that contributed to this analysis include the fortifications on Acrocorinth, the western city wall, and the Kraneion basilica along the eastern city wall. While Late Antique burials are also present in large numbers from the Demeter and Kore sanctuary on the road connecting the Acrocorinth citadel to the Late Antique city, this material andthe graves from Temple E have not been included in this research because it is the subject of study by Ethne Barnes (cf. Barnes, 2003). The excavation history for graves included in this analysis is discussed in this section.

3.3.1 North of the city: The Asklepieion and the Gymnasium

The earliest burial activity included in this study was north of the city, on the low bluff overlooking the coastal plain leading to Lechaion harbor. Here, the site of the Greek and Roman temple to Asklepius and the surrounding healing sanctuary (the

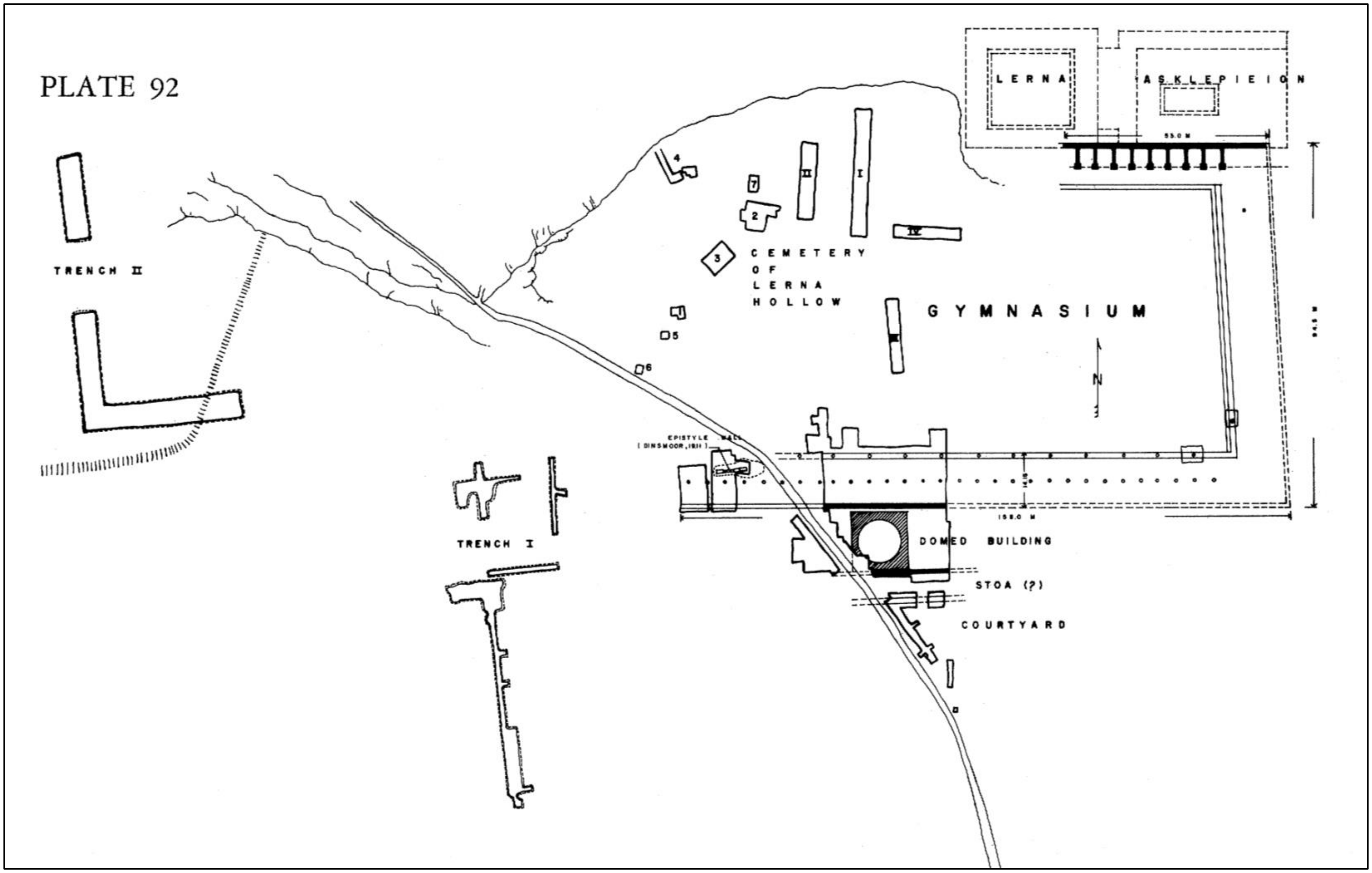

Figure III.2. Plan of excavation activity in the Asklepieion/Gymnasium area (reprinted from Plate 92 in Wiseman, 1967a). Photo: courtesy of the American School of Classical Studies at Athens, Corinth Excavations.

Asklepieion) were used in late antiquity as part of a vast cemetery circumnavigating the ancient city walls. Construction of these Late Antique graves continued earlier traditions of extramural burial placement. Elaboration of established suburban burial grounds into organized cemeteries such as these is considered a common early feature of Late Antique urban development (Cantino Wataghin, 1999). Burials were placed outside the city walls throughout antiquity, and these Late Antique graves disturbed Roman chamber tombs which themselves disturbed Greek sarcophagi (Blegen et al., 1964; Meleti, 2013; Shear, 1928, 1929, 1930, 1931; see also NB 207, 232, 249, 292 and 318 for excavation of graves throughout this area).

Figure III.2 displays the areas intensively investigated during archaeological excavations and earlier architectural features associated with this cemetery. The low hill to the west of the Asklepieion, the so-called Hill of Zeus, was trenched during the first excavation campaign by the ASCSA in Corinth 1896 (Trenches I and II on Figure III.2) (Richardson, 1897). This hill and the mostly bedrock outcrop topped by the Temple of Asklepius bracket the ancient sanctuary to Asklepius, now known as Lerna Square. This area was cumulatively incorporated into the extramural cemetery in the 6th and 7th centuries AD (Sanders, 2004: 183). Slightly earlier graves are present near the former Gymnasium complex, though the majority of these graves also appear to date to the 6th century AD (as based on Slane and Sanders, 2005; M. Morison, pers. comm; Wiseman, 1967a, b, 1969, 1972).

The Asklepieion area in particular was the focus of intensive burial activity centered around two small chapels (see Figure III.3 for schematic of excavation activity in this area), and 324 graves were excavated in Lerna Square and on Asklepieion hill and Hill of Zeus in the 1930s (de Waele, 1933, 1935; Roebuck, 1951). Evidence for prolonged burial activity in the area was supported by excavations in the 1960s-1970s under J. Wiseman. During investigation of the so-called "Gymnasium" complex to the west of the Asklepieion and near the original trenches on the "Hill of Zeus", Wiseman supervised the excavation of 113 Late Antique graves in the so-called "Cemetery of Lerna Hollow" marked on Figure III.2 (Wiseman, 1967a, b, 1969, 1972). As shown in

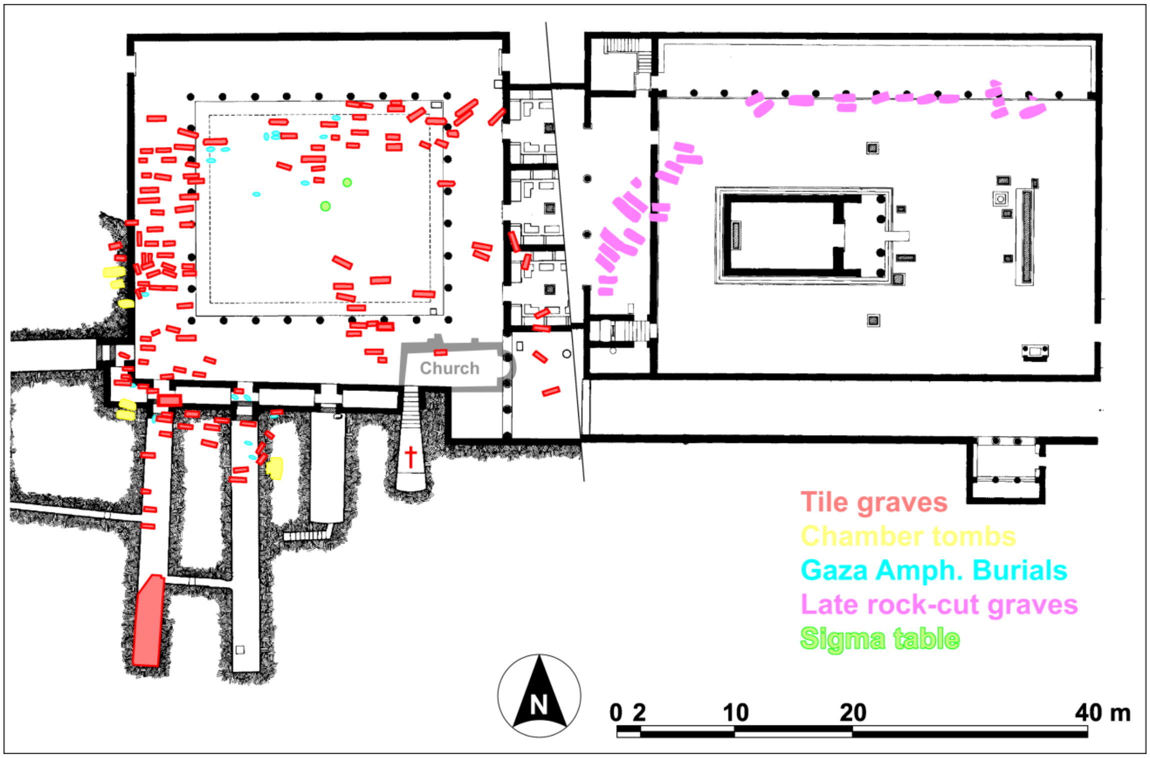

Figure III.3. Burials and chapels constructed on the ancient Asklepieion precincts (reprinted from Sanders, 2005, Figure 16.7). Photo: courtesy of D. Peck and J. Herbst. American School of Classical Studies at Athens, Corinth Excavations.

Figure III.3, tombs were particularly densely concentrated in Lerna Square, most likely as a result of ease of access to burial rites in one of the chapels in the southeast portion of this area.

Grave forms in this area were diverse. Simple tile covered single inhumations and burials placed in amphorae were next to chambers cut in the bedrock, and the latter often contained multiple primary interments. Graves were also placed in buildings and structures related to the Roman water supply for the area, including cisterns (Grave 1932.37), drains (Grave 1933.45), and four of the six caverns used as water reservoirs. A few graves were used in the course of secondary burial ritual, and Wiseman (1972: 9) has identified one tomb which was completely empty at the time of excavation as a likely "cenotaph" or symbolic burial for the deceased whose bodies were not available for burial. The original excavators even suggested that one Roman reservoir reused for Late Antique burials (the large red area in the lower left corner of Figure III.3, Grave 1933.111, NB 136) was a "plague pit" dating from the Bubonic pandemic in AD 542 as it contained around 100 interments (de Waele, 1933: 357; Roebuck, 1951: 164; but see Sanders, 2004, 2005; Slane and Sanders, 2005: 291).

It is often assumed that large graves containing many interments or mass burials arose during times of high mortality, and are often referred to as "plague pits." Unfortunately, this initial assessment can not be evaluated using osteological data. Though select human skeletal remains from the Asklepieion were curated for analysis by J. Lawrence Angel (1942), none of the material from Grave 1933.111 was retained, and paleopathological or aDNA confirmation of the presence of the *Y. pestis* pathogen is not possible. On the other hand, recent investigation of material culture from this deposit identified a coin of Justin II (in circulation from AD 565-578), providing a *terminus post quem* for the burial activity later than the disease's initial outbreak (Slane and Sanders, 2005). Though outbreaks of the plague continued through the second half of the 7th century AD (Allen, 1979), this reassessment also highlighted the fact that this grave was associated with ceramic vessels used in typical burial ritual, and was contemporaneous with single interments placed in the same reservoir (Sanders, 2004, 2005). As compared to this grave, a "plague pit" would be expected to provide evidence of other anomalous body treatments related to their method of death and the attendant haste in burial, including less strict adherence to traditions of arranging the body due to the worry of contagion. The presence of grave objects related to mortuary ritual, especially those used in washing and anointing the corpse, would also be unlikely in a plague-related burial. More likely, this reservoir and the surrounding area were the site of complex burial activity throughout the 6th and 7th centuries AD, a supposition supported by the remains of two chapels in Lerna Square itself and artifacts including a sigma table that were used during corpse treatment and commemoration (Sanders, 2005).

One chapel was built in the former Lerna springhouse in front of one water reservoir along the edge of the square, marked with a cross on Figure III.3, and was probably in use during the last half of the 7th century AD (Sanders, 2005). This chapel appears to have made use of the existing water system. The water itself was mainly directed into a large basin in the floor of this chapel which may have been used for a myriad of ritual purposes including washing the corpse prior to burial. Coins of Constans II were present in this basin and under a small bench along one wall, providing a *terminus post quem* of AD 641-668 (Coins 1933-247 and 1933-248) (cf. de Waele, 1935: 358), and over 70 Late Antique lamps were found during excavation of this church (NB 136), making its use contemporary with the nearby burial activity.

A number of tombs are also associated with a separate church built in the southeast corner of Lerna Square (the "church" to the north and east of the chapel in the water reservoir on Figure III.3); however, the dating of this structure is more problematic as it is disturbed by a number of Medieval buildings (de Waele, 1935: 358; Roebuck, 1951: 169-171; NB 126). This small building most likely served as a cemetery chapel since it was constructed in close association with existing tombs, and many later graves were placed in and around it. Though original publication of Lerna Square dates this structure to the 10th century AD (Roebuck, 1951: 169-171), this chronology may be based on numismatic evidence deposited during renovations of an earlier church, and is contradicted by the dating of tombs placed in its interior. *In situ* portions of this earlier building, shaded in Figure III.4 according to phasing by the original excavator (NB 126: 81, 86-7), imply this structure was likely ca. ten meters long east-west and five meters wide, with an apse at its east end (Roebuck, 1951: 170; NB 126: 66-67). After its construction, a large tomb (Grave 1932.54, A in Figure III.4) was built up against the northeast foundation inside the church (Roebuck, 1951: 170), and later still, two tile graves (Graves 1932.26 and 1932.29, not shown in figure) overlaid Grave 1932.54. When the church was rebuilt, these tombs were then sealed in place beneath the floor paving of this later structure (NB 126: 86; B in Figure III.4). This stratigraphic relationship is further illustrated in Figure III.5, which shows the west end of the church during its excavation in 1932 with the floor paving tiles and Grave 1932.54 marked. The top of Grave 1932.54 is .40 m below the later paving (NB 126: 86).

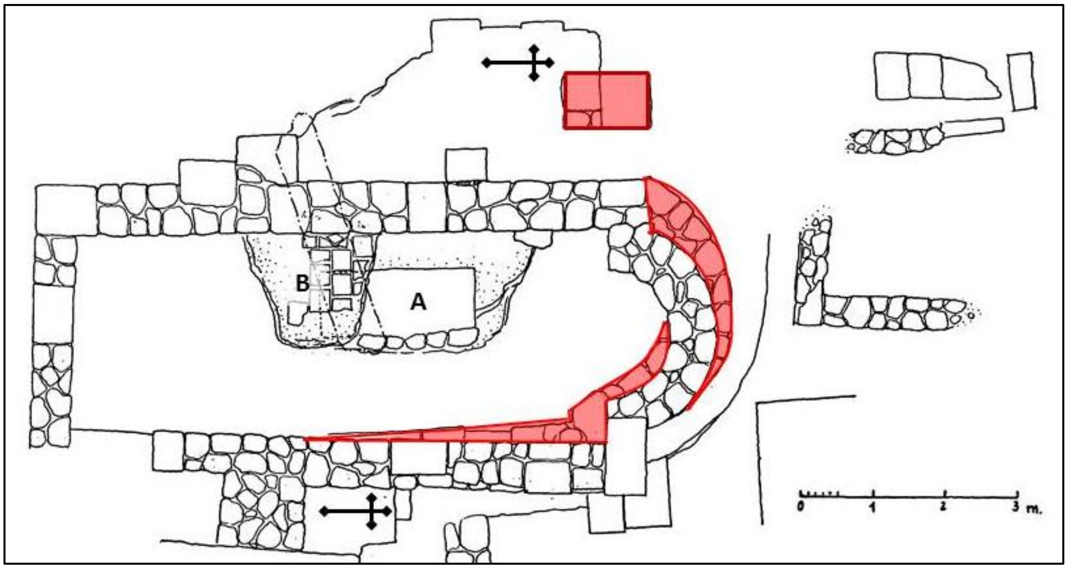

Figure III.4. Remains of the church in Lerna Square (reprinted with additions from Roebuck, 1951, Figure 33). Remains of the original church are shaded, Grave 1932.54 is A, the pavement from the second church is B, and the possible secondary burial receptacles each marked with a cross. Original photo: courtesy of the American School of Classical Studies at Athens, Corinth Excavations.

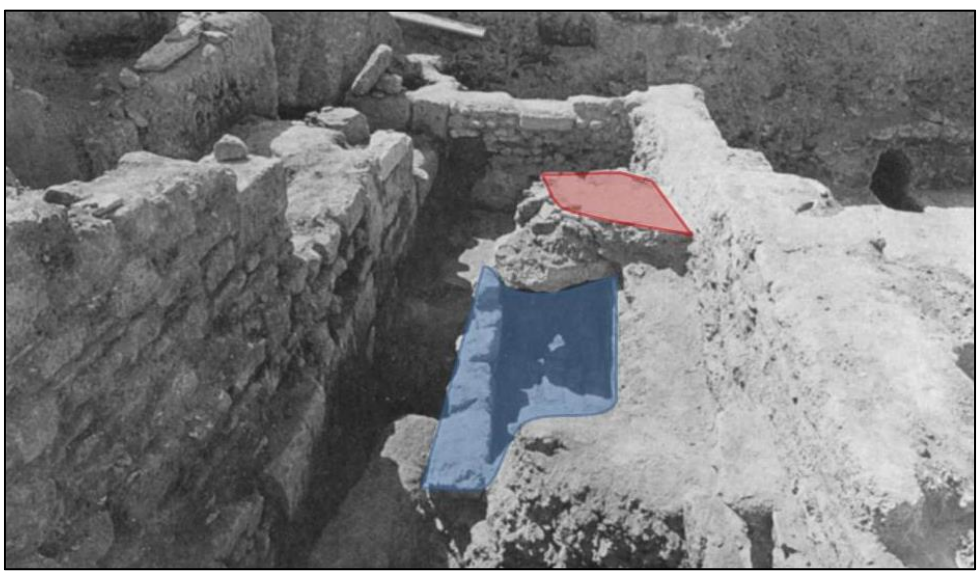

Figure III.5. West end of the church in Lerna Square during excavation (reprinted with additions from Plate 68, number 2, in Roebuck, 1951). The paving tiles are shaded red, and the top of Grave 1932.54 blue. Photo: courtesy of the American School of Classical Studies at Athens, Corinth Excavations.

Inscriptions associated with the tile graves (I-1091 is associated with Grave 1932.26 and I-1092 with Grave 1932.29) thus can be used to date this grave complex, which in turn must date later than the original church. Both inscriptions (I-1091 was published as N. 559, and I-1092 as N.560 in Kent, 1966) are characteristic of epigraphs dating to the mid-6th through 8th centuries AD (for dating criteria, see Poulou-Papadimitriou et al., 2012 and Walbank and Walbank, 2006), and inscription I-1092 was *in situ*, sunk into the middle of the grave. As this grave complex dates later than the building's foundations against which the lowest grave was built, the church itself must also have been constructed by the 8th century AD. When the church was rebuilt, much of the original structure was demolished, and new foundations put in, so that even if much later coins were in contexts by the apse foundation, they may have been deposited during this later activity.

Use of the surrounding cemetery continued through the 7th and 8th centuries, with the latest burial practices involving sequential use of tombs and reservoirs for multiple interment events. At least two tombs may have been built as secondary burial receptacles when the cemetery became crowded (contra Roebuck, 1951: 163), as each contained a large number of burials (one built against the southern wall of the church, no grave number assigned, and Grave 1932.32, cf. NB 126: 74; see the crosses on Figure III.4). Two caverns of the Roman water system were also used for collective burial (Graves 1933.110 and 1933.111, including the reservoir marked on Figure III.2). This cemetery may even have continued to be used into the Byzantine period, as material culture and renovations to the church dating to at least the 11th century AD are present (Coin 1932-287, dating to the 11th century AD, was found above the 2nd church's pavement, cf. NB 126 p. 90). One coin of John I. Zimiscus (Coin 1933-142) was found in the fill of Cavern B/III near the ceiling and another in the drain in front of this cavern (Coin 1933-236), possibly indicating these collective burial places were used as late as the end of the 10th and into the 11th centuries AD (NB 136: 125).

While many skeletons were buried together in these collective burials, the deceased in this cemetery were also grouped together by grave placement. In the

Figure III.6. Isolated burial area cut into the bedrock near the ancient Gymnasium. Photo: L. Kennedy.

Gymnasium area, a number of graves were clustered around the north edge of the Gymnasium stoa (see Figure III.2). Elsewhere a large area cut in the bedrock and with walls built up around it, pictured in Figure III.6 and located near excavation areas 2 and 7 on Figure III.2, effectively isolated and offset a number of other tombs (Graves 1967.03 through .06, .08, .12, and 1969.45 through .54, plus Graves 71, 74 and 75 from Wiseman, 1969; Graves 1967.10a-c and Graves 79 and 83 from Wiseman, 1969 are also connected to this cutting, though not inside it). Wiseman (1969) suggested this grouping may be based on race, kinship, or shared membership in a burial guild. Brief notes by Angel in the excavation reports (cf. Wiseman, 1969) and osteological examination by A.

Wesolowsky (1971, 1973) supports the demographic and cultural diversity suggested by the complexity in burial behavior.

3.3.2 East city walls: Kraneion basilica

Much as along the northern city walls, many graves were also placed near the Kenchrean Gate in the eastern city walls. Late Antique burials were particularly clustered around a small church, the so-called Kraneion basilica (Carpenter, 1929; Pallas, 1956b, 1970, 1972, 1976; Shelley, 1943). Though some graves predate its construction in the 6^{th} century AD, the intensification of burial activity after it was built suggests that the church was regularly used during funeral ritual. As Kraneion continued to be used for burial purposes throughout the Byzantine period despite what appears to be an originally suburban location for the cemetery, its popularity may also indicate that a large population resided nearby throughout late antiquity.

The elaborate structure and repeated renovations of this church suggest it was built to house the relics of particularly holy individuals (Carpenter, 1929; Sanders, 2004; Shelley, 1943). Other graves may have been placed inside the church either due to a desire to be buried close to sanctified relics, or because burial within the church walls emphasized ecclesial involvement and status in the community for the family of the deceased (Cantino Wataghin 1999). In either case, these graves serve as important glimpses of high-status mortuary assemblages.

The early cemetery surrounding the Kraneion basilica is obscured by later burial activity in the area and substantial renovations of the church, during which the building appears to have maintained its previous focus on funeral rites. The last renovation of this structure occurred in the 13^{th} century AD, and burials continued into the modern period (Carpenter, 1929; Shelley, 1943). The tombs in the church were disturbed by this activity and provide little opportunity for statistical analysis, though they serve to date graves elsewhere in Corinth (Sanders, 2004). Further excavation of the area and the associated cemetery has progressed under the Greek Archaeological Service and is unavailable for this dissertation (Athanasoulis and Manolessou, 2013).

3.3.3 The ancient city center: The Roman forum and surroundings

The ancient city center of Corinth focused on the Temple of Apollo on "Temple Hill," which monument formed a prominent landmark in the ancient city and modern village. This area, especially the Roman forum ("Agora") shown in Figure III.7, was in continuous commercial and administrative use until at least the 6th century AD (Broneer, 1954; Engels, 1990; Palinkas and Herbst, 2011; Williams, 1993). After it fell into disuse, and possibly after the fortified area of the city was reduced in size so that it excluded the former city center, residents of Corinth began to use this area for burials (Ivison, 1996; Sanders, 2004, 2005). This activity began with isolated burials, most appearing to date within the 7th century AD (Broneer, 1926: 50, 55; 1935: 55; Morgan, 1938: 370; Robinson, 1962: 110-111; Scranton, 1957: 29; Weinberg, 1974; Weinberg, 1939: 592; Williams and Fisher, 1975: 15, 1976: 118; Williams et al., 1974: 9-10). Following this, many of these originally isolated tombs became the focus of continued burial activity, resulting in grave clusters (Morgan, 1938; Scranton, 1957: 29-30). A few locations were further memorialized through the construction of churches, and organized cemeteries developed around them. Commercial and industrial activity then resumed in following periods (Davidson, 1940; Morgan, 1937; Scranton, 1957). The 10th-11th centuries AD construction of buildings such as a glass factory and a ceramic workshop obscured archaeological evidence of Late Antique graves and provide a likely end date for burial activity in many parts of this area.

Early ASCSA excavations uncovered many Late Antique graves scattered throughout the forum and along the major thoroughfares leading out of this space. Abandoned buildings were used for these graves, and the roads leading south and west out of this space were interrupted by these burials and other structures, making it likely that the area's use had changed from that in earlier periods (Broneer, 1926: 50, 55;

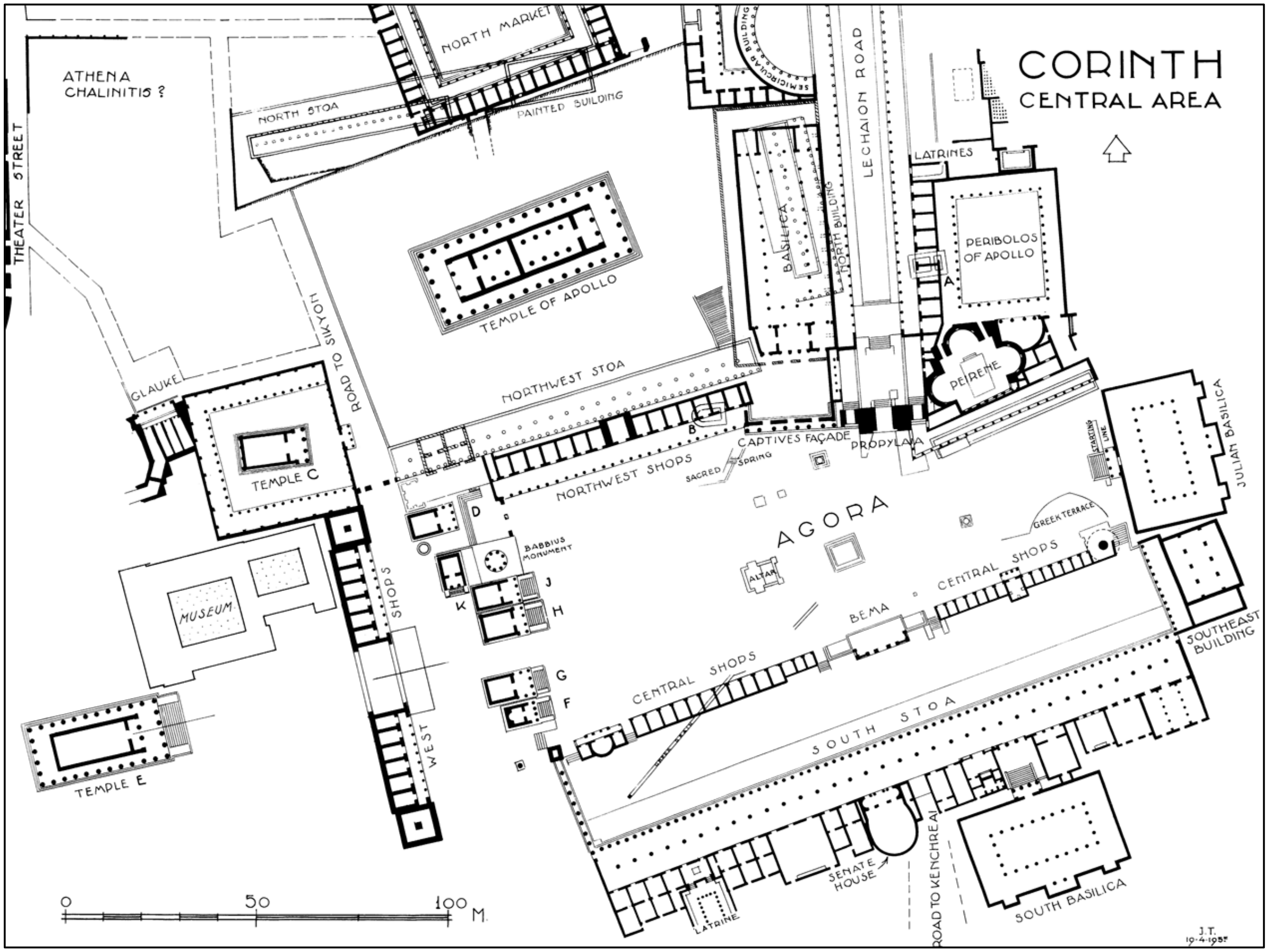

Figure III.7. Plan of the Roman administrative and civic center of Corinth (reprinted from Scranton, 1957: Plan 3). Photo: courtesy of the American School of Classical Studies at Athens, Corinth Excavations.

Robinson, 1962: 109-111; Scranton, 1957: 30; Weinberg, 1960: 50; Williams, 1978: 25-8; Williams and Fisher, 1975: 15, 1976: 118; Williams et al., 1974: 9-10). Other structures were also present in the area at this time, including a bath complex along the southern border of the forum (in the area of the South Stoa on Figure III.7) (Broneer, 1954: 151; Biers, 2003: 309), but apart from buildings in the southwest corner (Robinson, 1962; Williams, 1978; Williams and Fisher, 1975, 1976; Williams et al., 1974), these were hastily excavated and remain incompletely published. Scranton (1951: 73) mentions only that blocks from monuments along the eastern edge of the forum were incorporated into a "network of early Christian walls which eventually began to spread over the edges of the Agora area." His later publication (1957: 31-33) similarly only mentioned that earlier buildings were quarried for worked stone, without discussing the purpose for which this building material was used. It is reasonable, however, to assume that some of these structures may have been dwellings, and that the local community placed these graves in this area out of convenience, rather than utilizing one of the suburban cemeteries.

The idea that these graves were in close proximity to residential neighborhoods is made more likely by the fact that some of these isolated tombs became the focus of later burial and cult activity. Grave clusters developed in a number of locations: in the colonnade of the Julian Basilica at the eastern end of the forum (Scranton, 1957:11; Weinberg, 1960: 50); in the western portion of the South Stoa (Morgan, 1938; Scranton, 1957: 30-31; Weinberg, 1939; Weinberg, 1974); near Shop IV of the Central Shops in eastern half of the forum (Morgan, 1937; Scranton, 1957: 29-30); and slightly east of Temple Hill, in the Hemicycle (the "semi-circular building" marked on Figure III.7) next to the Lechaion road (Broneer, 1926: 50, 55; Scranton, 1957: 29). Burial groups may also have been present in the basilica located directly south of the South Stoa (Morgan, 1936; Scranton, 1957: 29-30), in the courtyard of the Peirene fountain by the monumental entrance to the forum (Scranton, 1957: 30), and in the precincts of Temple C, located to the west of Temple Hill (NB 40: 58; NB 45: 23; NB 46: 49; NB 49: 48; NB

50: 15, 37, 46), and Temple E to the west of the forum (Fowler, 1901; Freeman, 1941: 172; Scranton, 1957: 29).

Unfortunately, the dating and extent of these grave clusters is problematic due to later construction in the area, though burial rituals appear to have been regularly practiced in a number of locations. Both sigma tables and lamps were found in the area around Peirene and in the Hemicycle (Broneer, 1926: 51), indicating commemoration activities were common in both areas. Interest in select graves was enhanced by their attribution to “barbarian invaders” or to the results of sacks and invasions (Charanis, 1950, 1952; Davidson and Horváth, 1937; Morgan, 1937; Setton, 1950, 1952; Weinberg, 1974). However, the majority of the skeletal remains from archaeological investigations were not curated for analysis until the 1960s (brief osteological summaries from graves in the southwestern portion of the forum are present in Robinson, 1962; Williams, 1978; Williams and Fisher, 1975; Williams et al., 1974).

3.3.4 Commemorating and memorializing graves in the forum area

Study and recognition of Late Antique graves is further complicated by the intensification of burial practices around select tombs. Many Late Antique graves in the forum area were reused over the course of generations, and continuous commemoration activities may have led to the construction of churches on these sites. Both reuse and building activity would have obscured the mortuary context of early burial events, making their identification and the reconstruction of individual burial assemblages difficult. Figure III.8 shows one tomb in the forum area and demonstrates the difficulties involved in interpreting these mortuary contexts. In this photo, taken when the tomb was first opened by archaeologists in 1934, the bottom of the grave is covered in “masses of bones belonging to a large number of skeletons” (Broneer, 1935: 55) which mixed together after decomposition and as additional interments were added. In this case, any objects deposited with the deceased will be difficult, if not impossible, to associate with

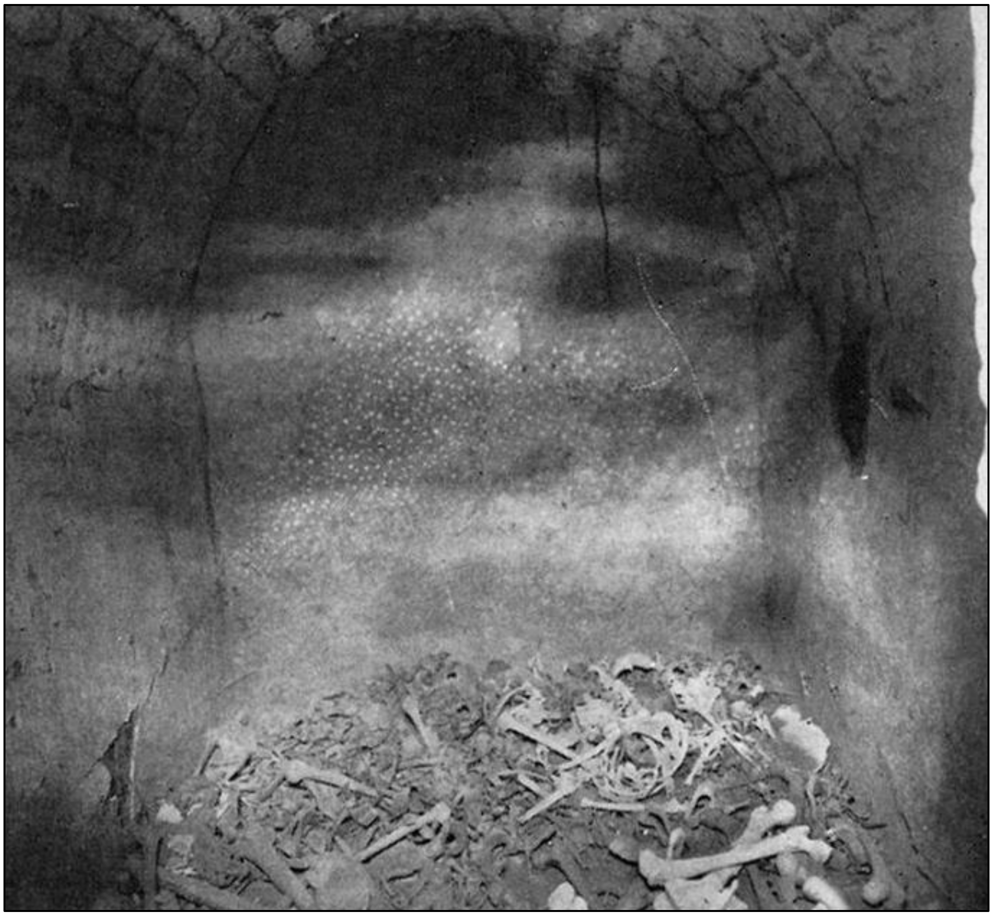

Figure III.8. Interior of tomb in the forum area (Grave 1934.001, reprinted from Broneer, 1935, Figure 2 and Scranton, 1957, Plate 17.2). Photo: courtesy of the American School of Classical Studies at Athens, Corinth Excavations.

specific burial events. Dating of the tomb's construction is dependent on individual artifacts rather than on entire assemblages as would be ideal.

On the other hand, this integration of existing tombs into new buildings appears to have been a deliberate attempt to monumentalize specific interments or provide access to these grave sites through the creation of reliquary chapels. Cantino Wataghin (1999) suggested this practice of remembering particular burial sites is related to the desire for burial by the relics of saints. Both are derived from the same social attitude toward death and the corpse which privileged access to particular graves based on the identity or

Figure III.9. State plan (Scale 1:150) of the Bema Church with early graves marked (reprinted with additions from Scranton, 1957, Figure 3). Original photo: courtesy of the American School of Classical Studies at Athens, Corinth Excavations.

sanctity of the individual(s) buried within them. One such chapel was associated with the graves in Central Shop IV (Morgan, 1937: 547), and the Julian Basilica and South Basilica may also have been the sites of small churches, though evidence for these structures is equivocal (Morgan, 1936: 62 contra Scranton, 1957: 29-30; and Scranton, 1957: 11 contra Weinberg, 1960: 50). Similarly, a chapel and/or monastic complex in the area near Peirene may also be associated with Late Antique tombs (Hill, 1927; Richardson, 1900: 221; Scranton, 1957: 30). Two other locations, the so-called "Bema Church" and the church on Temple Hill, located ca. 10 m due north of the northeastern corner of the ancient Temple of Apollo, in particular make use of earlier graves in their construction (Ivison, 1993).

A few tombs constructed towards the middle of the Central Shops were predecessors of the 10th century AD "Bema Church" (Ivison, 1993; Morgan, 1936; Scranton, 1951). Unfortunately, this church was renovated and the surrounding area used as an extensive cemetery into the 14th century AD (Ivison, 1993), so the majority of Late Antique graves were found to be disturbed or reused. Figure III.9 shows the final construction phase of this church with early graves marked. One such tomb, Grave 1936.12 (blue in figure), contained objects datable to the late 6th-7th century, and was incorporated into the church narthex during the 13th century renovations (Ivison, 1993: 78). Others may have had a similar early initial use, but the skeletal material associated with this original activity cannot be identified, since many graves – including Grave 1936.12 – were reopened for inhumations in the 13th century and these interments were commingled. Grave 1936.15 (red in figure), for example, may have been completely cleaned out at this time, and the earliest artifacts in this mortuary context date to the 10th century AD (Ivison, 1993: 78). However, the deliberate reuse and prominent position of the old graves in the new church, rather than their outright destruction, appears to indicate that these graves and their original interments were important factors in the location of the church and surrounding graveyard.

Even more intriguing is the association of Late Antique graves with the church built on Temple Hill in the 13th century AD. Figure III.10 shows that the west end of this church was built over top of two so-called "ossuaries" (Graves 1972.20 and 1972.70), partially destroying their original form. Robinson (1976) considered that these two graves were part of the foundations of the west wall of the narthex and therefore were structurally contemporaneous with the building. However, at least one of these graves (to the left and slightly west of the narthex on the plan) appears to have been constructed earlier. When excavated, as shown in Figure III.11, the top of the vault was broken and the tomb filled with bones and earth to the top of the walls, implying that the tomb was used for a sequence of burial events over a long period of time. This fill and the human

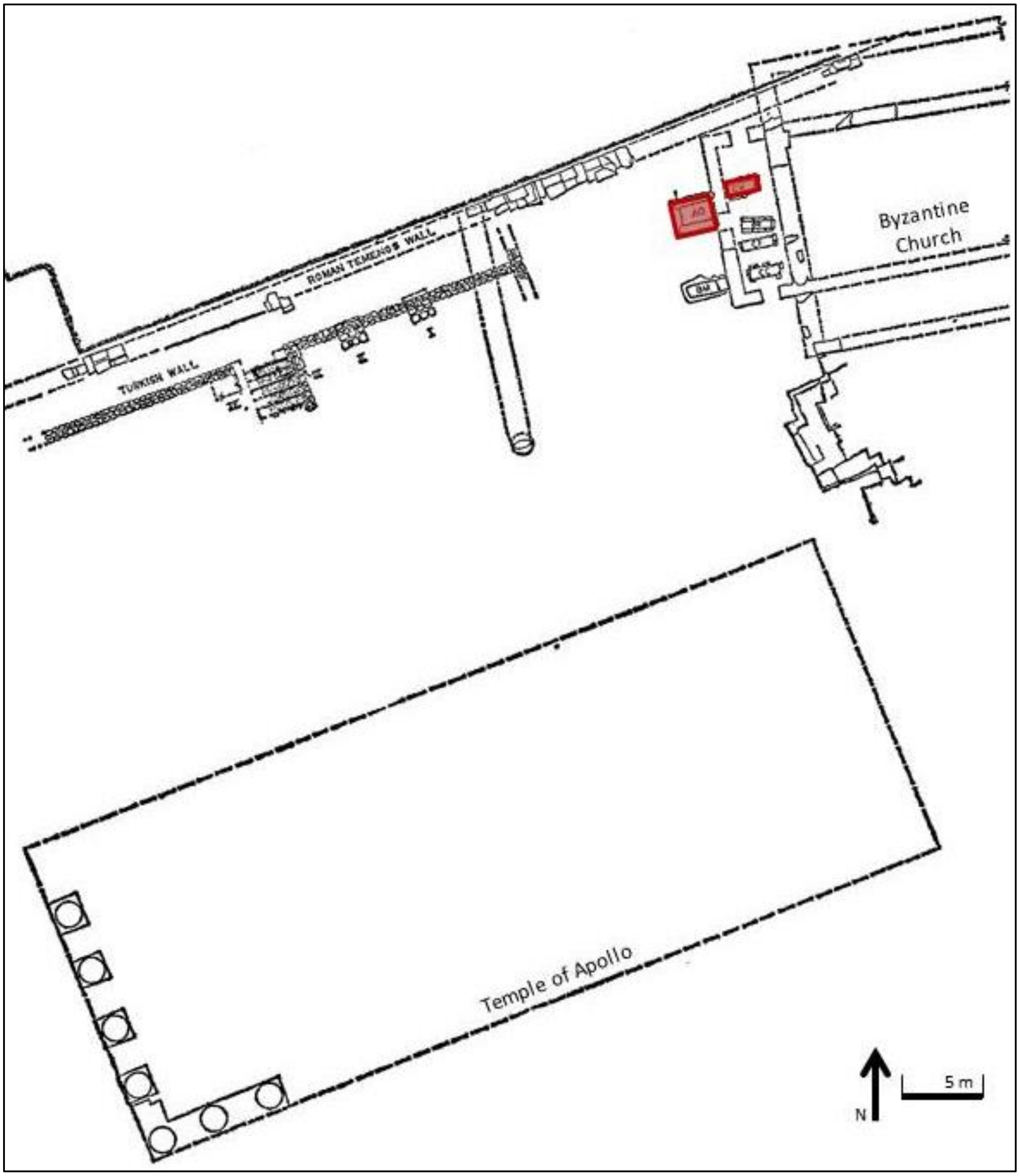

Figure III.10. Plan of church north of the Temple of Apollo after the 1972 excavations (reprinted with additions from Robinson, 1976, Figure 6). Original photo: courtesy of the American School of Classical Studies at Athens, Corinth Excavations.

skeletal remains were removed in layers which preserved the stratigraphic separation of burial events, allowing the objects associated with the earliest burials to be distinguished from the artifacts deposited in the top layer within this tomb (NB 525: 68-71, 76). The objects buried with these initial interments date to the 7th or 8th centuries AD, and could be used to date the church itself, if the grave and the church are contemporary (Robinson, 1976).

On the other hand, Ivison (1993: 91) identified similarities between the undamaged form of Grave 1972.20, which likely had a vaulted roof over a double chamber, and an intact tomb elsewhere in the Corinth forum (cf. Williams and Fisher, 1974), using this evidence to claim that the original exterior of both of these graves was not associated with any church walls. Therefore, these freestanding graves were earlier constructs which were only later, and deliberately, incorporated into the church. At this time their original visible aspect was altered and the tombs reused, and upper layers in

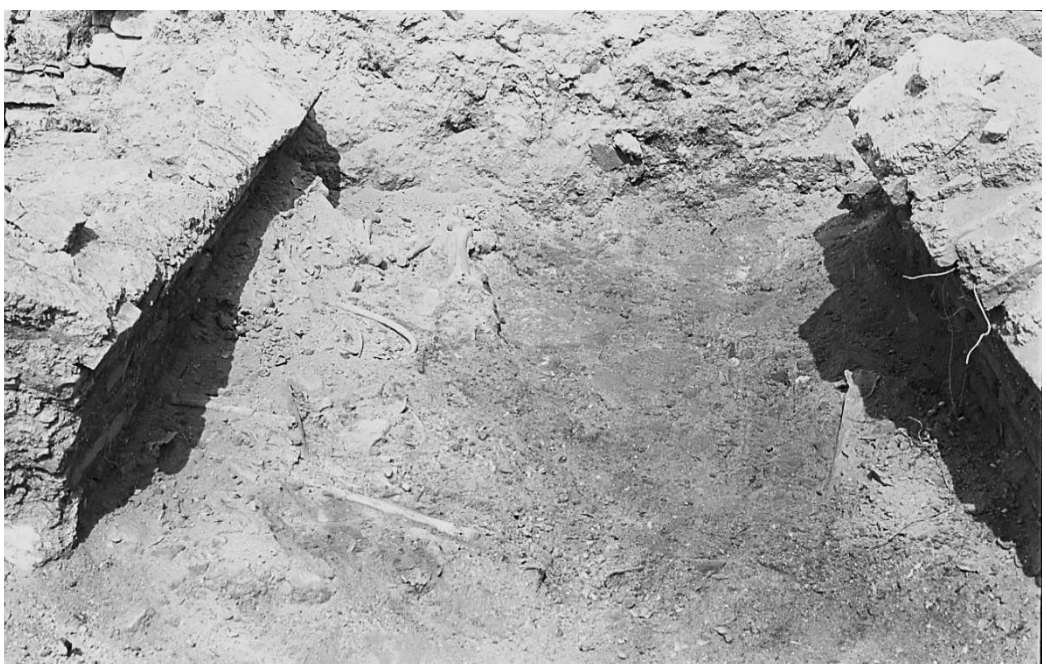

Figure III.11. Fill of Grave 1972.20 showing human skeletal remains near the top of the tomb. (Corinth Image 1972 071 05). Photo: courtesy of the American School of Classical Studies at Athens, Corinth Excavations.

Figure III.12. Grave 1972.20 after excavation. (Corinth Image 1972 070 32). Photo: Robinson, H.S. Courtesy of the American School of Classical Studies at Athens, Corinth Excavations.

Figure III.13. Grave 1973.03 from the forum, pictured as it might have looked to passersby in antiquity (reprinted from Williams et al., 1974, Plate 1,c). Photo: courtesy of the American School of Classical Studies at Athens, Corinth Excavations.

Grave 1972.20 contained artifacts from these later burials dating to the 12th or 13th centuries AD (Ivison, 1993: 96). Figure III.12 of Grave 1972.20 after excavation can be compared to Figure III.13 which shows Grave 1973.03 from the southwest area of the forum as it originally appeared to mourners in antiquity. Grave 1972.20 likely closely resembled this tomb when it was constructed, though Grave 1973.03 only contained one subterranean chamber (Ivison, 1993: 91).

Grave 1972.20 and two others (Graves 1971.22 and 1972.70) were used extensively for a large number of interments, possibly starting as early as the 6th century and continuing into the Byzantine period. These tombs, and burial within these tombs, may have been privileged accordingly. At the least, Graves 1971.22, 1972.20, and 1972.70 were deliberately recognized and chosen for prolonged commemoration. During the 13th century, burials were placed inside and to the west of the church, including the cutting of new graves as well as the placement of corpses in already established tombs. Many other early graves in the area were disturbed by this later burial activity with no regard or memory of where the earlier grave had been placed (Ivison, 1993). Bones disturbed from Graves 1972.38, 1972.58, 1972.72, 1975.52, and 1975.60, for example, were piled on or next to later interments, or pushed to the side in grave cuts. In the case of tombs 1972.20, 1972.70, and 1971.22, though many of the interments which used the same tomb structure date centuries later than its initial construction, they were evidently part of a pattern of continued use which incorporated rather than disturbed earlier burial events. This reuse demonstrates respect for the placement of certain graves and their structural integrity, as well as toward the individuals originally buried there. Also interesting is the fact that not all isolated burials appear to have been commemorated with the construction of a church, or to be associated with these later structures at all.

This relationship between specific tombs and churches is found elsewhere in the region around Corinth, where many chapels appear to have been founded on the burial site of prominent members of the community or church leaders. The Kraneion Church and the Kodratus Basilica may both have functioned as martyriums for the commemoration of specific individuals (Carpenter, 1929; Pallas, 1970, 1972; Sanders, 2004; Shelley, 1943). The massive basilica at Lechaion, the ancient western harbor of Corinth, also holds the tomb of a church father in pride of place against the exterior of the apse (Pallas, 1956a; Sanders, 2004). This association between churches and the burial liturgy is upheld by the later development of cemeteries surrounding these buildings, a development which is present for the churches on Temple Hill and at the Kenchrean Gate, and appears to have been paralleled by the chapels in Lerna Square.

3.3.4 West and south of the city: Other isolated burials

The ASCSA also excavated a number of scattered burials in the areas surrounding the ancient city center. A few were uncovered in the fields to the west (Robinson, 1962), a few in course of the Panayia Field excavations (Sanders, 1999), and still more in the fortifications at the summit of Acrocorinth and along the circuit of the ancient city walls (Blegen et al., 1930; Davidson and Horváth, 1937). Many of these graves were recorded in the course of rescue excavations, not during comprehensive or planned investigations, and their isolation may be somewhat artificial. On the other hand, the ASCSA excavated the isolated graves in Panayia Field during the course of systematic excavation campaigns. These burials are particularly important for contextualizing Late Antique mortuary practices since their stratigraphic relationship to a 6^{th} century AD bath (Sanders, 1999) extended existing grave chronologies into the late 6^{th} and possibly 7^{th} century AD (Sanders, 2004, 2005: 10).

The graves located near the Acrocorinth fortress have additionally been important evidence in archaeological inference regarding the presence of foreigners in Late Antique Corinthian cemeteries. Compared to the Panayia Field burials, these tombs are relatively grander, and some differences in tomb morphology may be due to differences in the local community using these graves. While Panayia Field was relatively isolated to the south and east of the Roman forum, the Acrocorinth fortress to the south of the city of Corinth remained a self-contained soldier barracks and governor’s palace during the Byzantine period. The area retained its own watersource and a few churches, markets, and baths serviced a permanent, official military outpost stationed on the site (Blegen et al., 1930; Carpenter et al., 1936). As a result, Late Antique graves were present in the church built on the summit of the landform and in a vast cemetery which extended outside the fortifications. The church graves, unfortunately, are disturbed by later renovations, grave constructions, and reuse, and may even have been cleaned out with the bones placed in ossuaries to make room for new burial activity (Ivison, 1993).

In the cemetery directly outside the fortification, however, graves were less impacted by later construction activity and more evidence is available regarding their chronology and interments. Graves dating to the Roman through the Byzantine period are present all along the western expanse of the Classical city wall (Davidson and Horváth, 1937; NB 125, 156), and burial activity was also concentrated on the western slopes of Acrocorinth outside the lowest gate of the citadel (NB 269). While the burial area as a whole contains tombs dating to a wide range of time periods, the objects found in graves built into abandoned towers in the fortification are common products of the Eastern Roman Empire in the 7^{th}-9^{th} centuries AD (Csallány, 1954; Curta, 2010b; Poulou-Papadimitriou, 2005). Early arguments that these graves contained the remains of “Avar invaders” or mercenaries based on the similarities between these objects to artifacts found in tombs excavated in the modern country of Hungary (Davidson and Horváth, 1937) require further scrutiny. Similar objects are present in graves placed in the Roman Forum, possibly indicating that the families of these groups of interred individuals shared a similar position in the community.

On the other hand, the comparison of these graves is complicated by their isolation, and similarities among the imports which found their way into funerary deposits may be a result of similarities in social class rather than profession. The placement of these tombs on the city outskirts may be related to the development of Late Antique suburban cemeteries elsewhere outside Corinth’s Roman center, such as in the Asklepieion area or surrounding the Kraneion basilica. Other isolated grave clusters to the west of the ancient city may likewise be related to the desire of local residents to bury their deceased relatives in nearby grave plots (Robinson, 1962: 116; NBs 99, 100, 132, 149, 170, 207, 242, 269, 435, 447).

3.4 Material Used in Mortuary Analyses

While this research attempts to fit mortuary behavior at Corinth within a regional framework, not all of the Late Antique cemeteries at Corinth are comprehensively represented. With reference to the nearby site of Isthmia (Rife, 2012), the tombs which are included can be considered to be typical of regional traditions, though there appears to have been localized variants of ritual elaborations. There is no sign of some of the grave types noted by Rife (2012) at Isthmia; for example, grave cuttings covered with flat tiles, and the use of tiles to face the interior of graves, is not present in graves reliably dated to late antiquity at Corinth. Similarly, only one tile grave of the type so common at Corinth was discovered at Isthmia. Thus, though the archaeological material excavated by the ASCSA at Corinth covers a wide range of funeral behaviors, the graves included in this dissertation may not incorporate all burial types present at Corinth as I did not have access to the entirety of mortuary evidence from this city. The majority of the data I used is from two areas: the suburban cemetery located by the ancient Asklepieion and Gymnasium, and the graves placed in the ancient city center after the Roman forum fell out of civic and administrative use.

In addition, much of this archaeology is currently being studied in ongoing research. The artifacts themselves will be published by material culture specialists. Final publication of the Gymnasium complex is also ongoing, though I was able to compare dates for graves with the team currently working on the Gymnasium publication, and I am indebted to their unpublished results (J. Wiseman and M. Morison, pers. comm.). As a result, though I used the excavation notes and artifacts in order to assess grave morphology and object classifications and to determine the period of use for each grave, a catalogue of finds from these burial areas is not present here. In the next chapter, I discuss how I treated this archaeological data to produce attributes for multivariate statistical analyses. I also present original osteological analysis of the skeletal material from all of the graves included in this dissertation. As the skeletal remains from the 1960s-1970s excavation of the Gymnasium complex underwent complete curation, the best data currently available on Late Antique burial behavior in Corinth is from this area, and is the best suited to multivariate analysis.

CHAPTER IV

MORTUARY SAMPLE AND ANALYTICAL METHODS

The historical sources and mortuary archaeology already conducted at Corinth have identified a great deal of variability in how Late Antique Corinthians were buried. Cemeteries and isolated graves for this period are present throughout the areas excavated by the American School of Classical Studies in Athens (ASCSA). Their spatial distribution is evidence for the location of communities and the reorganization of the city in late antiquity (Ivison, 1996; Sanders, 2004, 2005). On the other hand, these graves also provide a wealth of information regarding the composition and life histories of members of these communities. Using an anthropological approach, this research uses these data to present original analyses utilizing osteological data and mortuary behavior.

For the purposes of this study, I gathered information from the excavation of 1174 graves from the site areas discussed in Chapter III and using the original excavation reports, Corinth monograph volumes, and the field notes and artifacts located at the ASCSA Corinth field museum. I included mortuary data relating to grave construction techniques, such as whether the grave cut was lined or covered and how and whether the grave was marked, in addition to information on the grave assemblage, such as what objects were present in the grave and where they were placed with reference to the corpse, and the position and arrangement of the skeletal remains. I also collected osteological information from the skeletal remains using standard osteological techniques (Buikstra and Ubelaker, 1994; İşcan, 1989; Schaefer et al., 2009; Ubelaker, 1978). When possible, I compared individual graves and different burial episodes within the same grave, as determined by the excavation notes in the field notebooks.

Quality of these data was dependent on the excavation methodology and the thoroughness with which each tomb was recorded; field notes from early excavations often do not describe the position of the skeleton in the grave and may not fully describe the grave construct itself, especially if the volume of material from that day of excavation was particularly large. Thus, uneven recording practices limit the data available from many of the tombs excavated in the ancient city center. Skeletal remains from select tombs began to be kept for analysis starting in the 1930s, at which point they also began to be accorded greater interest in the excavation notes. These concerns and a critical reevaluation of the archaeological data and material remains from these graves led me to restrict my dataset to 630 mortuary contexts which I could securely date to the late 5th through 8th centuries AD. This reduced dataset forms a window into Late Antique populations at Corinth and provides a solid framework within which future research on mortuary behavior in this city can operate.

In the following chapter, I first discuss how I used these data to reevaluate the chronological placement of individual mortuary contexts. I also present an updated chronology of Late Antique mortuary behavior which I based on recent revisions to the local ceramic chronology (Hammond, 2015; Sanders, 1999, 2004, 2005; Slane, 1990, 1994; Slane and Sanders, 2005), reappraisals of regional mortuary archaeology and the dates for common artifacts placed in graves (Poulou-Papadimitriou, 2005; Poulou-Papadimitriou et al., 2012; Rife, 2012; Rife et al., 2007; Tzavella, 2008; Walbank and Walbank, 2006), and the relationships among graves as recorded in the excavation notes. Where possible, I used the original artifacts present in these grave assemblages to make these chronological determinations and I referenced the original excavation notes and reports when these objects were not available. For the Gymnasium excavation area, Melissa Morison (pers. comm.) also gave me access to dates from her ongoing study of the pottery, allowing a much finer chronological placement for tombs in this area than elsewhere.

I then briefly describe the mortuary sample, and go on to explain the categories I use to explain mortuary variability and subdivide these data for statistical analyses. In this section, I explain how I classified grave forms, corpse treatment, and mortuary objects, introducing the terminology I use in the remainder of this dissertation to differentiation among these behaviors. Thus, instead of using comparanda for individual artifacts to suggest possible identities for skeletons with which this object was placed, I use presence/absence data for object categories to look for patterns in how communities and social groups buried their dead in Chapter V.

In the fourth section of this chapter, I present the preliminary results from the osteological analyses for these mortuary contexts. Skeletal data include sex and age at death and provide a demographic framework for this cemetery population. These demographics may be used as an indication of which members of the population are likely underrepresented by this dataset. I also use human skeletal remains to determine the minimum number of individuals (MNI) interred in each mortuary context and the treatment of these corpses during or after burial. The osteological results and the mortuary variables used in this research are presented for each grave in an appendix at the end of this dissertation.

The archaeological and anthropological categories presented here are formulated for their use in multivariate statistical analyses. In the final section of this chapter, I describe the individual analyses I use in this research. In Chapter V, I present the results of these analyses and summarize the implications of these data for mortuary developments in Late Antique Corinth.

4.1 Archaeological Chronology

I determined the chronological age during which a grave was in use based on consultation between the excavation notes and the chronology for Late Antique grave forms developed by Sanders (2004, 2005). Also of note were the dates for objects in the grave fill and the stratigraphic relationship of the grave cut and fill to well-dated deposits including other graves. Unfortunately, the stratigraphic relationship of many of these graves to the surrounding layers was not regularly recorded in early excavations. The ability to develop a chronological sequence in grave forms was even debated by Roebuck (1951: 162), who deemed the separation of grave forms the result of practicality and availability of materials, rather than personal or cultural choice. However, given recent revisions of lamp and pottery chronologies (Garnett, 1975;

Karivieri, 1996; Sanders, 1999; Slane, 1994, 2008; Slane and Sanders, 2005), it is now apparent that the use of different grave forms followed a regular progression through late antiquity (Sanders, 2004, 2005).

Similar reassessments are ongoing using parallels for the jewelry and other objects of personal adornment present in graves (Curta, 2010b), but for the most part a Corinth-specific chronology is not currently available (J. Ott, pers. comm.). However, objects of personal adornment, especially those which ascribe status to the deceased, should be used cautiously in assigning specific dates to funerary contexts. As the objects used in funerary rituals to accompany the corpse underwent a similar transformative process as the deceased themselves, their meaning and use likely changed from that implied by their everyday use. It is possible that objects which originally conferred authority or status to their beholder in particular would have been kept as heirlooms. These artifacts were then deposited in graves after the period in which they would have been used in life, and can only be used to date graves to a fairly wide range.

Additional complications for assigning a date to a grave can arise from reuse and manipulation, as early graves were often incorporated into churches built centuries later (Ivison, 1993; Shelley, 1943). In some cases, burial events within the same grave are stratigraphically distinguished or separated through use of tiles, mortar, or other varieties of grave floors placed over top of previous burials (Ivison, 1993). Most reuse, however, was more chronologically restricted. Based on modern analogues, it is probable that the majority of multiple burial interments, especially those used by a family unit, were limited to a few generations of use (Tzortzopoulou-Gregory, 2010). Though these later interments can then be expected to date within the same archaeological period, chronological determinations for individual burials are problematic. Later interments within the same grave disturbed earlier ones, pushing aside any objects placed with these corpses and scattering the bones if enough time had passed for decomposition. In these cases, it is unclear whether objects found in the grave can be associated with the earliest interments and are relevant for dating the construction of the grave.

Due to these complications, in the following analyses I date graves to broad periods of burial activity. I used those graves that could be more firmly dated using stratigraphic information and the inclusion of objects or inscriptions to establish chronological brackets for the funerary use of specific areas. I then dated other tombs based on their proximity or similarity in morphology to grave constructs in well-dated areas. The earliest period covered by this study mainly spans the late 5th through 6th centuries, with some graves possibly dating to the 7th century AD. I attributed burial activity generally dated to the mid- to late-6th through 7th centuries to the second period, overlapping Period I slightly. The latest period began with grave forms not constructed prior to the mid-7th century AD, and continued at least through the 8th century AD if not later. Ambiguity and overlap in these periods is somewhat due to the chronological sequence in burial placement, as well as to the overall transitional nature of mortuary behavior during these periods. Graves chronologically belonging to "**Late Antiquity NPD**" are so marked because no precise date can be assigned, though they can be attributed broadly to late antiquity.

Period I. Burial practices during the earliest period show the influence of earlier, Roman traditions. Graves were placed in established cemeteries, such as those that encircled the Classical city wall. Many of the mortuary behaviors and objects included in these graves were also based on earlier traditions, though innovations, especially in grave morphology, developed before these earlier Roman cemeteries went out of use.

Period II. In the intermediary period, burial activity intensified in select areas, and this increased activity appears to have often been serviced by a small church or funerary chapel. Isolated Late Antique graves were also placed in new locations within the boundaries of the former city wall. Grave clusters dating to this time period are present in the Roman forum area, for example, as well as between the former city center and the western city wall. These locations were probably chosen for convenience, as they were likely in close proximity to the bereaved's residential neighborhood. Tomb constructions were similar to those placed outside the city and dating to a slightly earlier date, and likely represent attempts to build analogous structures in a slightly different environment.

Period III. The final period is transitional from Late Antique mortuary behavior to Byzantine practices. At this time, burial activity concentrated around graves that had been isolated in the intermediary period, showing a development of organized burial places in close proximity to 7th century graves. Reuse of graves was also prolonged in this final period, with increased numbers of individuals interred in each tomb. A few graves appear to have been used continuously for corpse disposal until the 10th century AD, and others likely became the focus of later, Byzantine cemeteries. Incorporation of these locations into 13th century AD cemeteries or places of worship further complicates the identification of graves originally constructed during this transitional period.

4.2 Mortuary Data

The sample of graves used in this research is from excavations conducted by the ASCSA in Corinth starting in 1897. These mortuary contexts cover a wide spatial distribution as well as a wide range of burial behaviors. As the identity of who was buried in each part of the site is doubtless indebted to the communities living in close proximity, these graves are described in the following analyses with reference to their location. I describe this in reference to their proximity with major landforms or architectural landmarks in the ancient city. I then group these locales geographically by site area. A few of these areas also relate to formal "cemeteries," but more contain a number of discrete grave clusters grouped together with isolated grave sites. As

Table IV.1. Grave counts by area and chronological period. The number of these graves for which basic information regarding the interred skeletal remains is available is in parentheses next to the overall count. The minimum number of individuals (MNI) is tallied from the graves in parentheses.

	Period				Total Graves	MNI
	I : late 5th - 6th c AD	II : 7th c AD	III: mid-7th - 8th c AD	Late Antiquity NPD		
North of the City	165 (58)	212 (78)	39 (14)	3 (0)	419 (150)	413
City Center	1 (1)	57 (44)	60 (40)	3 (3)	121 (88)	377
City Outskirts	36 (27)	32 (20)	16 (12)	6 (5)	90 (64)	140
Total Graves	202 (86)	301 (142)	115 (66)	12 (8)		
MNI	86	439	389	16		

discussed by Cantino-Wataghin (1999), these distinctions have chronological and cultural implications, as burial placement shifted gradually during late antiquity from suburban cemeteries to urban and especially *ad sanctos* burial. Thus, as Table IV.1 shows, the graves placed "**North of the City**" by the ancient Asklepieion and Gymnasium include the largest number of graves dating to Period I. Other relatively early graves are part of the "**City Outskirts**" group, which collectively refers to any graves placed east, south, and west of the ancient city. Finally, "**City Center**" groups the interments from Temple Hill, Temple C, and the former forum area.

Though I grouped tombs within site areas in order to compare mortuary activity at different locations across the city, there is an unequal distribution of graves by area for this analysis (Table IV.1). Those graves placed north of the city form a larger group than do those excavated from the rest of the city burial locations combined. Additionally, no single group forms a comprehensive representation of all graves originally placed in a single, circumscribed area. The "City Outskirts" group in particular combines graves scattered along the entire southern half of the ancient city walls, rather than entire cemeteries. However, these groupings assist in statistical comparison of these areas by limiting the difference in sample sizes among them. Additionally, though the group "North of the City" retains the greatest number of graves, the overall number of interments is almost equal between this area and the city center (MNI for graves north of the city = 413, for graves in the city center = 377), so that these areas were likely used for a comparable number of burial episodes and, possibly, for a comparable amount of time. The number of interments in graves on the city outskirts apart from those located near the Asklepieion, on the other hand, is much lower, reflecting the dispersed nature of these graves and the incomplete excavation of the surrounding area (MNI = 140).

In this section, I describe the archaeological evidence within these burial areas to which characterize mortuary variability in this sample and the terminology used in their description. I based the typology for grave morphologies found in Late Antique Corinth primarily on discussions by Sanders (2004, 2005) and Ivison (1996), though the chronology and, therefore, the progression of grave forms presented by Ivison (1996) for late antiquity is problematic and does not incorporate new dating evidence (Sanders, 2004; Slane and Sanders, 2005). I then discuss the artifacts found in and around Late Antique graves. In order to maintain a consistent terminology for Corinth, however, my typology was also informed by mortuary behavior employed in later, Byzantine graves (AD 950+), as these traditions evolved from forms first adopted during late antiquity (Ivison, 1993). I also compared the material culture of Corinthian graves and those of neighboring regions in Greece (Bourbou and Tsilipakou, 2009; Eliot and Eliot, 1968; Garvie-Lok, 2010; Poulou-Papadimitriou et al., 2012; Rife, 2012; Rife et al., 2007; Toth, 2009; Tzavella, 2008; 2010; Ubelaker and Rife, 2007; 2008).

4.2.1 Grave form

Grave form refers to the architecture of the grave itself and how it was built, many aspects of which would have been of limited visibility once the grave was filled and covered. Grave forms typical of late antiquity are displayed in Figure IV.1. These variations may be a result of the amount of time a family had after death to provide a grave receptacle, or relatively more elaborate structures may reflect the amount of money available to the family to spend on funeral expenses. Other variations are a result of chronological developments in grave forms, or differences in treatment of children as

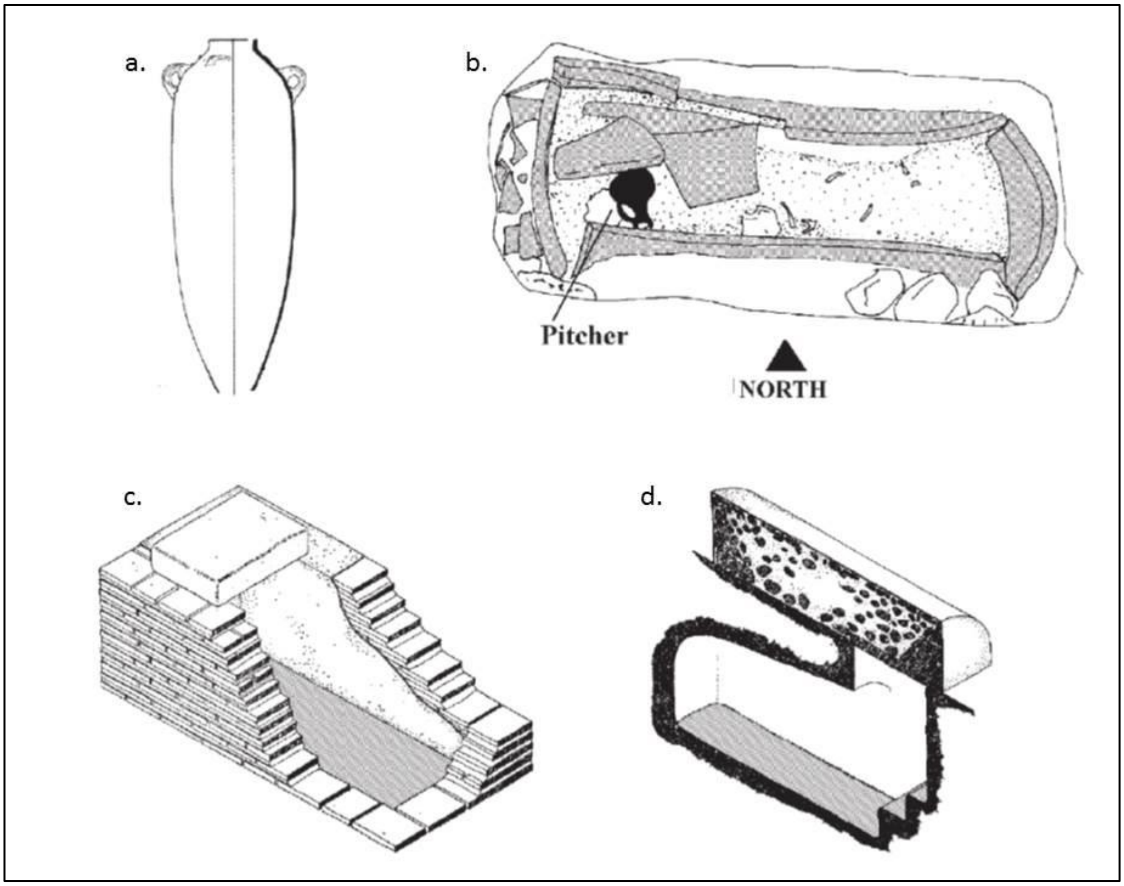

Figure IV.1. Typical grave forms in late antiquity (reprinted from Sanders, 2005, Figure 16.8a-d). Grave form a. is a Gaza amphora, b. is a tile grave, c. is a built cist, and d. is a rock-cut chamber tomb. Photo: courtesy of the American School of Classical Studies at Athens, Corinth Excavations.

opposed to adults. Thus, the grave typology presented here preserves differences in grave construction or elaboration which may be due to social status or class.

Pit Graves refer to interments lacking a formal monument or container for the deceased. These graves were cut into both sediment and bedrock, filled in after burial, and no stone slabs or tiles were used to cover or cap these graves. Often these were described as “simple inhumations” in the excavation notes.

Graves involving slightly more labor had ceramic tiles or fragments of amphorae placed over inhumations prior to filling the rectangular grave cut. The majority of

Figure IV.2. Tile grave (1993.03) from Panayia Field, photographed from the west (Corinth photo 1999 029 03a). Photo: courtesy of the American School of Classical Studies at Athens, Corinth Excavations.

Tile Graves (Figure IV.1b) were formed by covering the corpse with flat roof tiles propped against each other in the shape of a tent as in Figure IV.2. This grave type was used almost exclusively for single inhumations, and the length of the grave was dependent on the height of the deceased so that the number of tiles used per side varied accordingly (Roebuck, 1951; Sanders, 2005; Wiseman, 1967b). Occasionally, a double layer of tiles was used to cover the body, or rounded cover tiles were placed over the ridge where the leaning side tiles met, the sides held in placed by stones. The triangular ends of these graves were also sometimes blocked by fragmentary tiles or ceramic vessels (Wiseman, 1967b).

Burial inside a complete or mostly complete amphora, rather than merely covering the corpse with ceramic fragments, was used exclusively for young children or infants. **Amphora Graves** (Figure IV.1, a) mostly used storage vessels of the Gaza type (Sanders, 2005). Burials incorporated whole or fragmentary amphorae, and occasionally the mouth of the vessel was stoppered with a tile, stone, or the broken fragment of another amphora.

More formalized versions of Pit Graves, or **Cists**, are more carefully cut into the ground or bedrock and were covered by large flat tiles or rock slabs. Some cists were also coated with stucco on the interior, or contained a "pillow" of rock or tile at the head end of the grave. These structures often contained multiple interments.

In areas where bedrock lies well below the ground surface, such as the former forum area, a variety of cist graves were lined by tiles, stone slabs, reused architectural material (called *spolia*) or brick and mortar walls (Figure IV.1, c and Figure IV.3). These **Built Cists** were also usually rectangular or roughly squared in shape and contained multiple interments. Some built cists were also lined on the bottom with stone slabs or

Figure IV.3. Built cist from the forum area (Grave 1937.25, reprinted from Morgan, 1938, Figure 11, p. 370 and Scranton, 1957, Plate 17.1). Photo: courtesy of the American School of Classical Studies at Athens, Corinth Excavations.

tiles and faced on the sides with stucco or plaster, though those with square or roof tiles lining the floor may date later than other built cists. The sides of rock-cut cists were also occasionally built up with mud and brick in a similar fashion (Wiseman, 1969: 80), indicating a possible gradual progression in the elaboration of cist graves which may have been chronological. This progression is supported by the fact that the built cists in the former forum area are slightly later in date than graves in the Asklepieion area (Sanders, 2004, 2005).

More elaborate graves were composed of chambers cut into bedrock or built out of tiles and stones, leaving only a small, square opening to the east through which the corpse was lowered. **Rock-Cut Chambers** (Figure IV.1, d) and **Built Vaults** (Figure IV.4, IV.5) are similar in structure, as both provided a rectangular chamber, at least partially subsurface, which was accessed by a shaft or opening on their top. **Rock-Cut Chambers**, however, appear to have developed from earlier traditions in the Asklepieion area of tunneling into clay (Roebuck, 1951) and date earlier than the **Built Vaults** (Sanders, 2005). **Built Vaults**, which are almost entirely present the ancient city center, may have been a later adaptation of the chamber tomb morphology for use in an area lacking exposed bedrock. In some examples of each of these types, the floor of the tomb was cut through to divide the chamber into two graves (Roebuck, 1951; Shelley, 1943; Wiseman, 1969). Elaborate forms of these structures were incorporated into Late Antique churches, such as the Kraneion Church to the east of the city of Corinth (Shelley, 1943). These tombs had niches built into the walls for lamps, doorways for reentry and reuse, and the graves cut in the bottom of the chambers were built of tiles and stuccoed on the inside, with marble cover slabs.

Typically, the opening for **Rock-Cut Chambers** was a nearly square, vertical shaft at the east end of the grave that widened into a rectangular, vaulted chamber below the surface (Roebuck, 1951; Wiseman, 1967a, b, 1969). Some of these tombs have steps at the east end to make entrance easier. The later **Built Vaults** were often constructed using *spolia* or brick and mortar, with an arched roof made of flat bricks in heavy mortar (Sanders, 2004, 2005). A door or an entrance hole similar to the entrance shaft in rock-

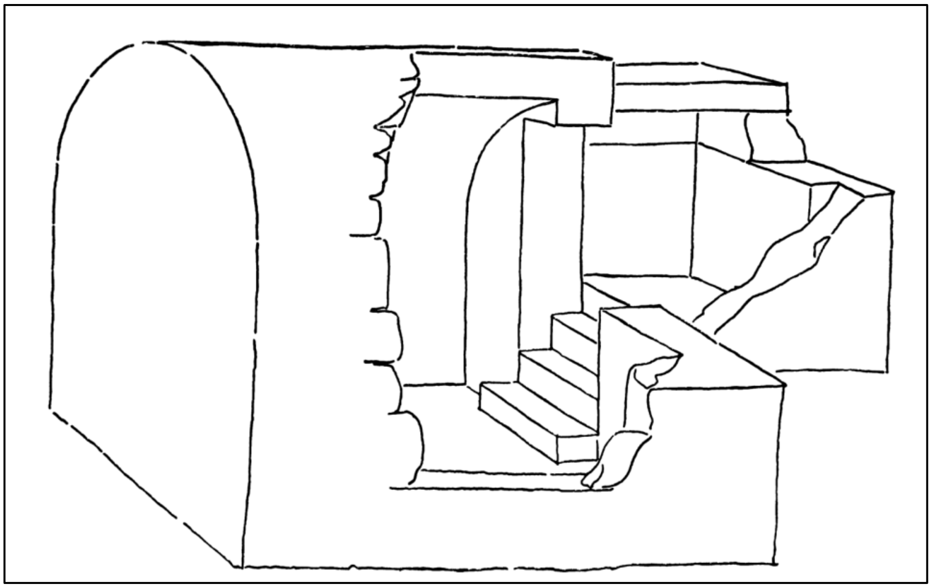

Figure IV.4. Schematic drawing of a built vault (reprinted from Scranton, 1957, Figure 12, p. 127). Photo: courtesy of the American School of Classical Studies at Athens, Corinth Excavations.

Figure IV.5. Built vault tomb from the forum area (Grave 1973.03), photographed at likely ground level (reprinted from Williams et al., 1974, Plate 2a). Photo: courtesy of the American School of Classical Studies at Athens, Corinth Excavations.

cut chamber tombs allowed access at their eastern end. The vault built over the tomb was likely visible above the ground surface, as shown in Figure IV.5, and is reminiscent of the stucco mounds constructed over tombs in the Asklepieion/Gymnasium area. Tombs of this type were constructed in the city center of Corinth through the late 8th century AD (Sanders, 2005), and many were reused in later periods (Ivison, 1993).

Additionally in late antiquity, portions of abandoned structures were used for burials. In this practice, small enclosed areas, especially those related to the water supply of buildings such as drains or cisterns (Rife, 2012; Robinson, 1962; Roebuck, 1951; Sanders, 2004; Scranton, 1957; Wiseman, 1967), were minimally altered prior to being used as a grave receptacle. This connection may have been deliberate, as many ancient water sources in the city were the site of later Christian chapels or cult areas such as at Peirene by the Forum (Richardson, 1902) and in the Fountain of the Lamps (Wiseman, 1972) and the Lerna fountain house (de Waele, 1935; Roebuck, 1951) by the Asklepieion and Gymnasium. The use of water, especially for bathing or anointing, is similarly prominent in Christian rituals, including early Christian burial treatments for the corpse (Kyriakakis, 1974; Sanders, 2004, 2005). I therefore use the term **Reused Architecture** here to draw attention to the minimal restructuring these structures underwent prior to their use as tombs.

4.2.2 Corpse treatment

In Late Antique Greece, the way the body is cared for after death may be a result of religion, status, or community and family membership. The Christian church, for example, required the body to be presented and cared for in certain ways after death. These may have changed over time, as later Byzantine practices included disinterment of the deceased in order to clean the bones and facilitate their purification and entrance into heaven. Status may also have been reflected in the care with which body position followed Christian recommendations. Status or social affiliations may have been reflected in the decision of whether to bury the deceased in a new tomb or reuse an older

Figure IV.6. Sequential reuse of tombs resulted in some disturbance of skeletal material (Grave 1973.03, reprinted from Williams et al., 1974, Plate 2b). Photo: courtesy of the American School of Classical Studies at Athens, Corinth Excavations.

grave receptacle. Where possible, therefore, I recorded the position of the skeletal elements in the grave and the number of individuals interred.

The majority of graves contained primary interments, wherein the body of the deceased only underwent one burial event. In **primary burial** contexts, the skeletal remains of the deceased were mainly in anatomical order, and any disturbance was likely due to sequential burial events reusing the same grave receptacle. An example of primary burial of multiple skeletons and the resulting disturbance is shown in Figure IV.6. In **secondary burial**, on the other hand, select bones or the entire skeleton was removed from the grave after decomposition. The secondary burial category combines mortuary contexts where the tomb was used as a charnel house and the deceased was buried temporarily prior to bone removal with contexts where a skeleton was deposited in a pile or bundle within the grave. A few tombs were used for both primary interments and during secondary burial ritual.

I also discriminated among graves structures which were **empty**, those containing one **single interment**, and those containing more than one body or **multiple interments**. Empty graves were identified based on the similarity of their form and construction to nearby tombs. Multiple interments could be the result of a shared burial event, or as the result of sequential activity. In the latter case, while the bones of the previous burial may have been disturbed, this interaction should be considered accidental rather than ritual in origin. When a burial event was shared, the deceased are assumed to have died in close succession, possibly a mother and child who died during the birthing process or as the result of shared infection, and the skeletal remains are mainly in anatomical position.

Other aspects of body treatment include the orientation of the corpse, or whether the head was usually directed to the west in the grave, and its arrangement to resemble someone sleeping. These practices rarely varied; only the position of the hands was somewhat diverse. In addition, early excavations often do not record this information, and as a result, this category was not included in the statistical analyses of mortuary behavior. As small objects of clothing and adornment are often present near the bones in the grave, it is likely that the majority of Late Antique dead were clothed when buried. Individual items of adornment are included in categorizations of the grave assemblage.

4.2.3 Objects found with body

This category references all artifacts found in the grave and presumed deposited at time of burial. While fragmentary or otherwise residual material may also be present in the grave fill, these objects are only used for dating, not for ritual reconstruction. **Coins** are one example of artifacts whose presence in the grave may be the result of accidental deposition. Although Kyriakakis (1974) remarks that the pagan, Roman practice of placing a coin in the mouth or hand for entrance to the underworld was

Figure IV.7. Pierced coin (Coin 1933-217) found in grave (Grave 1933.111) (Photo digital 2010 0005). Photo: Petros Dellatolas. Courtesy of the American School of Classical Studies at Athens, Corinth Excavations.

observed in the later Byzantine period, evidence for a direct association between any coins found in Late Antique graves and the skeletal remains at Corinth is equivocal. Archaeological evidence for the deliberate inclusion of coins throughout Greece is lacking by the 6th century AD (Poulou-Papadimitriou et al., 2012). However, I do include these artifacts in the following statistical analysis. Modified coins, especially pierced coins, may have been worn as jewelry and/or used as magical amulets (Bollók, 2013) and are included separately in this analysis as items of personal adornment. One such coin, minted by Anastasius in the late 5th or early 6th century AD (Coin 1933-217) is pictured in Figure IV.7.

Objects worn by the deceased at the time of burial have been found during excavation, including jewelry and clothing fasteners such as buckles. Even clothing has been discovered in rare instances, as in Grave 1932.42 in the Asklepieion which preserved a piece of cloth adhering to one of the ribs. A fragment of gold thread was also present in a tile grave in the same area (Grave 1932.58), which may have been part from a veil or other particularly elaborate article of clothing (NB 126: 98). However, clothing is not included in this analysis due to poor preservation of this material.

The deceased was also commonly interred with articles of **jewelry**, including rings, earrings, and necklaces. These objects were fairly simple, manufactured for the

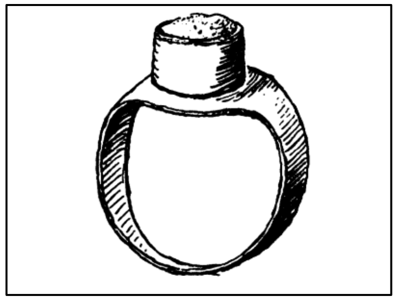

Figure IV.8. Ring with a bezel of a type common in late antiquity (reprinted from Davidson, 1952, Figure 41, p. 234, catalogue number 1821). Photo: courtesy of the American School of Classical Studies at Athens, Corinth Excavations.

most part out of wire and sometimes using beads made from stone or glass (cf. Davidson, 1952). Faience, presumably imported from Egypt, was also present in Late Antique Corinth, though objects of this workmanship are not commonly found in graves. Rings were also generally simple, as in Figure IV.8, and sometimes constructed only of strands of bronze wire twisted together, though some preserve signs of filigree work, bezels flattened and inscribed with a monogram, or a setting for a gem or glass. Some jewelry has been attributed to invaders or foreigners, based on their association with imported buckles and weapons (Davidson and Horváth, 1937). However, this artifact class groups simple objects of adornment together with those of likely foreign origin and any that may have been worn as magical amulets.

Buckles, though an object of personal adornment, may relate more to changing clothing styles than to status or vanity. Metal objects such as buckles were by necessity imported, and as a result have formed an integral part of the debate on whether foreigners were present in Late Antique Corinth (Curta, 2010b; Davidson and Horváth, 1937). However, trade in metal objects, especially buckles and weapons, have been tied to imperial military activity as these items were included in the basic kit equipped to new recruits (Mango, 2001, 2009c). Buckles and weapons found at Corinth are pictured in Figure IV.9. The ubiquity of buckles, and their distribution throughout the Eastern Roman Empire, was even noted in early scholarship, where they were

Figure IV.9. Buckles and an arrowhead from archaeological contexts at Corinth (reprinted from Davidson and Horváth, 1937, Figure 6). Photo: courtesy of the American School of Classical Studies at Athens, Corinth Excavations.

considered a singularly Byzantine product (Csallány, 1954). The presence of particular buckle types may therefore be an indication of profession or status, rather than foreign origin. Poulou-Papadimitriou (2005) further suggests that some buckles, especially those made of gold or with elaborate monograms and scrollwork, may have been given as a reward to individuals by the emperor himself. It seems likely that these buckles would have been highly valued and passed on to any children, but similar buckles may have denoted an attempt at ascribed status. Specific buckle types can also be used to date the graves (Curta, 2010b; Poulou-Papadimitriou, 2005; Sanders, 2004). If an indication of military occupation, the inclusion of buckles in a grave may correlate with the presence of weapons such as swords, spears, or arrows (Davidson and Horváth, 1937). These **weapons**, as well as daggers and other metal implements, are also sometimes found in Late Antique graves. The metal finds, including a number of these weapons, from one grave located in a tower along the ancient city wall are pictured in Figure IV.10.

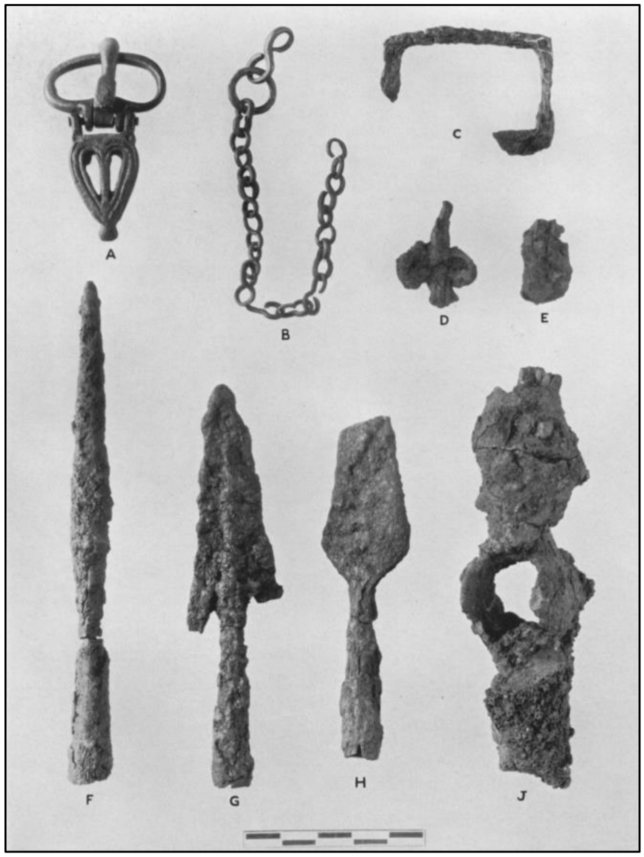

Figure IV.10. Weapons and other metal artifacts from a grave assemblage (Grave 1932.100a, reprinted from Davidson and Horváth, 1937, Figure 2, p. 231). Photo: courtesy of the American School of Classical Studies at Athens, Corinth Excavations.

Figure IV.11. Four Late Antique lekythoi and a mug placed in grave assemblages near the ancient Gymnasium complex (reprinted from Wiseman, 1967b, Plate 15b numbers 1, 3-6). Photo: courtesy of the American School of Classical Studies at Athens, Corinth Excavations.

The **ceramics** placed alongside the deceased in late antiquity, as opposed to earlier periods, were mainly restricted to small pots and pitchers. These vessels, often referred to as lekythoi or water jugs, were probably used for libations of water and wine, or for anointing the deceased with water, wine, or oil (Sanders, 2004; Tzavella, 2010). Figure IV.11 shows a range of forms taken by these libation vessels and one mug, all of which were excavated from graves near the ancient Gymnasium complex. The form of the pitcher being used may have been a regional tradition, as Rife (2012) notes that the lekythos shape common to Argos and Corinth was not present at Isthmia. A few graves also contain tablewares which may have been used during the funeral meal. **Other** objects, including glass and metal vessels, **implements** such as pins or fire-strikers, or **faunal** elements such as animal skeletons or chicken eggs, are also irregularly found in graves of this time period. However, these variables are rare, and generally found in fewer than 5% of Late Antique graves. Many of these items, especially the glass vessels or small metal or wood objects, may have been poorly preserved, and are potentially an unreliable archaeological indicator of differential ritual activity.

4.2.4 Commemoration objects

The presence of tombstones, or some form of **marker** on the exterior of the grave, would have been integral to commemoration of the deceased. Plaques, some with epithets, were often placed flat on top of the tomb, and grave sites were also marked by aboveground structures or mounds. As grave markers may in many cases have been disturbed from their original position, it is not possible to know if many of the graves included in this analysis originally had a grave marker that was subsequently removed or lost. A reconstruction of how a Late Antique burial location may have looked in antiquity with these markers and structures is pictured in Figure IV.12.

Tombstones often incorporated Christian sentiments and symbols, including crosses and ivy leaves, and a brief epithet identifying the interred person and when they died (Ivison, 1996; Kent, 1966). Along with names, these inscriptions occasionally also

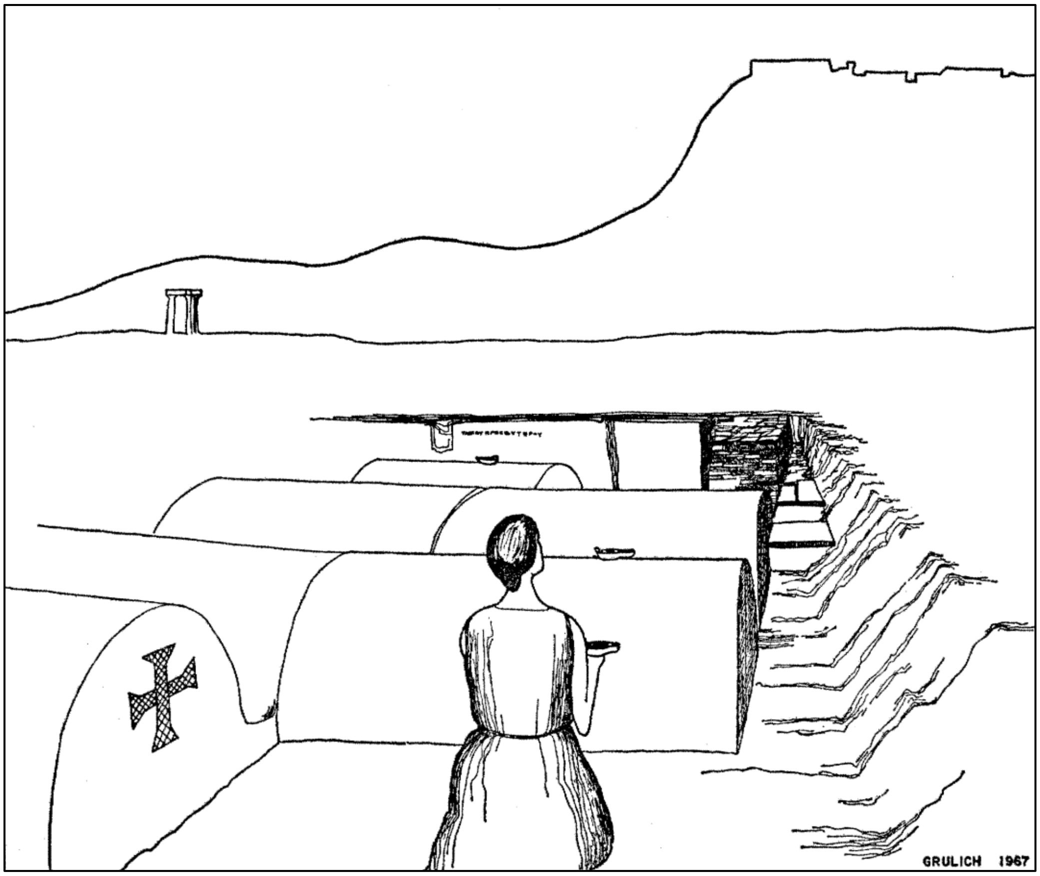

Figure IV.12. Reconstruction of a Late Antique burial ground (reprinted from Wiseman, 1969: 86). Photo: courtesy of the American School of Classical Studies at Athens, Corinth Excavations.

recorded information regarding the ethnic affiliation of the deceased, their status in life (i.e., whether they were a freedman or a slave), or their occupation. Grave markings of this sort are common (65 were found in the area surrounding the Asklepieion, for example, cf. Roebuck, 1951: 165-7), but are often difficult if not impossible to associate with the original graves due to post-depositional processes or the fact that these inscriptions would by definition have been exposed and overlying the grave proper (Ivison, 1996; Sanders, 2004, 2005).

Christian names were particularly common on Late Antique grave inscriptions, as are names designating a connection with the Classical past (Roebuck, 1951: 165). One tombstone from the Asklepieion, for example, refers to an Andreas as being interred in one of two neighboring tombs (I-1020, recovered between tombs 1931.31 and 1931.32; cf. Kent, 1966, number 552; Roebuck, 1951: 166). While this name was popular among Christians due to its association with an apostle, it also has a long tradition in the area as a form of Andreas was common in Early Roman Corinth (Roebuck, 1951). As continuity or engagement with the past was especially pronounced among the elite, having a Classical name may have been an indication of high status. Other possibilities explaining naming traditions include continuity in the local community, wherein names have been passed on through generations.

Lamps present at the grave site are also evidence for continuing mortuary rites. As they were left outside the grave, however, it is not possible to determine the particular burial event with which they were associated, and as graves became communal structures, they may even have been used to commemorate the deceased more generally. Much like tombstones, this relationship is often not archaeologically preserved.

4.3 Osteological Data

Osteological analyses form an additional component to this research. The human skeletal remains from these graves form the basis for my original data and are presented in the Appendix. They also contribute to the statistical interpretation of mortuary behavior in Chapter V. Where possible, I use skeletal morphology to determine the sex and age at death. However, this osteological analysis was hampered by early archaeological practices and the fragmentary preservation of skeletal remains at Corinth. Prior to the 1960s, postcranial remains were not usually retained after excavation, and storage was prioritized for those crania which were particularly well-preserved or associated with particularly rich or unusual grave goods. Additionally, the ASCSA storage rooms at ancient Corinth were adversely affected by German occupation of Greece during World War II, at which time many skeletal remains were lost. As a result, demographics for most of the forum area do not represent the age and sex structure of these cemeteries, let alone the demographic structure of the living population which used them. For the graves for which both cranial and post-cranial remains were kept, skeletal elements are poorly preserved. As a result, for those graves without skeletal material, or for which skeletal preservation was poor, I integrate information from excavation notes and data from previous osteological analyses. Where possible, sex determination was based on both cranial and pelvic morphology, and age determination on cranial and postcranial morphology, dental development, and skeletal maturation as follows.

4.3.1 Osteological determination of MNI, sex, and age at death

Out of the 630 graves dated to late antiquity, only 112 have associated skeletal remains. Where human skeletal remains are not preserved for study, I was occasionally able to estimate age class using detailed field photos and drawings, or I used published sex and age determinations where available to augment my data (Angel, 1942; Angel in Weinberg, 1974; Angel in Wiseman, 1969; Burns, 1982; Burns in Williams et al., 1974; Gejvall and Henschen, 1968; Gejvall in Robinson, 1962; Koumares in Davidson and Horváth, 1937; Wesolowsky, 1971, 1973; Wesolowsky in Wiseman, 1972). The excavation notes sufficiently described an additional 61 graves for the general determination of adult vs subadult age class and I used this information to estimate the number of skeletons originally buried in each structure. The excavation notes also supplied an initial count of the interred skeletons for 130 more graves, and I compiled this information as well to supply a rough estimate of the number of interments in graves for comparative purposes. As summarized in Table IV.2, at least 930 individuals were buried in 302 graves dating to the 6th-8th centuries AD at Corinth.

For the 112 mortuary contexts with preserved skeletons, I quantified the minimum number of individuals (MNI) present in each grave since skeletal assemblages were fragmentary and later mortuary events frequently disturbed earlier burials in the same receptacle. I estimated MNI by quantifying the number of specific segments of

Table IV.2. Burial location and archaeological period of graves included in osteological analyses. Number of skeletons present in each grave (MNI) is in parentheses next to the grave count. The "skeletal data" category includes counts from those graves for which excavation notes included basic osteological information (subadult vs adult status). "Excavation counts" presents additional graves where no skeletal data was available but the excavation notes permit a rough estimate of the number of skeletons.

		Period				
		I : late 5th - 6th c	II : 7th c	III : mid-7th - 8th c	NPD	Total
North of the City	Osteo. analysis	15 (17)	45 (167)	4 (24)	-	
	Other skeletal data	8 (8)	11 (13)	-	-	
	Excavation counts	35 (34)	22 (22)	10 (128)	-	
	Total	58 (59)	78 (202)	14 (152)	-	150 (413)
City Center	Osteo. analysis	1 (1)	15 (103)	21 (145)	1 (3)	
	Other skeletal data	-	16 (21)	13 (23)	-	
	Excavation counts	-	13 (54)	6 (25)	2 (2)	
	Total	1 (1)	44 (178)	40 (193)	3 (5)	88 (377)
City Outskirts	Osteo. analysis	2 (2)	7 (13)	1 (1)	-	
	Other skeletal data	4 (4)	2 (5)	2 (2)	3 (5)	
	Excavation counts	21 (20)	11 (41)	9 (41)	2 (6)	
	Total	27 (26)	20 (59)	12 (44)	5 (11)	64 (140)
	Total	86 (86)	142 (439)	66 (389)	8 (16)	302 (930)

individual skeletal elements (the number of left and right proximal and distal epiphyses). I then adjusted this measure using osteometric sorting and skeletal maturation to identify possible pair-matches within age classes (Buikstra et al., 1984; Byrd, 2008; Byrd and Adams, 2003; Owsley et al., 1995; Schaefer, 2008; Schaefer and Black, 2007). In instances where skeletal remains were deliberately removed for reburial, this measure most likely underestimates the original number of adult individuals buried in each tomb (Adams and Konigsberg, 2004; Fieller and Turner, 1982; Sołtysiak, 2013). Therefore, I also estimated MNI using multiple bones in order to identify whether graves with a high MNI were used as temporary initial resting places prior to secondary burial ritual. In these cases, MNI estimated from smaller bones (such as those in the hands and feet, or the patellae) is higher than the MNI estimated from bones more likely to be noticed and collected during mortuary events (Rife, 2012: 199; Ubelaker and Rife, 2008, 2011). I could only identify most skeletons as broadly subadult or adult in skeletal maturation for these commingled contexts, or for any graves with a high MNI and no archaeological separation of burial events. Commingling and selective bone removal also complicated paleopathological analyses, and I do not include differential diagnoses for pathologies or the determination of cause of death at this time.

Diagnostic criteria for age at death are preserved for 49.5% of this sample (236 out of 477 skeletons). Secure sex determination was only possible for 114 skeletons (24%). I scored age ranges and sex for cranial and pelvic morphological traits, and compared scores to determine age at death and sex for each individual. Age categories were defined as follows: infant, birth-3 years; child, 3-12 years; adolescent, 12-20 years; young adult, 20-35 years; middle adult, 35-50 years; old adult, 50+ years. I scored sex as male, probable male, female, probable female, and indeterminate. In all demographic summaries, I grouped together males with probable males and females with probable females. Finer subdivisions of adult ages were not possible and most sex determinations were indeterminate as a result of preservation and difficulties in sorting fragmentary skeletal remains in commingled contexts.

Due to the preferential preservation of cranial remains, I based osteological sex and age at death determination for many skeletons on cranial morphology alone. This limited aging criteria for adult skulls to cranial suture closure and obliteration (Acsádi and Nemeskéri, 1970; Mann et al., 1991; Meindl and Lovejoy, 1985) and dental attrition (Scott, 1979; Shykoluk and Lovell, 2010; Smith, 1984). As a result, I could only distinguish young adults from older adults, and even this broad age-at-death category may be unreliable (Hershkovitz et al., 1997; Key et al., 1994; Singer, 1953). Where possible, I also used the Suchey-Brooks system for aging pubic symphyseal morphology (Brooks and Suchey, 1990) and assigned auricular surface morphology to age phases (Buckberry and Chamberlain, 2002; Lovejoy et al., 1985). For subadults, I could achieve better estimates for age at death using dental development and eruption (McKay n.d. from Steele and Bramblett, 1988; Moorees et al., 1963a; 1963b; Simpson and Kunos, 1998; Smith, 1991; Ubelaker, 1989) as well as union of primary ossification centers in the basicranium (Schaefer et al., 2009). Where postcranial remains are preserved, subadult age estimates incorporated epiphyseal union (Buikstra and Ubelaker, 1994; McKern and Stewart, 1957; Schaefer et al., 2009; Ubelaker, 1989).

I preferentially used pelvic morphology in sex determination. As only the skull was preserved for many individuals, I also used sexually dimorphic cranial features to estimate sex for all skeletons (Buikstra and Ubelaker, 1994; Graw et al., 1999; Rogers, 2005). I emphasized the form of the mastoid process, supraorbital ridges, and nuchal lines, but also used the supraorbital margin as this feature was preserved in many extremely fragmentary skeletons. Pelvic, especially pubic, criteria (Buikstra and Ubelaker, 1994; Klales et al., 2012; Phenice, 1969; Singh and Potturi, 1978; Straus, 1927; Sutherland and Suchey, 1991) are more accurate than cranial sex determination and less dependent on population-specific sexual dimorphism. However, all sexing and aging criteria are based on standards developed using modern populations, and some error is associated with their use.

4.3.2 Demographic framework

Figure IV.13 shows age distributions plotted as histograms for each chronological period using the age categories described in the previous section. Adults and subadults that could not be assigned to a specific age class are treated as separate categories, leading to the identification of 208 subadults and 293 adults. I analyzed eight additional skeletons, six subadults and two adults, from Late Antique graves that could not be assigned to a particular period and are not shown on the figure. The 33 skeletons attributed to the late 5^{th} – 6^{th} centuries AD (Period I) do not provide an adequate sample of individuals of diagnostic age for demographic comparison, and clearly demonstrate biases in skeletal preservation inherent in this dataset. Though larger skeletal samples are present for Period II (7^{th} century graves) and III (mid-7^{th} – 8^{th} century graves), these data show fewer subadults than would be expected from natural mortality.

As this dataset is based on a partially culled population, i.e., at least a portion of this sample is the result of selective archaeological recovery, no demographic analysis is

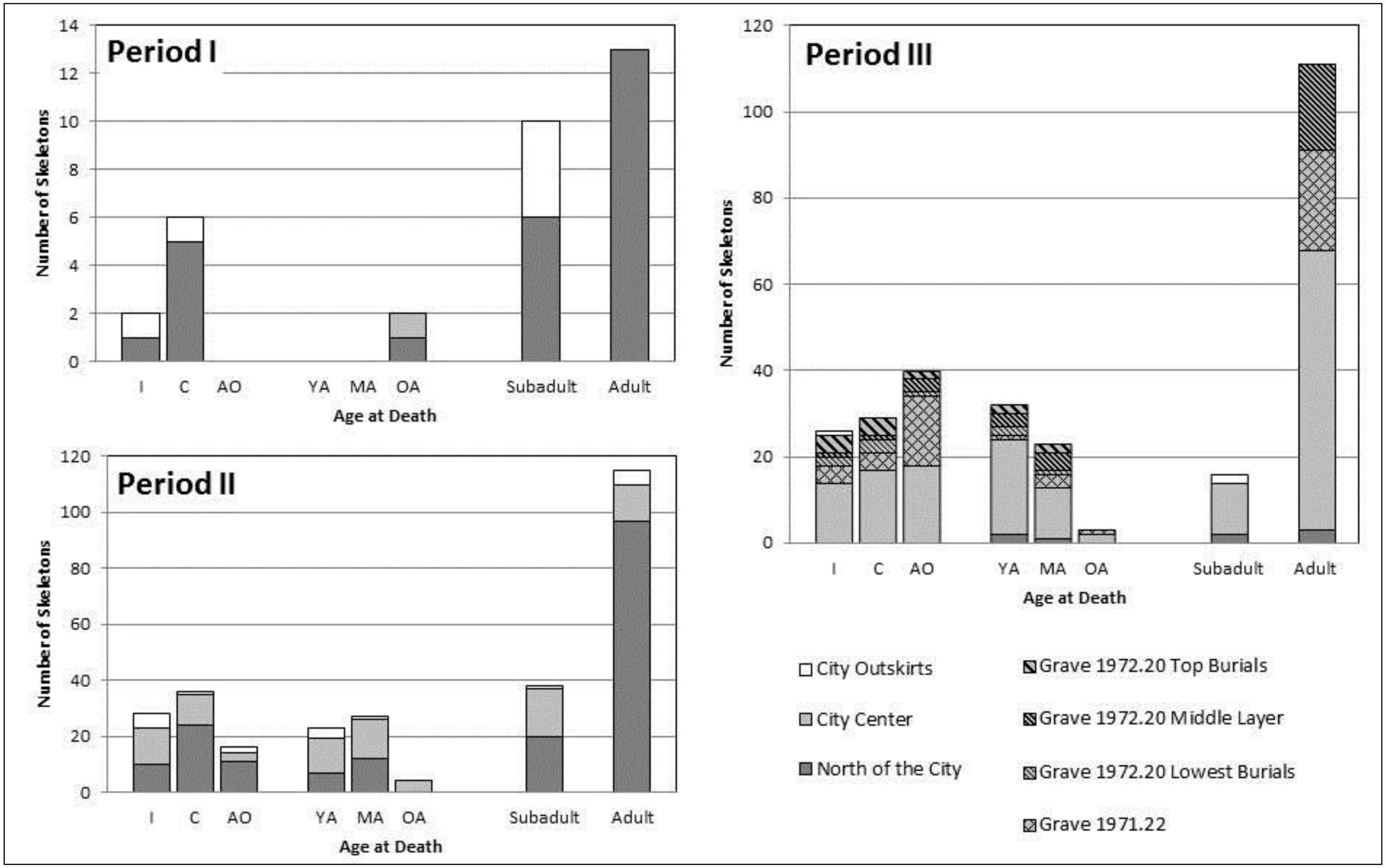

Figure IV.13. Death profiles for skeletal sample by chronological period. Age classes are abbreviated as follows: Infant, I; Child, C; Adolescent, AO; Young Adult, YA; Middle Adult, MA; and Old Adult, OA.

Table IV.3. Adult sex ratios.

		Number of Males	Number of Females	Number of Adults	Sex Ratio (M/F)
North of the City	Period I	2	5	14	0.4
	Period II	21	17	116	1.2
	Period III	2	2	4	1
City Center	Period I	1	0	1	
	Period II	20	13	45	1.5
	Period III	14	13	108	1.1
City Outskirts	Period I	0	0	0	
	Period II	3	2	10	1.5
	Period III	1	0	1	

possible (Meindl and Russell, 1998: 378). Infants and children, though often buried in Late Antique cemeteries in distinct grave types, are also poorly preserved and not accurately represented in the death profiles for Periods I and II (Figure IV.13). On the other hand, selective archaeological recovery, commingled contexts, and increased recognition of young adults may have resulted in an artificially "catastrophic" pattern in the death table for Period III. In this sample, higher numbers of infants, children, and young adults are present than would be expected in a stable population (Paine, 2000). However, in commingled contexts, MNI estimates tend to be biased towards the enumeration of subadult skeletons (Sołtysiak, 2013). Death profiles for both Periods II and III were produced from osteological analyses of commingled graves.

Table IV.3 lists the sex ratios for the adults in this dataset. There are slightly more male skeletons sexed than female, but there is little appreciable bias toward greater representation of males. However, the chronological samples with the largest numbers of skeletons were also the most difficult to sex due to fragmentation and commingling. It is therefore difficult to interpret whether these demographic statistics are meaningful.

As skeletal material from the Gymnasium excavations was not culled, it has already formed the basis of demographic investigations (Wesolowsky, 1971, 1973). Figure IV.14 compares this previous osteological analysis with the present study in a death table. Unfortunately, it is not possible to directly compare the original sex and age

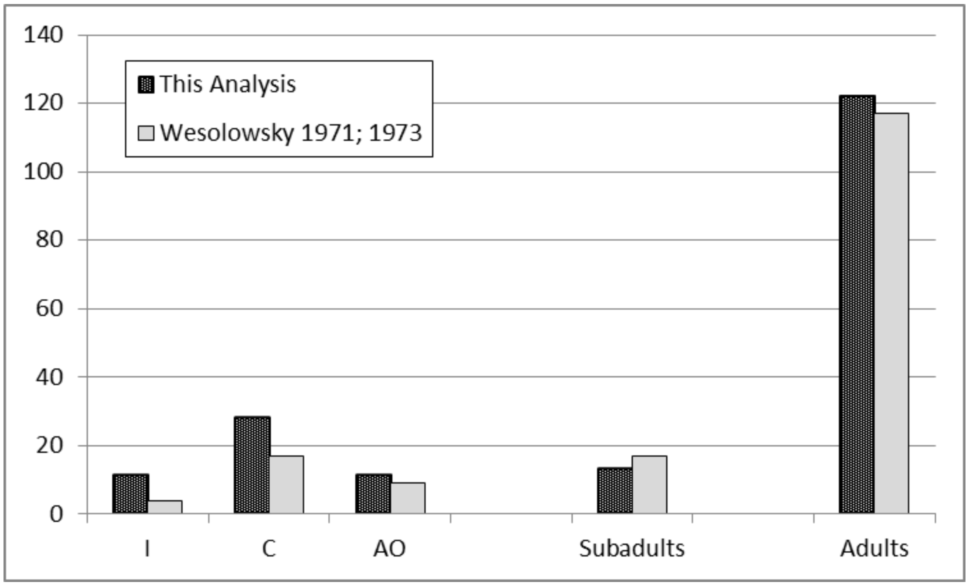

Figure IV.14. Demographic comparison of osteological analyses of the skeletal material from the Gymnasium area. Comparative data from Wesolowsky (1971, 1973), who does not separate adults by age class. Age classes are abbreviated as follows: Infant, I; Child, C; Adolescent, AO.

at death determinations for each grave with mine, though where available, the present sex and age estimates closely align with Wesolowsky's (1971, 1973). In his analysis, Wesolowsky (1973) identified 164 individuals, the majority of which were adults including 54 males and 43 females. In comparison, I identified 185 skeletons, among which I found 20 males and 22 females. The main difference between our analyses lies in the fact that I identified more subadults. However, skeletons are similarly distributed among age classes and sexes, and both analyses found substantially more adults than subadults. Wesolowsky (1973: 347) suggested that this age bias is similar to other industrial societies, and that some subadults must have been buried in a separate place or alternative way which was not identified in this cemetery. As neither analysis included the skeletal material from the nearby Asklepieion complex, it is possible that this missing demographic was buried very close to the Gymnasium graves.

While general demographic trends in these cemeteries are obscured, I am able to use osteological analysis to identify differences in mortuary treatment from grave to grave. Two graves in particular show evidence that some bones were removed from the burial receptacle after decomposition. Both grave 1972.20 and grave 1971.22 from Temple Hill were used for primary interments as well as for placement of initial interments prior to secondary burial. Demographic information from these tombs is included in Figure IV.13, Period III, and cross hatching differentiate these skeletons from the rest of the dataset. Visual separation of these skeletons from the rest of the skeletal sample is also warranted due to the reuse of both graves into the 13th century. In grave 1971.22, I was not able to separate out the skeletons which date to late antiquity.

MNI in each tomb was determined by small, easily overlooked bones. Grave 1971.22 originally contained 52 skeletons, at least 44 of whom were at least six years old at time of death, as determined by the size and form of the talus (Schaefer et al., 2009: 314-315). Approximately 34 of these skeletons (14 adults and 20 subadults) were also represented by a substantial number of long bones, and ten had associated cranial material. Grave 1972.20 originally contained 55 skeletons, a number based on the presence of the patella. In this grave, 23 of the adult and subadult skeletons were mostly complete if fragmentary. Thus, it appears as though not all of these skeletons were the subject of secondary burial ritual.

In addition, these two graves also appear to have been the subject of slightly different bone removal activities despite being in contemporary use. Bones of the lower limbs are present in higher frequencies in Grave 1971.22 than bones of the upper body, including the upper arms and cranium. This distribution of skeletal elements is likely the result of removal only of certain bones during secondary burial activity (Ubelaker and Rife, 2008). I did not observe this selectivity in Grave 1972.20. Observance of secondary burial rituals may have differed as a result of who was buried in these graves. Grave 1972.20 was mainly used as a temporary initial burial receptacle for individuals aged at least twelve years old at time of death (age estimate based on patellae showing adult morphology, see Schaefer et al., 2009: 277). Only five subadults were interred in this grave during its use as a charnel facility (the “Grave 1972.20 Middle Layer” on Figure IV.13). Grave 1971.22 contained a considerably larger proportion of subadults, and this difference in ages may have resulted in different burial rituals. Differential preservation of the lower limb bones may also have influenced their recovery, though bones from the lower body were not present in greater frequencies from Grave 1972.20.

Diachronic changes in burial activity were also observable in Grave 1972.20 as burial events were stratigraphically separated in the tomb. Its excavation according to these layers enabled osteometric sorting of the skeletons and differentiation of burial activity. It was first used for nine primary interments, followed by a period of disuse indicated by the accumulation of sediment in the grave. It was then used as a charnel facility closely followed by the deposition of 14 other primary interments. Thus, at least 30 individuals are primarily represented by fragmentary or small bones that may have been left behind during reburial. Grave 1971.22 may have undergone a similarly complex history of use. These changes in burial activity raise interesting questions of how graves were remembered despite changing traditions in the treatment of the corpse. They also suggest that alternatives were consistently observed in aspects of funerary treatment including whether the complete skeleton was removed from the initial interment facility prior to secondary burial. Variations in which option was selected are likely results of social and economic factors (Sanders, 2004).

4.4 Data Treatment and Statistics for Mortuary Analyses

For the statistical analysis of mortuary behavior in Chapter V, I classify these archaeological and osteological data into presence-absence variables where possible. Terminology from Section IV.2 retained as a variable in the following analyses was bolded in the preceding discussion of archaeological evidence. Coding of some variables was limited by preservation or other biases, and some graves had high instances of missing data, so these artifacts were grouped together for analysis. Table IV.4 presents these binary variables. Table IV.5 present those categorical variables which could not be usefully reduced to binary presence/absence. Categorical variables relating to grave morphology ("Grave Type"), burial treatment, site area, and period formed major *a*

Table IV.4. Binary variables (presence/absence data) used in multivariate statistics.

Grave Marker	Clearly associated inscriptions or above-ground superstructures such as stucco mounds which identified tombs for commemoration
Lamps	Ceramic, mould-made lamps left outside the grave
Ceramics	Whole or nearly complete ceramic vessels, including storage vessels not used in grave construction, tableware, and libation vessels
Jewelry	Objects of personal adornment including fragments of rings, earrings, and necklaces
Coins	Currency other than those pierced coins obviously used as jewelry
Buckles	Clothing fasteners, often decorative
Weapons	Daggers, spearheads, arrowheads, and swords
Implements	Tools or objects otherwise having a practical purpose, such as pins and fire-strikers
Faunal	Animal bones in or on the grave, placed in close association with the human skeletal remains or other grave objects
Other Vessels	Glass or metal vessels
Multiple Burials	Multiple as opposed to single skeletons present in grave receptacle

priori divisions in this dataset. In particular, I used grave placement and construction in initial chronological assessments for graves (Sanders, 2004). Both categorical and binary variables were used in the following univariate and multivariate analyses to describe meaningful differentiation in Late Antique funerary behavior.

Many variables may combine evidence for a range of behaviors. Among the binary variables, I included tableware and other storage vessels within "Ceramics" due to low incidences of appearance. The majority of these vessels were of the variety used to hold and pour liquids. Likewise, the buckles present in graves could be attributed to a number of discrete types, some of which may have been in contemporary use. Among the categorical variables I limited coding of corpse treatment to whether interments were primary, secondary, or both. Unfortunately, more detailed information, especially arm and leg placement, was not reliably recorded and/or tomb reuse had obscured this information for earlier burials. For these statistical analyses, I also consider all of the individuals buried within each grave receptacle as a group, with the assumption that they

Table IV.5. Categorical variables (character states could not be reduced to presence/absence) used in multivariate statistics.

Period	Period I: late 5^{th} – 6^{th} centuries AD Period II: mid-late 6^{th} – 7^{th} centuries AD Period III: mid-7^{th} – 8^{th} centuries AD
Site Area	
North of the City	Includes the following burial locations identified in Appendix: Asklepieion, Lerna Square, Cavern B/III, Cavern C/IV, Cavern D/VI, Cavern E/V, Hill of Zeus, Gymnasium, Lerna Cemetery, Bedrock Cutting, L-Shaped Cutting, Fountain of the Lamps
City Center	Includes the following burial locations: Hemicycle, N of Temple, Peirene, Temple Hill, Bema Church, Captives' Façade, Central Shops E, Forum NE, Forum SE, Forum SW, Julian Basilica, NW Shops, S Basilica, S Stoa, S Stoa W, Temple D, Temple F, Temple G, Temple H, W Shops, Temple C
City Outskirts	Includes the following burial locations: Panayia, East Wall, Kraneion Basilica, N of Village, Roman Bath, Acrocorinth, Anaploga, Cheliotomylos, Tseliolophos, Odeion, Quarry, Ravine, Roman Villa, Theater, W City Wall, W Ridge
Grave Type	Construction and morphology divided graves into the following groups as defined in Section IV.2.1: Pit, Tile, Amphora, Cists, Built Cists, Rock-Cut Chambers, Built Vaults, Reused Architecture
Corpse Treatment	
Primary	The tomb was only used for primary interments
Secondary	The tomb was used as a temporary initial interment site or secondary interments are present
Both	The tomb was used for both primary interments and during secondary burial ritual as a site for bone removal or deposition in piles or bundles
Sex	
Male	All adults in the grave are male
Female	All adults in the grave are female
Both	Both male and females are present in the mortuary context
Indeterminate	Adults are present in the grave, but the sex ratio is indeterminate
Age	
Adult	All interred human remains are skeletally mature
Subadult	All interred human remains are skeletally immature
Both	Interred human remains included both adults and subadults according to skeletal maturity

would likely share many of the same social aspects reflected in mortuary treatment since these shared aspects resulted in their burial within the same tomb. Accordingly, sex and age categories reflect the demographics of individual mortuary contexts. Corpse treatment likewise often changed in graves used over a particularly long period of time. Where applicable, I address finer demographic subdivisions in the discussion of mortuary results. These grouped data may result in underestimation of mortuary variability and differentiation.

Also as a result of tomb reuse and commingling of skeletal elements, I was not able to code osteological data into finer age at death subdivisions or make a secure sex determination. Adolescents, though only documented in 17 graves, were always buried in the same manner as skeletally mature individuals, and may have been accorded adult stature in funerary ritual. As this finding is in agreement with the early age at which Romans were legally allowed to marry and enter into army service (*Cod. Theod.* 3.5.4-5, 3.5.7-11, 7.13.1), I group adolescents with skeletally mature adults for the remaining statistical analyses, or I compare adult groups with and without adolescents included.

In these analyses, I subdivide the mortuary dataset by burial location or by chronological period. The Asklepieion/Gymnasium cemetery contributes the largest number of graves (N=419) in a single area ("North of the City"), as well as the highest quality of data. This means that some variables, such as the presence of lamps and inscriptions, can only be included in statistics for that area. Additionally, the majority of graves from the Asklepieion/Gymnasium date early in this time period, so that the earliest two periods are the best described statistically. Within this early period, on the other hand, I can only assign the majority of interments to a chronological period, and am unable to more precisely date these graves since objects were not usually interred with the deceased. To best describe variation, the three chronological periods are analyzed separately for the pooled dataset.

Within these groupings, I use statistical analyses to examine mortuary variability. First, I use univariate statistics to assess the underlying distribution of these data. I use chi-square statistics to compare whether individual variables are meaningfully associated with major divisions in site location, chronology, and demographics. I also examine the distribution of demographic groups by site area and period using ANOVAs.

I then use factor analysis (FA) to identify relationships among mortuary variables (Hotelling, 1933; O'Shea, 1984). FA can be used to examine the structure of ungrouped observations, such as graves, resulting in factors that reduce the number of variables while still retaining the variance and covariance represented in the original dataset (Manly, 2005; Reyment et al., 1984; Sokal and Rohlf, 1995). For these analyses, I used both binary and categorical data, though I limited the categorical data so that they did not overly contribute to variability in the dataset. To determine which variables I could include in each FA, I calculated phi coefficients (O'Shea, 1984; Willemsen, 1974) for all pairs of variables to determine how often they co-occurred. I excluded variables from individual FAs if their occurrence in each subdivided portion of the dataset being run was less than 2-3%. While the standard for this cutoff has traditionally been set at 5% (O'Shea, 1984: 66), this proportion is arbitrary. I used a lower instance of 2% for this dataset to more fully characterize variation since the majority of Late Antique graves do not contain grave offerings.

In order to emphasize the contributions of the binary variables, and to enhance interpretation of these analyses, I then extract those factors accounting for the greatest amount of variability in the dataset, i.e., with eigenvalues over .75. I rotate these extracted factors using varimax criteria (O'Shea, 1984). This manipulation results in those variables which contribute strongly to each factor displaying high negative or positive loadings against a background of low loadings on all other variables (Harman, 1976). This procedure can thus be used to visualize groupings in the dataset based on the relationships among variables.

After rotating the factors, I examine the relationships among variables to first identify any differences resulting from temporal variation in order to avoid using those variables to interpret social distinctions among the mortuary data. I then examine the statistical correlation between factors and indicator variables such as sex of the interred or the presence of artifacts that have been linked to status, profession, or ethnicity in archaeological hypotheses. All analyses, unless otherwise stated, are run using GNU PSPP Statistical Analysis Software.

CHAPTER V

MORTUARY RESULTS

In this chapter, I present the results of the multivariate statistical analyses of mortuary behavior. I use univariate statistics to examine how these data are chronologically and spatially distributed, and then I use factor analysis to examine mortuary variability during this time period and identify variables which may covary according to underlying social phenomena. First, I analyzed the pooled dataset of graves from all time periods and burial locations. Second, I divided the dataset by site location, examining the graves constructed north of the city and in the city center separately. Third, I looked at mortuary behavior within individual time periods. I use the resulting factors to identify variables which mark high status for each site area and time period, dividing each period into high and low ends of the status spectrum. Using indicator variables, I determine whether individual status markers are a result of ascribed or achieved status. Then, using the remaining factors, I identify spatial variability that may correspond to other social parameters other than hierarchical status and economic class. Thus, these analyses split this dataset into groups that highlight major contrasts between ends of the status spectrum, and distinctions which correlate with geographic separation of graves and may suggest underlying differences in community composition. In the final section, I identify these mortuary groups and discuss their implications for the interpretation of regional social and political trends. These mortuary correlates of identity are explored in later chapters with reference to geochemical evidence for geographical residence during childhood (Chapters VI and VII).

5.1 Statistical Results

5.1.1 Univariate analyses

Table V.1 shows that, for the site of Corinth, site location and chronological periods both display significant differences in the majority of mortuary variables. All values in this table are chi-square statistics, with significant differences accepted at $p<.05$. Only implements are statistically likely to be found in graves regardless of their location or period, but as only four graves contained implements, their distribution is difficult to interpret. Ceramics and coins are also not significantly associated with differences in site area, and the presence of faunal bones, other vessels, and corpse treatment is not meaningfully related to archaeological period. Thus, these six variables may be related to social divisions reflected in differential mortuary treatment within cemeteries or time periods.

For other variables, diachronic change resulted in contemporary shifts in mortuary behavior and grave locations. Grave types in generally early use, such as

Table V.1. Chi-square comparisons of variable occurrence by burial area and period for pooled dataset. Values in bold indicate significance at $p<0.05$.

Variable	Site Area		Period	
Grave Marker	df=2	**45.05**	df=3	**41.15**
Lamps		**38.68**		**8.69**
Ceramics		1.30	df=4	**96.18**
Jewelry		**32.12**		**36.67**
Coins		5.52		7.69
Buckles		**41.42**		**54.95**
Weapons		**14.67**		**21.79**
Implements		3.06		4.31
Faunal		**13.32**		3.24
Other Vessels		**13.07**		3.63
Multiple Burials		**13.11**		**64.97**
Grave Type	df=16	**311.59**	df=32	**396.76**
Corpse Treatment	df=6	**13.09**	df=12	18.98

amphorae and tile graves, were also primarily present in site areas used early on in late antiquity for burial. Chronological associations may also result in correlation among variables. The correlation between tile graves/amphorae burials and single interments, for example, also relates to the diachronic change in tomb type presence and the increasing use of individual mortuary contexts for sequential burial events. Ceramics are also mostly associated with multiple rather than single interment tombs (N=46 out of 58; chi-square=49.27, df=1, p=.000), which correlates with the diachronic relationship displayed for these variables in Table V.1.

Unsurprisingly, the proportion of secondary burials also increased with the presence of multiple interments (chi-square=17.76, df=2, p=.000), and only one secondary burial was of an individual placed in a grave by themselves. No secondary burials were present in this dataset prior to the late 6th century. Likewise, a variety of grave forms were used for multiple interments in later periods at Corinth, though a few built cists and reused architectural remains were used for single inhumations of both men and women.

Table V.1 also shows that graves in geographically separated site areas included different artifact classes in grave assemblages. Jewelry, buckles, and weapons were all overwhelmingly placed in graves by fortified centers on the outskirts of the city, such as the city walls near Acrocorinth, and in the city center. On the other hand, only five graves contained weapons, all of which date to the 7th-8th century, so this statistical relationship is problematic. The presence of these objects in graves from the city center correlates with the generally late date of burial activity in this area. However, they are also present in graves on the outskirts of the city where the majority of graves date earlier than those placed in the city center. Faunal remains were also mainly present in graves placed in the city center, and non-ceramic vessels in graves placed on the city outskirts. However, only 4-5 graves contained these items, and these statistical relationships may not be reliable. Other statistical relationship may be a result of later construction activity disturbing graves, such as for lamps and graves markers which could only be reliably associated with graves excavated in the Asklepieion and

Gymnasium areas. Coins are mainly only present in graves on the city outskirts including those north of the city, and this may be statistically significant, however their deposition may have been accidental.

Demographic distinctions are also present among chronological and spatial divisions. Individuals of all skeletal age classes and both sexes were found in all areas of the site. However, more subadults were buried in graves in the city center than in the other burial locations combined (112 subadults out of 56 graves as compared to 101 out of 100 graves, ANOVA F = 2.93, df=2, p=.057). This increase is almost statistically significant and correlates with diachronic changes in corpse treatment. During the late 5^{th} – 6^{th} centuries AD, single primary inhumations on the city outskirts contained both adults and subadults. In later centuries, subadults were buried in both single and multiple interment tombs. By the 6^{th} – 8^{th} centuries AD (Periods II and III), the majority of multiple occupancy tombs contain subadult skeletal remains (N=54 compared to 8), though adults were buried with subadults in 41 of these graves. During these later periods, single interment graves were also more likely to be of subadults than adults (N=46 out of 66). Single subadult burials were placed in pits, cists, built cists, and built vaults in addition to the earlier tile and amphora graves. Table V.2 shows these differences are reflected in the significant chi-square values displayed by grave type and corpse treatment for demographic criteria.

Table V.2 also shows that relationships between these mortuary variables and sex and age-at death also exist using chi-square statistics. Since many graves contained successive interments of males and females as well as subadults, however, the association of individual skeletal remains to each grave object is obscured by later burial events and these relationships may be problematic. Similarly, as some grave types were only used for single interments, while others only for multiple interments, the discovery that males and females and adults and subadults are only buried together in tomb types commonly used for multiple interments is not useful. Individuals of both sexes were often present together in tombs with multiple interments, and there was no relationship

Table V.2. Chi-square comparisons of variable occurrence by demographic criteria for pooled dataset. Values in bold indicate significance at p<0.05.

Variable	Sex		Age (Adolescents Included as Adults)	
Grave Marker	df=2	3.14	df=2	**7.54**
Lamps		.81		3.42
Ceramics		**12.75**		**40.21**
Jewelry		**7.39**		**13.49**
Coins		.68		5.07
Buckles		2.76		**8.62**
Weapons		1.05		1.83
Implements		1.76		**7.65**
Faunal		1.22		1.12
Other Vessels	n/a			1.13
Multiple Burials	-		-	
Grave Type	df=12	**22.72**	df=14	**79.06**
Corpse Treatment	df=4	4.48	df=4	**18.10**

between the presence of males or females and the presence of infants or children in multiple interment burials (chi-square=1.43, p=.489).

Based on the demographic distribution of skeletal remains in each mortuary context, more mortuary variables show differences according to age at death than for sex. While ceramics, jewelry, and grave type are all statistically related to sex of the interred, only lamps, coins, weapons, faunal remains, and other vessels are likely to be found in graves regardless of age class. However, samples sizes make these relationships difficult to interpret, and other correlations are the result of poor preservation and commingling of skeletal remains.

The lack of a relationship between age at death and lamps, coins, weapons, faunal remains, or other vessels may be a result of few graves overall containing these objects or to lack of resolution within age class data. The chi-square value for coins is almost statistically significantly (p=.079), and a relationship may exist between the placement of coins in graves and the adult status of the interred (only three of the 15 graves which contained coins were also used exclusively for subadult burials). Among variables that are significant, although implements were only placed in single interment graves of adults, only three graves with detailed osteological information available contained one of these items, and they vary in type. Similarly, buckles are only present in ten graves with detailed osteological information available, six of which contain both adults and subadults. Sex-related differences in jewelry distributions among graves also exemplify more problems with sample sizes than actual differences in the data. Jewelry is more likely to be present in graves containing both males and females (N=10) than the graves of only males (N=2) or only females (N=1). Within these multiple interment graves, it is unclear whether it was one of the male or one of the female skeletons who was originally adorned with these objects.

Of the variables and the relationships listed in Table V.2, the distribution of ceramics by sex and age class is worthy of note. Though these vessels are more likely to be found in tombs with both males and females than in tombs with only males or only females, this relationship is most likely the result of the increased likelihood that ceramic objects would be present in multiple burial graves. If ceramic vessels used in burial services were deposited in the grave with the corpse, it would be natural to be more likely to find ceramics in a grave which had been the receptacle for more burial events. These multiple interments are also more likely to show variety in the types of ceramic objects present, though all types are represented in small numbers in single occupancy graves.

On the other hand, the skeletons of adults are also more likely to be associated with ceramics than the skeletons of subadults in both single and multiple interment tombs. Only two out of 73 graves containing only subadults also contain ceramic vessels, as compared to 12 out of 44 graves containing only adults, and 21 out of 38 graves containing both adults and subadults. Both of the subadult burials containing ceramic objects were single interments, and none of the 14 multiple interment graves containing only subadults had associated ceramics. The osteological data was not sufficient for any statistical comparison of vessel type and sex of the interred. The only coarseware pot present in a single inhumation where osteological data was available was placed in a built cist for a man (Grave 1938.10), which was also the only single inhumation in which weapons had been placed, and was one of only two single inhumations of adults, both male, adorned with a buckle. It is possible, however, that this possible sex association, as it is statistically insignificant, is a result of preservation rather than gendering in grave offerings.

All other objects found in graves are associated with both men and women as well as subadults. Single interments of subadults are as likely as single interments of adults to contain jewelry and buckles. In fact, all of these grave objects are found in graves with multiple interments.

In summary, these univariate analyses show that a great deal of variation exists in Late Antique mortuary behavior at Corinth. As the majority of variables show significant chronological variation, much of this variation must be the result of diachronic changes in behavior. Significant changes occurred in corpse treatment and the number of individuals interred in each mortuary context, and artifacts placed in grave assemblages also varied over time. On the other hand, significant differences are also present with regards to the use of many of these variables in geographically separated burial locations. Some of these mortuary distinctions were a result of biological identity, as subadults appear to have been treated differently than adults in mortuary contexts throughout late antiquity. However, the majority of variables do not discriminate between the mortuary contexts of males and females. These variables may instead differentiate tombs used by separate social groups and will be examined further using factor analyses for subsets of these data.

5.1.2 Multivariate analyses

5.1.2.1 Pooled dataset

Table V.3 shows the phi coefficients for the pooled dataset. Based on these phis, I did not run the binary variables Weapons, Faunal, and Other Vessels in this FA. Seven factors have eigenvalues greater than .75, accounting for a total of 82.03% of variance in the complete dataset (see Figure V.1 for a graphical representation of factor

Table V.3. Entire dataset: phi coefficients for mortuary variables. All variables except for "Burial Treatment" are binary; "Burial Treatment" has 3 case states, and the value given is for the Cramer's V instead of the Phi coefficient. Bolded values are below the cut-off point.

	Lamps	Ceramics	Jewelry	Coins	Buckles	Weapons	Implements	Faunal	Other Vessels	Multiple Burials	Corpse Treatment
Grave Marker	.29	.28	.15	**.00**	.16	**0**	.03	.02	.06	.42	.18
Lamps	-	.12	.17	.17	.03	**0**	.03	.07	.02	.26	.11
Ceramics		-	.16	.21	.16	.12	.08	.11	.14	.41	.19
Jewelry			-	.23	.38	.29	.18	.03	.03	.38	.25
Coins				-	.07	.05	.14	.12	.02	.15	.14
Buckles					-	.44	.18	.02	.18	.22	.11
Weapons						-	.44	**.01**	**.01**	.11	.21
Implements							-	**.01**	**.01**	.03	.21
Faunal								-	**.01**	.15	.26
Other Vessels									-	.02	.02
Multiple Burials										-	.28

contributions to variance). Factor 1 only accounts for 28.60% of the total variance in this sample, which low value may be a result of poor preservation and missing data in this pooled dataset. In other words, the total variance in this sample is low, and reflects the fact that grave goods were not placed in most graves in this time period. However, groupings are present among these variables. Factors 2 and 3 account for 23.53% of the remaining variance, while the remaining four account for 29.90%. As can be seen in Figure V.1, the sample shows an exponential pattern in the drop in eigenvalues in successive components. Among the extracted factors (Table V.4 presents the rotated factor matrix for this analysis), five loadings were of the grouped pattern, meaning the presence of more than one variable contributed to each factor (Harman, 1976). In addition, two factors display bipolar factor loadings, or high positive loadings for some variables juxtaposed by high negative loadings for others. This indicates the presence of an inverse or mutually exclusive relationship among these variables (Harman, 1976).

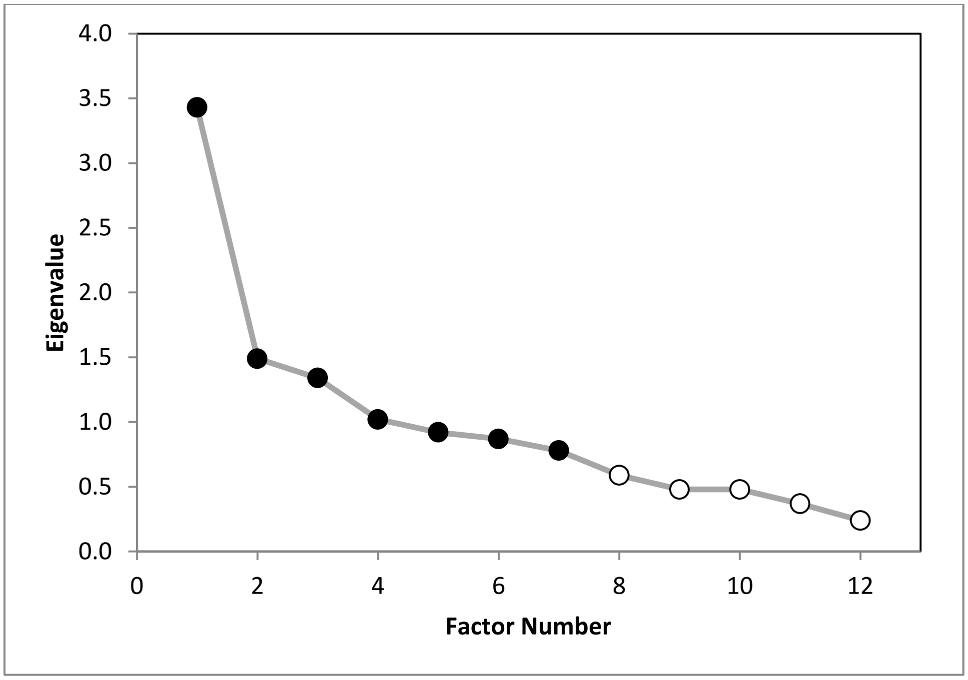

Figure V.1. Eigenvalue fall-off curve for the complete dataset. Datapoints of extracted factors are filled.

Table V.4. Factor analysis results for the complete dataset in a varimax rotated factor matrix. Strong loadings are bolded.

Mortuary Variable	F1	F2	F3	F4	F5	F6	F7
Period	**.63**	**-.19**	**-.38**	.02	**.37**	**-.33**	**.17**
Area	.06	-.35	**.58**	.10	.00	**.51**	**.43**
Grave Form	**.83**	-.15	.09	**-.33**	-.12	.08	.10
Grave Marker	**.68**	-.27	.27	.14	**.22**	.11	-.30
Lamps	.30	-.32	**.60**	-.09	.03	-.34	-.25
Ceramics	**.77**	.04	-.14	-.01	**-.27**	-.15	.05
Jewelry	.36	**.61**	.33	-.06	.09	.04	-.03
Coin	.19	**.63**	.28	.04	.07	-.31	**.43**
Buckle	.32	.25	-.21	-.06	.07	**.48**	-.28
Implement	-.11	**.51**	.29	.01	.01	.03	-.33
Corpse Treatment	**.47**	.21	-.27	-.01	.12	**.41**	.14
Multiple Interments	**.84**	.05	-.08	**.28**	**-.25**	-.05	-.07

Many factors show significant loadings for period, for which higher values indicate a chronologically later date. The only one which does not, Factor 4, groups high loading on multiple interments, for which high values indicate more than one skeleton was present, with negative loading on grave form, for which progressively higher values indicate relatively more elaborate graves. This association of loadings shows that relatively simple graves were not used for multiple interments. Factor 1 groups fairly high factor loadings on period, coding for Period II and later, together with high loadings on grave form, coding for relatively elaborate graves, and high values on grave makers, ceramics, and multiple interments, displaying a correlation between the presence of these objects in relatively elaborate, late graves. Factor 5 also displays a significant loading on period, though this value is not as high as in F1, suggesting this correlation is not as strong. F5 also shows positive loadings for grave markers on one hand and negative loadings for ceramics and multiple interments on the other. This inverse covariation may imply that by Period II, the use of grave markers or the presence of ceramics in multiple interment tombs was analogous. F7 displays an even more slight correlation with increasing period grouped with high loadings on area, which codes for graves placed north of the city on the low end, for graves in the ancient city center in the middle, and graves on the remainder of the city outskirts on the high end, and high loadings on coins. This grouping suggests coins may have been present in an increasing number of graves in the ancient city center over time.

Negative associations with period, on the other hand, suggest a negative correlation between this factor and time. F2 groups high loadings for jewelry, coins, and implements, indicating these objects occur together in these graves, together with a negative loading on period, suggesting a slight negative correlation of this grouping of variables with time. F3 and F6, on the other hand, display a stronger negative association with period, and each group a different assortment of artifacts' presence together with interment area. F3 highlights the fact that lamps are primarily found in the burial area north of the city. F6 shows that mortuary contexts where secondary burial was practiced, as indicated by the high loading on corpse treatment, and which also contain buckles are present in the city center, setting these burials apart.

These relationships among variables suggest that significant chronological and spatial patterning is present in this dataset as well as identifying possible complications with these data. For F3, for example, preservation biases may best account for the relationship between lamps and burial location as the cemetery north of the city was also the only area of the site for which lamp presence could reliably be coded. The grouping of variables in F4 is also not diachronic in nature, and implies that only certain grave types, not tile graves or amphorae burials, were ever selected for reuse in sequential burial events. In general, however, F1 is best interpreted as accounting for temporal variation in the sample, indicating that the primary dimension of variability in mortuary behavior is diachronic change. This finding is also clear in univariate analyses of individual variables. Though an exponential pattern in the eigenvalue curve is usually interpreted to indicate the presence of hierarchical status groups in a mortuary sample (Braun, 1979; Peebles and Kus, 1977), if F1 groups together variables whose occurrence is a function of temporal variation, it is unlikely to also reflect the presence of the Corinthian elite throughout the time period. In addition, redundancies in the factors would also be expected if one high-level status group was present in the city cemeteries (Braun, 1979; Peebles and Kus, 1977), and their lack may instead be a result of pooling chronological periods with slightly different mortuary behaviors associated with rank. The expected redundancies, with many variables grouped together with high loadings in the first principal component as well as appearing in components with lower eigenvalues, may be present when the dataset is refined by period. The grouping of variables in F2, F5, F6, and F7 may likewise correspond with chronological factors or with underlying social distinctions such as status groups. These associations are more fully explored in the following area- and period-specific analyses.

5.1.2.2 Graves located north of the city

As the cemetery near the Asklepieion and the Gymnasium contains the largest coincidence of mortuary and osteological data, I ran multivariate statistics separately on 155 graves from this area. Of these, 58 date to Period I, 83 to Period II, and 14 to Period III. Grave forms in this area include 4 pit graves, 20 amphora burials, 69 tile graves, 15 cists, 41 rock-cut chamber tombs, 2 built cists, and 4 tombs constructed out of abandoned architectural units. These analyses form the basis for a more in depth examination of the correlation of mortuary variability with osteological variables such as sex and age class. Though this data is only available consistently for this area of Corinth, I have included it here as an exploratory approach to compare with other site locales when this information is available in the future. These results are provisionally compared with FAs from graves in the city center.

In order to determine whether restricting this dataset to include only those graves with osteological data available limited information relating to mortuary behavior, I included osteological categories in the phi matrix for this subset (Table V.5). I use all of the binary variables other than the presence of multiple interments as in the previous analysis, and I use additional categorical variables. I recoded “Multiple Interments” into groups based on the diversity in MNI (0 interments, 1 interment, 2-3 interments, 4-10, 11-20, and 21+), and included the osteological categories of age classes and sexes present in grave. MNI was broken down into these categories in order to better reflect variation in tomb reuse, as the use of a grave for proportionally more burial events, and thus the burial of more skeletons within a grave receptacle, points to greater investment in a structure by a proportionally larger group or community. Location was also used in this analysis as a categorical variable in the place of Area as it reflects the geographic separation of graves within this large area of the site: either those offset from the wider cemetery through their construction in the reservoirs around Lerna Square or in the bedrock cutting by the Gymnasium, or because of their proximity to more ancient architectural features. These locations (listed in Table IV.5) are used to reference the graves in the Appendix. Table V.5 shows that the inclusion of these data did not result in

Table V.5. Phi coefficients for mortuary variables calculated for graves north of the city. Statistics run only on graves with osteological information available. MNI, Corpse Treatment, Age Classes, Sexes, Location, and Period are not binary variables and use the Cramer's V. Bolded values are below the cut-off point.

	Lamps	Ceramics	Jewelry	Coins	Buckles	Weapons	Implements	Faunal	Other Vessels	MNI	Corpse Treatment	Age Classes	Sexes	Location	Period
Grave Marker	.28	.36	.11	.02	.14	**0**	.07	.05	**0**	.45	.25	.33	.37	.64	.43
Lamps	-	.13	.09	.11	.08	**0**	.06	.05	**0**	.27	.18	.23	.18	.55	.16
Ceramics		-	.19	.21	.15	**0**	.06	.15	**0**	.66	.31	.55	.53	.52	.56
Jewelry			-	.32	.09	**0**	.14	.03	**0**	.40	.28	.39	.28	.26	.02
Coins				-	.10	**0**	.14	.23	**0**	.33	.05	.30	.09	.34	.11
Buckles					-	**0**	.02	**.01**	**0**	.34	.19	.30	.23	.20	.14
Weapons						-	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Implements							-	**.01**	**0**	.08	.04	.21	.25	.21	.15
Faunal								-	**0**	.20	.37	.17	**0**	.23	.08
Other Vessels									-	**0**	**0**	**0**	**0**	**0**	**0**
MNI										-	.64	.59	.64	.46	.41
Corpse Treatment											-	.30	.27	.24	.17
Age Classes												-	.36	.53	.26
Sexes													-	.53	.50
Location														-	.60

small phi coefficients for mortuary variables, and the inclusion of these data did not limit behavioral variables available to this FA. As shown in this table, neither weapons nor other vessels are present in any of these graves, and I did not include them in the following analysis. In addition, three phi coefficients for faunal material are below 2%, so I also excluded that variable.

Variety in age class and sex of interred was not considered for initial interpretations of mortuary diversity, and the presence of multiple interments was also treated as a binary variable for the factor analysis. Six factors have eigenvalues greater than .75, accounting for a total of 77.02% of variance in the complete dataset (see Figure V.2). After applying a varimax rotation, factor loadings on Factors 1 and 2 display a grouped pattern, and Factors 3 through 6 a bipolar loading pattern (see Table V.6). As is apparent in Figure V.2, these samples show an exponentially shaped eigenvalue falloff curve.

Factor 1 groups together high values for grave form, which coded for relatively elaborate tombs at the high end and relatively simple burials at the low end, with the presence of ceramics, grave markers, and multiple interments. These variables are present along with a fairly high loading on location, which on the high end codes for graves placed in the western portion of this burial area near the ancient Gymnasium complex, and on the low end codes for graves placed in the eastern area, near the ancient Asklepieion. For F1, fairly high loadings are also present on period, for which increasing values code for chronologically later graves, and corpse treatment, which codes for the presence of secondary burials on the high end. Factor 2, on the other hand, does not display any overlapping variables with F1, and groups together the presence of jewelry, coins, and implements. Location also displays a fairly high loading on this factor, and period a high negative loading, which codes for an inverse relationship with chronologically later time periods. In the bipolar patterned loadings, high positive loading on lamp presence in F3 is opposed by fairly high negative loadings on buckle presence and corpse treatment. In F4, positive loading on grave form is present along with negative loading on the presence of grave markers and multiple interments. F5 shows high positive loading on chronological period and coin presence juxtaposed by high negative loadings on location, and F6 presents a dichotomy between high positive loadings for buckle presence and high negative loadings for burial treatment.

Factor 1 separates out the majority of mortuary contexts from this burial area. High loadings on grave form for this factor, consistent with rock-cut chamber tombs and architectural units reused as graves, also show that this variable most clearly defines differences in mortuary behavior. These elaborate tombs tend to contain a greater variety in artifacts, particularly grave markers, and ceramics, and tend to form the resting place

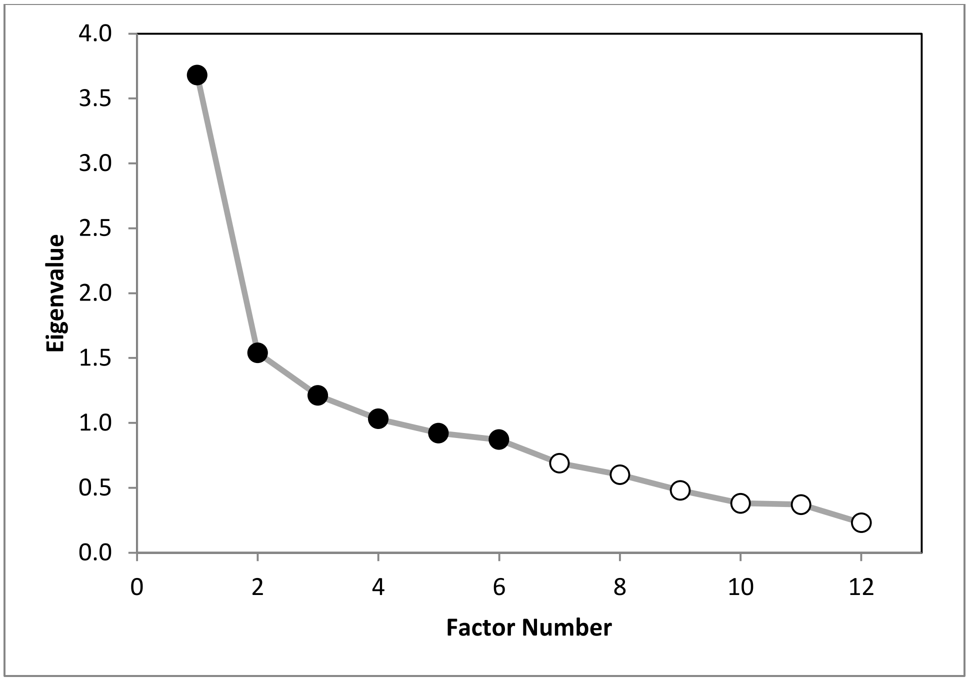

Figure V.2. Eigenvalue fall-off curve for the graves located north of the city. Datapoints of extracted factors are filled.

Table V.6. Factor analysis results for the graves located north of the city in a varimax rotated factor matrix. Strong loadings are bolded.

Mortuary Variable	F1	F2	F3	F4	F5	F6
Location	**.52**	**.40**	.24	.12	**-.47**	.05
Period	**.59**	**-.47**	-.17	.04	**.40**	.01
Grave Form	**.82**	-.15	-.01	**.27**	.08	-.06
Lamps	.30	-.03	**.79**	.06	.10	.08
Ceramics	**.75**	-.13	-.12	.03	.23	-.01
Jewelry	.37	**.60**	-.03	.09	.15	-.20
Coin	.22	**.61**	-.03	-.08	**.51**	.31
Buckle	.32	.15	**-.43**	.05	-.33	**.67**
Implement	-.07	**.59**	-.03	-.03	.12	-.27
Corpse Treatment	**.48**	.07	**-.43**	-.03	-.29	**-.49**
Grave Marker	**.71**	-.07	.35	**-.20**	-.30	.00
Multiple Interments	**.84**	-.05	-.05	**-.27**	.05	.01

for more decedents showing a greater variety in corpse treatment (i.e., they were used for multiple kinds of burial events). Most ceramic vessels were placed in rock-cut chamber tombs and architectural units reused as graves (chi-square=63.14, df=6, p=.000). Rock-cut chamber tombs also are associated with the majority of grave markers (chi-square=59.22, df=6, p=.000), both stucco mounds and inscriptions. In addition, almost all rock-cut chamber tombs contain more than one interment (N=33 out of 38). The majority of these multiple interments contain both males and females (chi-square=16.34, df=2, p=.000). Since multiple interments are also present in all built cists, half of the reused architectural units and cists, and are rarely found in pits, amphora burials, or tile graves (chi-square=99.06, df=6, p=.000), built cists and cists may also have been the focus of extended use. This relationship is echoed in Factor 4, which identifies that these simple graves, as represented by a low positive loading on grave form, rarely have grave markers or contain more than one individual.

Age classes are also meaningfully distributed by grave types. No adults were ever buried in amphora burials, and subadults were only ever buried by themselves in amphorae, tile graves, or cists, though they were buried with adults in rock-cut chamber graves as well (chi-square=63.43, df=8, p=.000). However, some of these subadult graves are in high status burials. Six of the 26 subadult-only graves have associated grave markers, though the majority of grave markers are associated with graves containing adults as well or only adults (chi-square=8.31, df=2, p=.016). In addition, the majority of multiple interments contain subadults as well as adults (N=25 out of 34), though none contain only subadults (chi-square=56.95, df=2, p=.000). Thus, the elaborate graves which display mortuary behavior associated with Factor 1 contain both adults and subadults, and this factor is not associated with biological distinctions.

Factor 2 highlights chronologically earlier mortuary behavior, as signified by the high negative loading on period for this factor. Graves in this group contain jewelry, coins, and implements, and Factor 5 likewise echoes the significance of coin presence as a grouping factor among these early graves and shows that this artifact was placed in graves in the eastern as well as the western portion of the burial area. Within this mortuary subset, sexes were not accorded differential treatment, as the graves of men and women were almost equally likely to contain jewelry (chi-square=2.08, df=2, p=.353), coins (chi-square=.19, df=2, p=.910, or implements (chi-square=1.66, df=2, p=.435). However, poor skeletal preservation may be affecting this patterning, as only one grave where osteological sex determination is possible contains an implement, and only six contain either jewelry or coins. On the other hand, adults and subadults are treated differently within this group, as only tombs which contain adults also contain jewelry (chi-square=12.38, df=2, p=.002), coins (chi-square=7.30, df=2, p=.026), or implements, though only two graves total contain implements and the resulting statistic is not significant. Age classes are also significantly distributed by location and period, though this may be an artifact of preservation as early excavations only occasionally noted the presence of a child in the grave, and Period III in this area only consists of three graves total.

In Factors 3 and 6, on the other hand, only burials which contain buckles or are associated with lamps in conjunction with the presence of secondary burial are set apart. Though a greater proportion of buckles were placed in graves with both primary and secondary interments, more lamps are associated with primary burials. Lamps are also equally likely to be present for the graves of subadults or adults (chi-square=4.11, df=2, p=.128). Buckles, on the other hand, are rarely placed in graves from this area. All three of mortuary contexts which contain buckles are also multiple interment tombs containing both adults and subadults. In one grave (Grave 1967.13, MNI=6), both males and females are osteologically identified, though preservation is not complete enough to identify any interments to sex in Grave 1967.08 (MNI=5), and only one of the three adults, a male, is preserved enough for osteological sex identification in Grave 1967.07 (MNI=4).

5.1.2.3 Graves located in the ancient city center

I ran the same variables used in Section 5.1.2.2 in a factor analysis of graves from the city center. This burial area was separated geographically and chronologically from the cemeteries constructed outside the ancient city walls, and may have served different communities in Late Antique Corinth as a result. In this area, 89 graves provide sufficient information for multivariate analyses of grave assemblages which can be compared with osteological data. Only one grave constructed in the ancient city center dates to Period I, 41 date to Period II, and 44 to Period III. Three additional graves could not be precisely dated, though they were built and used during late antiquity.

Table V.7. Phi coefficients for mortuary variables calculated for graves in the ancient city center. Statistics run only on graves with osteological information available. MNI, Burial Treatment, Age Classes, Sexes, Location, and Period are not binary variables and use the Cramer's V. Bolded values are below the cut-off point.

	Lamps	Ceramics	Jewelry	Coins	Buckles	Weapons	Implements	Faunal	Other Vessels	MNI	Corpse Treatment	Age Classes	Sexes	Location	Period
Grave Marker	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Lamps	-	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Ceramics		-	.22	.22	.22	.33	.32	.07	**0**	.42	.03	.59	.54	.52	.09
Jewelry			-	.38	.44	.40	.27	.04	**0**	.43	.27	.28	.54	.59	.22
Coins				-	.14	.16	.26	.20	**0**	.29	.14	.11	.23	.72	.19
Buckles					-	.55	.37	.08	**0**	.21	.08	.37	.26	.45	.37
Weapons						-	.70	.04	**0**	.24	.20	.25	.18	.25	.22
Implements							-	.03	**0**	.15	.32	.29	.38	.26	.16
Faunal								-	**0**	.37	.25	.11	.23	.44	.07
Other Vessels									-	**0**	**0**	**0**	**0**	**0**	**0**
MNI										-	.55	.52	.64	.51	.17
Corpse Treatment											-	.30	.25	.41	.27
Age Classes												-	.77	.54	.33
Sexes													-	.41	.52
Location														-	.44

As compared to graves placed in the burial area north of the city, these tombs are slightly more diverse in form, and include 4 pit graves, 5 amphorae, 10 tile graves, 8 cists, 2 rock-cut chambers, 40 built cists, 15 built vaults, 4 constructed out of abandoned architectural members, and one which may not have been a formal burial at all. In the final case, two individuals found in the Hemicycle along the Lechaion Road were likely entombed when the building collapsed on top of them (Broneer, 1926). Ceramic vessels placed in these graves were of the full variety of types, and a greater variety in buckle types was present in these graves as compared to graves in the northern burial area.

Table V.7 shows the phi coefficients for mortuary variables in this subset. Since grave markers and lamps can only be reliably coded for presence, not absence, in this area of the site, I did not include these variables in the following FA. As no graves contained vessels made of any materials other than ceramic, this variable is also not included. I did not discard any other variables based on phi coefficients.

In the FA, six factors had eigenvalues greater than .75, accounting for a total of 77.30% of variance in the complete dataset (see Figure V.3). Many of the variables share high loadings among factors. After applying varimax criteria, Table V.8 shows that Factors 1 and 4 display a grouped pattern, and Factors 2, 3, 5, and 6 are bipolar. Though F1 accounts for the highest variance in the sample (27.35%), Factors 2 and 3 each account for over 10% more of the variance, and Factor 4 accounts for almost 10%. As a result, the eigenvalue fall-off curve in Figure V.3 displays a broken exponential curve.

Factor 1 shows high factor loading for almost all of the mortuary variables, indicating that a few graves contain the full range of objects. F1 groups graves containing ceramics, jewelry, coins, buckles, weapons and implements together. This factor also shows fairly high loadings for grave form, for which high values code for more elaborate tombs and low values for simple burial types, and corpse treatment, or the presence of secondary burials. Graves with all of these variables are only present on Temple Hill.

Many of these factors also display a great deal of chronological variability. Factors 2 and 3 both together juxtapose chronological later graves against

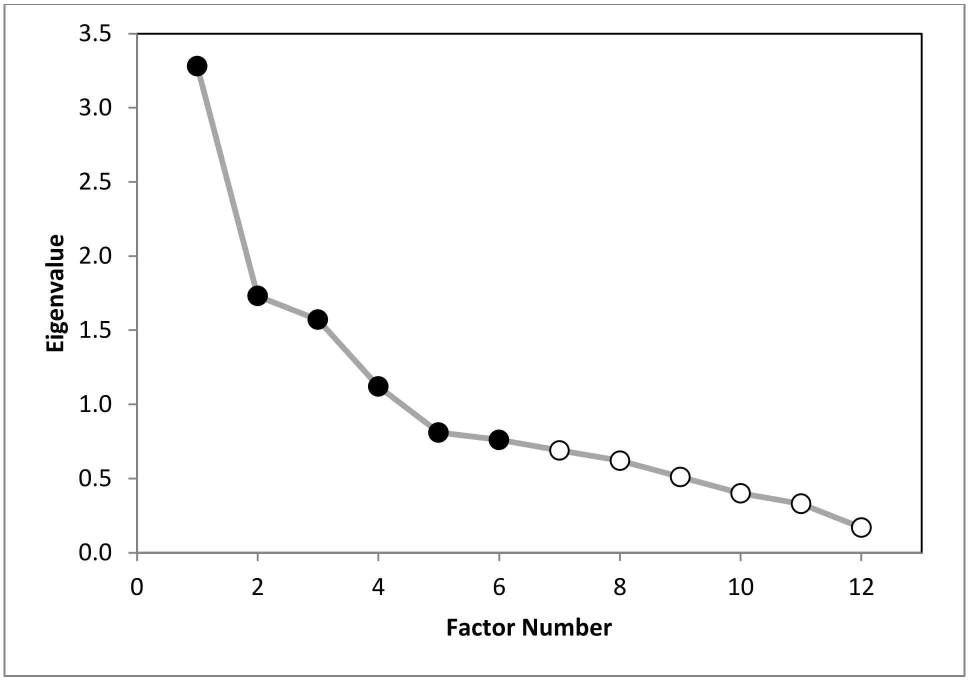

Figure V.3. Eigenvalue fall-off curve for the graves located in the ancient city center. Datapoints of extracted factors are filled.

Table V.8. Factor analysis results for the graves located in the ancient city center in a varimax rotated factor matrix. Strong loadings are bolded.

Mortuary Variable	F1	F2	F3	F4	F5	F6
Location	.04	**.12**	**.73**	**.39**	-.02	.06
Period	-.01	**-.41**	**-.37**	**.52**	.01	.08
Grave Form	**.47**	**.32**	**.35**	**-.21**	-.05	.10
Ceramics	**.54**	.09	**.53**	**.20**	.04	**-.25**
Jewelry	**.70**	.09	-.29	**-.30**	.06	.10
Coin	**.55**	.28	**-.47**	.09	**-.12**	.05
Buckle	**.68**	**-.46**	.00	-.15	**.16**	**-.26**
Weapon	**.79**	**-.39**	.12	-.05	**-.29**	.02
Implement	**.74**	**-.33**	.12	**.21**	**.17**	**.32**
Faunal	.13	**.57**	-.10	**.51**	.02	.04
Corpse Treatment	**.47**	**.31**	**-.39**	**.33**	.00	**-.25**
Multiple Interments	.32	**.68**	.02	**-.28**	.07	.07

chronologically earlier graves, as signified by the different negative loadings on period for these two factors as progressively higher loadings on this variable code for later time periods. For F2, graves of elaborate construction (as the loading on grave form is fairly high) with multiple primary interments are present in the earliest and latest time periods. High loading on faunal remains strongly covaried with multiple interments, indicating both are present in these graves. F2 also shows high negative loadings on buckles, weapons, and implements, so these objects were not placed in these mortuary contexts. For F3, on the other hand, graves from the second and third period, but of similar morphology to those in F2, grouped together based on the presence of ceramics due to the high positive loading on this variable. The high negative loading on coins and corpse treatment indicates that these later high status graves contained secondary burials and did not contain coins. Tombs in F2 were primarily constructed north of the former forum area and those in F3 were placed in the area of the former forum, since higher loadings on this variable indicate graves were located in the southern portion of this burial area, near the South Stoa, while lower loadings indicate graves were located in the northern portion of this burial area, near Temple Hill.

Since Factor 4 also displays high positive loading on period, this group is also correlated with later chronological burial activity. For this factor, the presence of faunal remains, ceramics, and implements in burials that do not contain jewelry appears to group these graves together. F4 graves are either of single primary interments or contained multiple interments with or without secondary burials, as indicated by the opposing loadings on corpse treatment and multiple interments. Based on the fairly high loading on location for this factor, these graves are mainly placed in the eastern portion of the former forum area. Factors 5 and 6 may highlight subsets of graves within these chronologically separated groups. In F5, this subset is composed of graves containing either buckles and implements or weapons. These graves also never contain coins. F6 instead identifies a group of primary interment graves where buckles and ceramics or implements are present.

The importance of grave form in Factors 1-4 implies that only tombs of certain morphologies are associated with the full range of mortuary behavior in this area. Relatively elaborate graves such as rock-cut chamber tombs, built cists, built vaults, and re-used architecture are more likely than relatively simple burials such as pit, tile, or cist graves or amphorae burials to contain the objects with high loadings in Factor 1. Only F1 displays a high positive loading for the variable jewelry, and the majority of jewelry is present in built cists and built vaults. However, as only 21 graves contain jewelry, this correlation is not statistically significant (chi-square=12.14, df=8, p=.145). Ceramics are also mainly found in relatively elaborate graves such as rock-cut chamber tombs, built cists, built vaults, and reused-architecture, though they are also present in a single cist grave, and again, these differences are not statistically significant (chi-square=11.00, df=8, p=.202). On the other hand, coins were never present in pit graves, amphora burials, tile or cist graves, or in rock-cut chamber tombs in this area (chi-square=34.00, df=8, p=.000). Major status differences reflected by grave form also do not appear to be related to age or sex. Though only subadults were buried in pit graves or amphorae in this area, they were also buried in the full range of other tomb types, often with adults. Both males and females were present in built cists and built vault grave types, though only males were placed in tile graves and only females in cist graves. Jewelry was placed in single and multiple interment tombs of both adults and subadults. Due to poor skeletal preservation, of the adults with jewelry, it is not clear how many are male versus female.

All of the variables coding for artifacts are shared by more than one factor with the exception of jewelry and coins. Factors 1, 3, and 4 share high loadings on the presence of ceramics, Factors 1, 2, 5, and likely 6 share buckle presence, Factors 1, 2, and 5 share weapons, Factors 1, 2, 4, and 5 share implements, and Factors 2 and 4 share faunal remains. Secondary burials are present in graves associated with mortuary correlates of rank in Factors 1 and 4, while only primary burials are present in Factors 2, 3 and 6. Redundancies may also highlight similarities in mortuary behavior among burial locations, and likewise, differences may correlate with spatial variability. Low loadings on location among Factors 1 and 6 indicate that these graves are primarily on Temple Hill, high loading on Factor 3 indicates these graves are located along the south and west end of the forum, and middle values on Factors 2 and 4 places these graves elsewhere in the forum area. Thus, the use of ceramics and implements in mortuary contexts draws an association between tombs constructed in the forum and a few graves on Temple Hill. On the whole, however, the graves in the former forum area are distinct from those placed north of the forum. This distinction is primarily a result of the differential use of ceramics and faunal remains, as the majority of graves containing these objects are in the forum area. Only one grave (out of 14) on Temple Hill contained ceramics, as compared to 14 out of 71 graves in the forum area. The distribution of faunal remains is similar, though this object type is rarely present overall.

These two object classes were also placed in dissimilar mortuary contexts within the forum area. Ceramics are only present in tombs containing the interments of adult males and multiple interment tombs. The association between age class and ceramics is statistically significant for this area (chi-square=18.76, df=2, p=.000). On the other hand, all three of the graves which contain faunal remains are multiple interment tombs, one of only subadults (South Stoa Grave 1937.21 from Period II), the other containing both males and females, though all of the skeletal remains are not preserved (Bema Church Grave 1936.15 from Period III), and I am unable to determine if this grave and the final interment (South Stoa Grave 1950.04 from Period III) was used for both adult and subadult burials. Interestingly, the original excavators suggested an additional grave in the South Stoa only included faunal, not human, remains, as only a chicken and the shell of an egg appear to have been placed in an amphora (Grave 1933.133 from Period II; cf. Broneer 1933: 569-570). This grave is not included in this FA, however, as I was unable to find the skeletal remains from this grave and am unable to verify at this time that this grave contained a chicken rather than a human neonate or fetal skeleton.

Buckles, weapons, and implements, on the other hand, are present in both burial locations, though in different mortuary contexts as indicated by the age-at-death of the decedents. Buckles are present in both subadults' tombs and in the graves of adults. In graves from the city center, buckles are present in 1 out of 32 graves containing only subadults, 3 out of 7 graves containing only adults, and 3 out of 8 graves containing both adults and subadults, and in both single and multiple interment tombs. In addition, among single interments with buckles, one is an adolescent aged ca. 16 years at death (from Grave 1925.03/04, considered an adult in the above comparison) and one is a young adult (Grave 1938.10). Weapons and implements, on the other hand, appear to have been primarily associated with adults. Though weapons are present in a few multiple interments (Grave 1972.20 on Temple Hill, Grave 1937.09/.15-.19 in the South Stoa, and Grave 1934.14 in the West Shops), only one of these graves contains subadult skeletons (Grave 1972.20), and in addition, this object is only present in one single adult interment, possibly that of a man (Grave 1938.10 in the South Stoa).

Coins, on the other hand, are more complicated to interpret. This object was mostly placed in relatively elaborate tombs in the area north of the forum (two out of 14 graves), rather than in the former forum area (four out of 71 graves). They are only present in one tomb where I was able to use osteological indicators to determine both sex and age of the interred skeletons, and this grave contained only subadults (Grave 1926.22). However, coins are not statistically more likely to be present in the graves of children (chi-square=.67, df=2, p=.716). Instead, in this area this artifact is present primarily in graves containing a large number of primary interments and, therefore, opened on multiple occasions at which time small objects such as coins could have been lost in the grave receptacle.

5.1.2.4 Comparison within time periods

Since much of the observed mortuary variability separating factors in the previous analyses appears to be related to diachronic change, I used time period to subdivide samples for further analyses. Based on the phi coefficients, as shown in Table V.9, Period I has very few variables available for factor analysis, and is not analyzed separately. Additionally, the majority of graves dating to this time period were from the cemetery surrounding the Asklepieion and Gymnasium, so that pooling the Period I

Table V.9. Period I (late 5th – 6th centuries AD): phi coefficients for mortuary variables. "Corpse Treatment" is the only variable with 3 case states, and the value given is the Cramer's V statistic. Bolded values are below the cut-off point.

	Lamps	Ceramics	Jewelry	Coins	Buckles	Weapons	Imple-ments	Faunal	Other Vessels	Multiple Burials	Corpse Treatment
Grave Marker	.12	.02	.05	**0**	**0**	**0**	.02	**0**	**0**	.06	.03
Lamps	-	.03	**.00**	**.00**	**0**	**0**	.04	**0**	**0**	.09	.06
Ceramics		-	.03	.35	**0**	**0**	**.01**	**0**	**0**	.02	**.01**
Jewelry			-	.30	**0**	**0**	.23	**0**	**0**	.17	.04
Coins				-	**0**	**0**	.21	**0**	**0**	.06	.04
Buckles					-	**0**	**0**	**0**	**0**	**0**	**0**
Weapons						-	**0**	**0**	**0**	**0**	**0**
Implements							-	**0**	**0**	.03	.02
Faunal								-	**0**	**0**	**0**
Other Vessels									-	**0**	**0**
Multiple Burials										-	**0**

Table V.10. Period II (mid-late 6th – 7th centuries AD): phi coefficients for mortuary variables. "Corpse Treatment" and "Burial Area" are not binary, and the value given is for the Cramer's V instead of the Phi coefficient. Bolded values are below the cut-off point.

	Lamps	Ceramics	Jewelry	Coins	Buckles	Weapons	Imple-ments	Faunal	Other Vessels	Multiple Burials	Corpse Treatment	Burial Area
Grave Marker	.36	.41	.23	.06	.11	**0**	**0**	.05	**0**	.46	.19	.20
Lamps	-	.20	.25	.14	.03	**0**	**0**	.09	**0**	.26	.23	.22
Ceramics		-	.19	**0**	.03	**0**	**0**	.16	.09	.43	.28	.06
Jewelry			-	.25	.22	**0**	**0**	.03	.03	.39	.23	.16
Coins				-	.06	**0**	**0**	.13	.02	.15	.06	.13
Buckles					-	**0**	**0**	.02	.53	.23	.12	.22
Weapons						-	**0**	**0**	**0**	**0**	**0**	**0**
Implements							-	**0**	**0**	**0**	**0**	**0**
Faunal								-	**.01**	.13	.24	.14
Other Vessels									-	.09	**0**	.30
Multiple Burials										-	.20	.15
Corpse Treatment											-	.14

Table V.11. Period III (mid-7th – 8th centuries AD): phi coefficients for mortuary variables. "Corpse Treatment" is not binary, and the value given is the Cramer's V statistic. Bolded values are below the cut-off point.

	Lamps	Ceramics	Jewelry	Coins	Buckles	Weapons	Implements	Faunal	Other Vessels	Multiple Burials	Corpse Treatment
Grave Marker	.15	.05	.06	.14	.35	**0**	**0**	**0**	.19	**.00**	.17
Lamps	-	.18	.21	.85	**0**	**0**	**0**	**0**	.07	.33	.19
Ceramics		-	.05	.11	.11	.06	.15	**.01**	.16	.15	.13
Jewelry			-	.23	.48	.39	.24	.08	.09	.32	.32
Coins				-	.06	.06	.18	.18	.05	.14	.30
Buckles					-	.47	.29	.07	.08	.05	.09
Weapons						-	.62	.03	.04	.10	.18
Implements							-	.02	.02	.06	.31
Faunal								-	.02	.14	.31
Other Vessels									-	.17	.06
Multiple Burials										-	.33

graves from the area north of the city with contemporary graves from other site areas lessened the number of variables available for analyses. Based on the phi coefficients shown in Table V.10, I excluded the following variables from Period II: Weapons, Implements, and Other Vessels. I also excluded the variable Lamps from all period-specific analyses due to preservation biases by burial area. As shown in Table V.11, this variable also has the lowest phi coefficients for Period III along with Grave Markers, so I excluded grave markers from the FA for Period III as well.

In the analysis of 284 graves dated to Period II, I extracted 6 factors with eigenvalues greater than .75, accounting for a total of 84.90% of variance (see Figure V.4 for a graphical representation of principal component contributions to variance). Loadings of these factors mainly display grouped and bipolar pattern types (see Table V.12). Factor 1, a grouped pattern, accounts for the highest variance (31.45%). Factors 2 – 4 display bipolar loading patterns, and Factors 5 and 6 display high positive loadings on only one variable. These factors display numerous redundancies and describe a situation during this time period where artifacts are not used in one particular way in grave assemblages.

Though F1 displays broad, underlying patterning in this data, the remaining variability can be broken down by site area. The highest area loading possible codes for graves present on the city outskirts, lower loadings correlate with graves in the city center, and the lowest values with graves placed north of the city. Thus, only Factor 3 codes for graves present exclusively by the forum and Temple Hill, Factors 4 through 6 for the Asklepieion/Gymnasium area, and Factor 2 excludes the graves in the northern burial area. Factor 2 also juxtaposes positive loadings for coins and faunal material with negative loadings for burial area and grave markers. In this case these loadings indicate that coins and faunal material together with the absence of grave markers set apart some graves among those placed anywhere other than the burial area north of the city. The correlation between a subset of burials from the ancient city center and faunal remains is echoed in the loadings on Factor 3; this factor juxtaposes these positive values against high negative loading on jewelry and buckles and may suggest a mutually exclusive relationship where these graves in the city center may also contain jewelry and buckles. Thus, both buckles and coins are present in both areas of the site, though in small numbers; most coins are present in grave contexts located north of the city, but this is not statistically significant (chi-square=3.92, df=2, p=.141) and this variable shows high loadings for both Factor 2 and Factor 4.

For the burial area north of the city (Factors 4-6), different associations between mortuary variables are present. For F4, high positive loadings on coins and buckles and high negative loadings on corpse treatment singles out primary interment graves containing both coins and buckles. F5 shows high positive loadings on buckles and corpse treatment and high negative loading on grave form, setting apart graves with secondary burials and buckles in relatively elaborate graves in this area. Finally, F6 highlights graves with jewelry, as indicated by high positive loading on this variable, or which contain both buckles and faunal material area, as indicated by fairly high negative

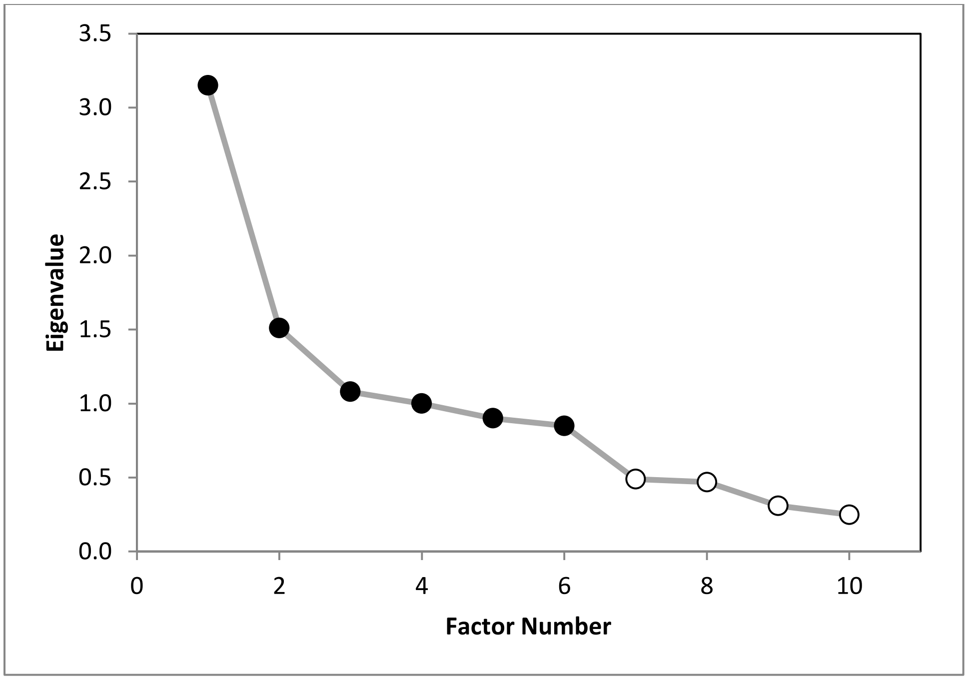

Figure V.4. Eigenvalue fall-off curve for Period II. Datapoints of extracted factors are filled.

Table V.12. Factor analysis results for Period II in a varimax rotated factor matrix. Strong loadings are bolded.

Mortuary Variable	F1	F2	F3	F4	F5	F6
Area	.05	**-.45**	**.62**	**.33**	**.39**	**.35**
Grave Form	**.72**	-.25	.10	.00	**-.29**	**-.34**
Grave Marker	**.62**	**-.62**	.17	.05	-.16	-.15
Ceramics	**.80**	.09	.00	-.07	-.04	-.11
Jewelry	**.64**	.04	**-.31**	-.05	-.11	**.61**
Coin	.31	**.58**	.07	**.60**	-.28	.17
Buckle	.34	.06	**-.45**	**.43**	**.61**	**-.31**
Faunal	.25	**.66**	**.59**	-.04	.06	**-.22**
Corpse Treatment	**.53**	.26	.09	**-.58**	**.40**	.12
Multiple Interments	**.80**	-.06	-.01	.08	.10	.12

loadings on these variables. Thus, in Period II graves, greater variety in mortuary behavior is present in the Asklepieion/Gymnasium area than in the ancient city center.

The greatest proportion of graves dating to Period II containing buckles are also present in graves on the city outskirts, including the cemetery by the Asklepieion and Gymnasium. Three out of 171 graves north of the city, three out of 20 graves elsewhere on the city outskirts, and only one out of 43 graves in the city center contain buckles, making this relationship statistically significant (chi-square=10.91, df=2, p=.004). Faunal material patterning by burial location is almost statistically significant as well (chi-square=4.77, df=4, p=.092), and the greatest proportion of graves with faunal material are present in the city center (two out of 43 graves, compared with one out of 171 graves north of the city). This spatial patterning is repeated by the shared presence of high positive loadings on faunal material among Factors 2 and 3. These results suggest that the graves in the city center used coins and faunal material analogous to the use of buckles in the burial area north of the city (Factors 4-6).

Coin and faunal material, however, are rare inclusions in any grave assemblage, and it is possible that some coins in particular were only present as a result of their being in the grave fill, and that they were not deliberately placed in graves. Only 14 graves from this period contain coins, and only three contain faunal material. Coins are also not significantly distributed in graves according to age-at-death (chi-square=3.81, df=2, p=.149). However, it is interesting that no burials in pits, amphorae, or reused architecture contain coins, while an almost equal percent of tile, cist, built cist, rock-cut chamber, and built vault graves do (chi-square=19.75, df=8, p=.011). Similarly, buckles are only associated with six multiple interments of both adults and subadults and males and females in Period II, and no single interments, making age and sex associations for this artifact problematic.

Along with burial area, grave form also appears to be a major source of mortuary differentiation during Period II. The most elaborate graves (rock-cut chambers, built cists, and reused architectural units) are the most likely to be associated with grave markers, especially inscriptions listing the name of the interred (chi-square=13.43, df=2, p=.001). Most of these tombs are multiple interments including both adults and subadults (N=15 out of 22). However, very few subadult-only interments were marked (N=4 of 17), and the majority of inscriptions refer to adults (Kent, 1966). Of these adults, both males and female interments are equally associated with grave markers (chi-square=.81, df=2, p=.668). Thus, adults were more likely to have their gravesite commemorated visually than subadults, unless those subadults were buried with adults. However, less elaborate graves such as pits, amphorae, tiles, and cists were also associated with grave markers such as stucco mounds and a few inscriptions, though to a lesser extent. Similarly, in almost half of the rock-cut chamber tombs and built vaults ceramic vessels were placed with the interred (25 out of 78 rock-cut chambers and four out of nine built vaults), but ceramics were also placed in at least one example of all other grave types.

As amphorae were exclusively used for the disposal of subadults, this relationship may be related to age. Graves with adult interments are also more likely than those of subadults to contain ceramic vessels (chi-square=25.64, df=2, p=.000). This result corresponds to the lack of ceramic vessels in subadult interments in the city center. Interestingly, ceramics were placed in one subadult grave on the city outskirts. This interment in Panayia Field (Grave 1998.29) contains a libation vessel. However, this anomaly may be explained by burial location in a small, isolated grave cluster displaying somewhat independently elaborated mortuary traditions. A ceramic vessel was also placed in an additional Panayia Field subadult burial dating to Period III (Grave 1998.34), and this grave is further distinct in that the grave assemblage may include a glass vessel in addition to the ceramic one.

Amphorae and pit graves are among the simplest interments, and no jewelry is present in either of these grave types. However, jewelry was very rarely used to adorn any of the deceased, and is only present in 8.55% of graves dating to this period. When present, jewelry is more likely to be found in multiple interment graves with both adults and subadults (chi-square=12.47, df=2, p=.002), so age-related patterning for this variable is obscured by burial treatment. However, at least two subadult-only interments in built cists were adorned with jewelry, one a single interment (Grave 1968.02 in the area of the Captive's Façade) and the other a multiple interment (Grave 1953.03 in the South Stoa), suggesting that the majority of mortuary distinctions during this period are not a result of demographic criteria.

For the 113 graves analyzed for Period III, 6 factors with eigenvalues greater than .75 account for 78.45% of the total variance in the subset (see Figure V.5). After rotation, factor loadings conform to grouped and bipolar patterns as described by Harman (1976) (see Table V.13). The factor accounting for the largest amount of variance (25.78%) is Factor 1 with a grouped pattern, and grouped factor loadings are also present for Factors 2 and 3. Factors 5 and 6 display bipolar patterns, and Factor 4 shows high loading on only one variable grouped with a fairly high loading on a second. Overall, the loadings on Factors 5 and 6 are low as a result of the rarity of the items they describe. Figure V.5 shows that the eigenvalue fall-off curve for Period III interments again displays an exponential curve, and redundancy also exists among the loadings for these factors, much as in Period II.

Factor 1 displays high loading scores for the binary variables jewelry, buckles, weapons, and implements, indicating these objects are present in these contexts. F1 also shows high loading scores for grave form, for which high values code for relatively more elaborate tomb constructs, and corpse treatment, high values of which indicate the presence of secondary burials. As compared to this high status group, Factors 2 and 3 pick out graves with multiple interments and possibly secondary burials which also contain faunal elements, as indicated by the high loadings on these variables. These results also correlates with spatial distinctions in mortuary behavior, as the loading on area is low for these factors and as a result these graves are located in the ancient city center. In Factor 2, faunal remains are paired with coins in grave assemblages, while in Factor 3, ceramics are present instead.

The remaining factors display redundancies for both Factor 1 and the Factor 2-3 group. Factor 4 displays the highest loading on other vessels, coupled with fairly high loadings on ceramics and grave form, highlighting fairly simple graves containing this

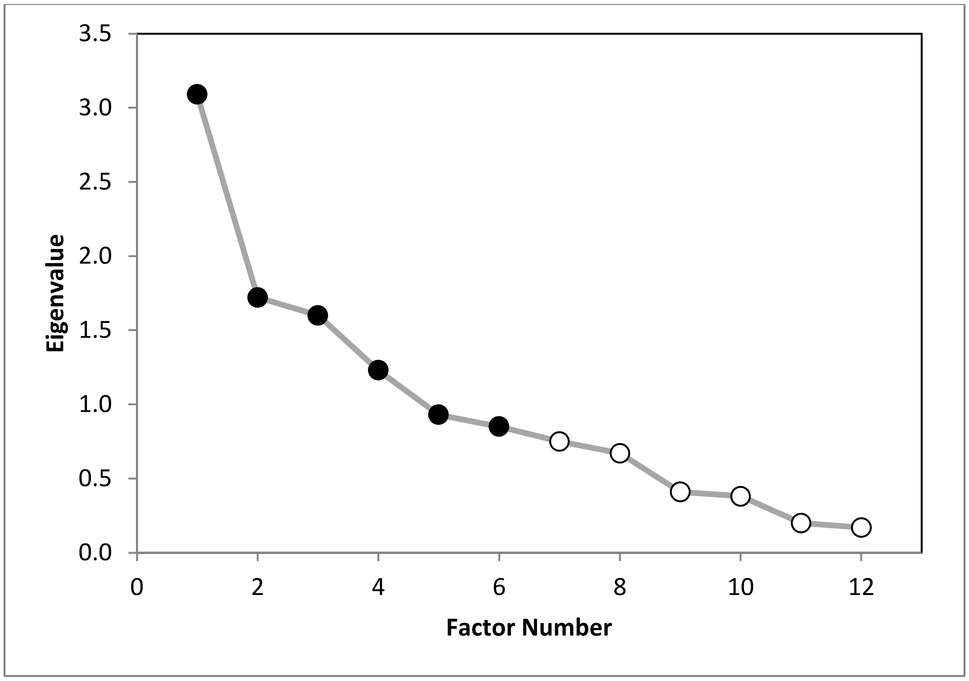

Figure V.5. Eigenvalue fall-off curve for Period III. Datapoints of extracted factors are filled.

Table V.13. Factor analysis results for Period III in a varimax rotated factor matrix. Strong loadings are bolded.

Mortuary Variable	F1	F2	F3	F4	F5	F6
Area	.06	.38	**-.78**	.21	.19	.10
Grave Form	**.62**	.10	-.03	.27	.03	.01
Ceramics	.28	**-.51**	**.56**	.40	.21	.10
Jewelry	**.71**	.28	-.18	-.12	-.05	-.07
Coin	.44	**.43**	-.12	.28	-.11	.03
Buckle	**.68**	-.28	-.34	-.17	.13	-.09
Weapon	**.80**	-.37	-.04	-.16	-.17	.28
Implement	**.73**	-.34	.02	-.03	-.01	-.26
Faunal	.12	**.49**	**.41**	.27	-.04	-.04
Other Vessel	-.06	-.19	-.16	**.84**	-.12	-.08
Corpse Treatment	.44	**.45**	.34	.02	.09	.11
Multiple Interments	.28	**.47**	**.44**	-.18	.04	-.08

combination of items. Factor 5, though displaying low factor loadings overall, shows the highest loadings on ceramics, coins, buckles, weapons, and other vessels, though the loadings on coins, weapons, and other vessels are negative. These values juxtapose graves containing ceramics and buckles from those containing coins, weapons, and other vessels. Finally, Factor 6 presents a dichotomy between high positive loadings on weapons and corpse treatment and high negative loading on implements, which in this case appears to highlight primary interment graves containing either weapons or implements.

Much as in Period II, relative elaborate graves are associated with the majority of objects placed in grave assemblages. These graves also appear to have been preferred for multiple interments (chi-square=14.32, df=7, p=.046) Over half of the burials during this period were in multiple interment tombs (N=47 out of 74 graves), with all five graves in reused architectural units and over 80% of the built vault (N=5 out of 6) and rock-cut chamber tombs (N= 6 out of 7) containing more than one skeleton. Jewelry was used to adorn proportionally more interments in built cists, built vaults, and reused architectural units than those in tile graves, cists, or rock-cut chambers, and none are associated with pit or amphora burials. This correlation is almost statistically significant (chi-square=13.81, df=7, p=.055). Buckles were also only found in built cists, built vaults, or reused architectural units during this time period (chi-square=24.19, df=7, p=.001).Weapons and implements, however, are not significantly associated with a particular grave type despite their presence in F1 and F6 (weapons: chi-square=6.31, df=7, p=.504; implements: chi-square=9.60, df=7, p=.212). These results may be due to the low incidence of occurrence of each artifact type, as only five graves from this time period contain weapons and only two contain implements. Coins are present in rock-cut chamber tombs, built cists, and built vaults as well as in reused architectural units (chi-square=40.27, df=7, p=.000). Their presence in only those tombs of the types most likely to have been reopened and used for successive burial events, however, makes it possible that these small objects are present by accident.

Grave form is also highly correlated with the presence of ceramics, which shows high loadings in Factors 3, 4, and 5. Out of the 45 graves which contained ceramics, 21 were rock-cut chamber tombs (out of only 25 total of this grave morphology). This relationship is statistically significant (chi-square=37.12, df=7, p=.000). However, ceramics were also present in a variety of tombs of other morphologies. A large proportion of built cist tombs also contained these objects (N=10 out of 31), as did cists (N=5 out of 8), and all of the burials placed in reused architectural units (N=5). This object is present in graves in both the burial area north of the city and in the city center, especially in the area of the former forum. In addition to libation vessels, tableware ceramics are also present in both areas, including one built cist (Grave 1938.07 in the South Stoa), two rock-cut chamber tombs (1933.162 and 1933.163 from the Hill of Zeus), and two reused cisterns in Lerna Square (Graves 1933.110 and 1933.111).. Additionally, non-ceramic vessels were also only present in one rock-cut chamber (1933.180 from the Hill of Zeus) and one built cist (1998.34 in Panayia Field).

On the other hand, grave form is not statistically correlated with either corpse treatment or faunal remains, though few instances of secondary burial or faunal remains are present in graves of this time period. Both primary and secondary burial was practiced in one grave each conforming to the cist, built cist, built vault, and reused architecture typologies, and secondary burial alone was practiced in only one grave, a built cist. Thus, only five out of 51 graves display evidence of secondary mortuary ritual, and patterning in corpse treatment is not visible despite the high loading on this variable in Factor 2. In addition, faunal remains were only placed in two graves in Period III and coins only in nine graves. Though both graves containing faunal remains were multiple interments constructed in the former forum area, patterning in this variable is difficult to determine.

Age-related distinctions in mortuary treatment are also apparent in Period III. Only one single subadult interment contained a ceramic vessel (Grave 1998.34 in Panayia Field), and ceramics are significantly more likely to be present in single or multiple interments which included adults (chi-square=10.80, df=4, p=.029). Both adults and subadults are equally likely to be adorned with jewelry or buckles prior to burial, however, and the only glass vessel present in any grave is associated with a subadult (Grave 1998.34) (Factor 4). Comparisons of grave assemblages by osteological sex, however, is hampered by small sample sizes. Only two single interments with buckles are well-enough preserved to permit osteological sex determination (the individuals in Graves 1969.36 near Temple G and 1938.10 by the South Stoa are both probably male). The man in Grave 1938.10 is also associated with a weapon and an implement, though this is likewise the only single interment containing either item for which osteological information is preserved. However, there does not appear to be any significant difference in the proportion of male versus female interments associated with jewelry or ceramics.

5.2 Interpretation of Mortuary Correlates for Societal Distinctions

Statistical analyses show that mortuary variability in this sample is a direct result of both diachronic change and spatial patterning of behavioral correlates for societal distinctions. In this research, I use factor analysis to pick out those behaviors which specifically mark high status for each area of the site, and how this changes over time. In the previous analyses, the presence of an exponential pattern in eigenvalue drop-offs and the fact that individual variables show high loadings for more than one factor is consistent with the presence of mortuary correlates for a superordinate dimension of status (Braun, 1979; Peebles and Kus, 1977; Wright, 2006). The first factor from each of these analyses can thus be interpreted to highlight the major contrasts between the ends of the status spectrum for specific site areas and periods. Those variables that share high loadings among factors may be the result of individual ranks or classes within these status groups or may mark other social distinctions. After identifying mortuary behaviors which correlate with high status, I then identify artifacts which are shared among burial areas as these may reflect subsets within status groups or classes shared within Corinthian society, and artifacts which reflect spatial variability which corresponds to other social parameters which are not simply related to vertical economic status. In this section I discuss how mortuary behavior in Late Antique Corinth can be seen to reflect biological age-at-death, community membership, and status. These results highlight differences between burial areas as well as patterning in mortuary variability within burial areas.

5.2.1 City-wide trends

Statistical analyses identify that unifying behaviors and trends present in burials throughout the city of Corinth relate to grave construction and corpse treatment. Differences in grave form within all cemeteries are associated with similar demographic criteria and social distinctions. First, the relatively simple amphorae burials were only used as burial receptacles for children and infants. Both amphorae and simple tile graves were used as grave receptacles throughout late antiquity, though they predominate in the earliest portion of this period. In addition, as picked out in the FA of the pooled dataset, these relatively simple graves did not contain multiple interments, which finding corresponds with the fact that, in the late-5th - 6th centuries AD, no more than two individuals were ever placed in one grave, while tombs dating to later periods could contain over 50 interred skeletons. The majority of these late tombs are multiple interment facilities, and contain both adults and subadults. Finally, differences in grave morphology are also associated with the primary dimension of mortuary variability identified in all factor analyses, implying that elaborate graves were used for high status mortuary contexts in all site areas and all time periods.

The fact that certain grave types were only used to bury subadults is consistent with the observation that this demographic appears to have been subjected to differential mortuary treatment than adults. A lower proportion of subadults than expected are present in the cemetery by the ancient Gymnasium (see Section 3.3, Osteological Analyses and Wesolowsky 1971, 1973), implying that the subadult population may also be underrepresented in these mortuary analyses. It is possible that only select subadults were buried at all, or a greater proportion were originally present in the graves in Lerna

Square, as this skeletal material was not kept, and only those graves where excavation notes specified the presence of an adult or child's skeleton could be used in this analysis. Children and infants may have been buried in a separate geographic location, in a grave form not archaeologically recognized, and/or treatment of the corpse may have differed from that of adults. On the other hand, as the graves in the area north of the city are generally earlier in date than graves constructed in the city center, and multiple interments, including subadults, tend to be placed in these later graves, it is possible that this differential treatment also changed over time.

In later graves in the city center, for example, subadults were placed in graves identical to those of adults more often than in amphorae burials. However, though the burial receptacle of children and infants changed, and these decedents were increasingly placed in multiple interment tombs with other subadults as well as with adults, treatment of the corpses of this demographic still appears to have differed from that of adults in later periods. Despite the fact that ceramic objects are only placed in graves starting with Period II, of the 29 graves in the former forum area which contain only children, none also contain ceramic vessels. This age distribution supports historical evidence that Byzantine burial liturgy differed for children (Fedwick, 1976), i.e., that their bodies were prepared in a distinct fashion. Their corpses could have been bathed through submersion, for example, rather than by pouring water over them. Likewise, those vessels present in multiple interment tombs with both adults and subadults can likely be considered to be the result of funerary behaviors related to the adult interments. Tableware and storage or cooking vessels were also only placed in single interments of adults, and it is possible that the grave-side meal (Sanders, 2004) was only shared by the families of deceased with high achieved status in the community. Unfortunately, only one single interment (Grave 1938.07 in the South Stoa) contains tableware, and this supposition can not be tested with the present data.

Rock-cut chamber tombs, cists, built cists, built vaults, and reused architectural units, all relatively elaborate grave forms, regularly contain more than four skeletons. On the other hand, the particular tomb constructs which were used varied by site area, since in the city center, built cists and vaults were constructed in addition to rock-cut chamber tombs and reused architectural units. These differences likely relate to the local environment in these two areas, since the proportion of cist and rock-cut chamber tombs is greater in areas where the bedrock was in close proximity with the ground surface and needed to be dug into for graves. Since cists and rock-cut chambers were primarily used in the cemetery located north of the city and built cists and vaults were constructed in the city center, it is possible that these two grave types were analogous. The fact that one of the rock cut chamber tombs, a cistern reused for burial, a few built vaults, and possibly a built cist were all used as the receptacle for more than twenty skeletons is consistent with equivalent use of these grave types. This fact also implies that these structures were selected for burial use by particularly large social groups or communities.

Relatively elaborate tombs were also used in each site area for mortuary contexts at the high end of the status spectrum. Grave assemblages from these constructs show the full range in the classes of objects present, as well as the highest number of objects. Since the majority of individuals were buried in multiple interment tombs, however, not all grave assemblages are identical, and many of these multiple interment facilities may have also been used by the lower classes. It is also possible that as a result of interment practices prioritizing grouped burials, only the dominant social identity would be reflected in the mortuary attributes of multiple interment tombs where a range of sexes and ages are present. The excavation notes occasionally make it clear that, when associations between burials or burial layers and grave objects are present, mortuary correlates of high status are found both near the bottom of these grave as well as near the top (for one example, cf. the distribution of weapons, buckles, and jewelry in Grave 1937.25, NB 173: 39, 46-7, 53-4). This means that later funerals were not necessarily using the placement of the corpse within the grave of a highly ranked member of society to further augment or ascribe status to the deceased. It is likely that individual structures or areas were only available to certain segments of the population, or that the owner of the grave could restrict who could be buried in that tomb (*Cod. Iust.* 1.11.7.6). Others may have been highly sought after for burial purposes due to the identities of those previously interred, as expected in graves incorporated into the cult of the saints. In this case, payment to the owner of the tomb for its use was likely commensurate to the prestige imparted by its burial location and associations. Thus, either rank or achieved status may be shared by all individuals buried in a multiple interment tomb.

These practices make it difficult to determine whether status differences, as reflected in mortuary variability, existed between the sexes or as a result of age-at-death. Rock-cut chamber tombs and built cists are the receptacles for either men or women or both. In addition, the only reused architectural unit for which osteological sex identification is possible is of a woman (Grave 1971.24), and both males and females are present in relatively simple tile and cist graves. Grave markers, which are likely correlates of status among Period II graves (see Period II, Factor 1) are also present for both male- and female-only interments, with no discernable differentiation by sex (chi-square=3.44, df=2, p=.179). Single male interments were placed in relatively simple tile graves as well as in rock-cut chamber tombs, and females were interred with males in pits, cists, rock-cut chambers, built cists, and built vaults during this time.

On the other hand, this also means that by the 7^{th} century AD, any decedent who was buried by themselves was thereby singled out. Single interments of subadults are as likely as single interments of adults to contain jewelry and buckles, and these objects are present in the graves of men and women, lending support for the suggestion that single interments in later periods were used for individuals with higher ascribed status (see Period III, Factor 3). However, this finding may also be related to mortuary behaviors which appear to separate burial areas. Thus, while it appears that some subadults and women were buried in high status, single interment graves, others may have been placed in high status multiple interment mortuary contexts. These finding also imply that there is no meaningful distribution of mortuary correlates of status by age or sex, and any existing sexual division of labor or power within Late Antique Corinthian society was not reflected in the mortuary domain.

As a result, the remaining variation in corpse treatment and the artifacts deposited in the grave during burial events can be related to spatial variability and community-specific practices rather than to biological sex or age. The particular mortuary behaviors associated with the extremes of the status spectrum vary by site area, and are discussed separately.

5.2.2 Differences between burial areas

Major differences in mortuary behavior differentiate burial areas. These distinctions are present in the FA for the pooled dataset and for both period-specific FAs. Though the graves placed north of the city are generally similar to those in the ancient city center, one site area, Panayia Field, displays a number of behaviors not otherwise observed at Corinth and can be distinguished despite its small number of graves. Because multivariate analyses were possible on a large number of graves located north of the city and from the ancient city center, these two burial areas were also directly compared. Although these graves share many of the same mortuary correlates for hierarchical status distinctions, I also statistically identified burial behaviors which correlate with spatial variability, implying different compositions for the communities using these geographically separated burial locations.

The graves in Panayia Field are distinct among this mortuary landscape, as highlighted by the Period III factor analysis (see Factor 4). These isolated graves are not only unique in that they are present in an area that may have been within the reduced circuit of the Late Antique city walls, they also display rare mortuary behavior. In two Period III graves of subadults in this area, ceramic libation vessels were placed with the corpse, and one of these graves contained a glass object as well. The presence of a glass vessel also sets apart these tombs, since glass is otherwise only present in two other graves, one of which was reused and disturbed in the Byzantine period (Grave 1928.08 and 1966.05). The association of objects usually restricted to the grave assemblages of adults also implies that this small community followed a different burial liturgy for children than did the rest of the population.

A few other distinctions, however, are likely the result of chronology or disturbance by later graves or building activity in the area. The presence of jewelry, coins, and implements together sets apart a number of tombs located north of the city (North of the City FA, F2 and F5), but these factors also display loadings for period which correlates with the early date for these graves (see also Pooled, F2). Similarly, though grave markers and lamps appear to only be associated with tombs north of the city, this is likely due to the increased construction activity in the city center after late antiquity which moved any objects placed on or near the grave. Thus, though a great number of epitaphs have been recovered from this area (Kent, 1966; Meritt, 1931), it is not possible to positively associate them with individual graves. This means that Period II, the presence of grave markers, ceramics, and jewelry in elaborate, multiple interment mortuary contexts (Pooled, F1; Period II, F1) likely defines high status graves throughout Corinth though the majority of tombs displaying these status correlates are present by the Asklepieion/Gymnasium (i.e., highlighted in North of the City, F1).

However, only the first factor extracted in the FA for Period II is not significantly correlated with site area. Thus, variability in this period generally separates the site area north of the city from the graves in the city center, implying that spatial variability most clearly defines mortuary groups. Among the factors associated with specific site areas, there are also few redundancies on factor loadings for mortuary variables coding for objects present within grave assemblages. This finding suggests that geographically distinct communities may have developed different preferences in the artifacts chosen to be placed in mortuary contexts. For Period III, greater hierarchical distinctions may be present among the tombs constructed in the ancient city center, and graves in this area show evidence of mortuary behavior not present in those placed north of the city.

These distinctions may result in part from the particular object which correlates with the high end of the status spectrum for each area. Since individual communities may have different symbolic associations for artifacts, the use of more than one object in mortuary contexts may correlate with analogous ranks or statuses. For graves placed by the ancient Asklepieion and Gymnasium, grave markers, jewelry, and ceramics correlate with rank in Period II (F1 for both the period-specific and the area-specific FA), and ceramics and possibly buckles for Period III (F5). These high status graves are present throughout the burial area. On the other hand, tombs associated with the high end of the status spectrum in the ancient city center display a greater variety of items in grave assemblages. Those containing the full range of mortuary correlates for status in Period III, including the presence of jewelry, coins, buckles, weapons, and implements in addition to ceramics (City Center F1), were only present on Temple Hill. Variability in mortuary behavior thus appears among the objects which reflect status in these areas.

Subsets of graves within these areas also contain particular artifacts and grave assemblages. In the ancient city center, some single, primary interments contain faunal remains along with other mortuary correlates of status (City Center F2, F4; Period III F2, F3), and a separate subset highlights the inclusion of implements or weapons in high status mortuary contexts (City Center F5; Period III F6). In comparison, faunal remains are only present in one grave north of the city, and weapons in none. Buckles are also associated with different demographics in each area, suggesting the mortuary context of their use differs despite high loadings on this variable for both area-specific factor analyses (North of City F3, F6; City Center F1, F5, F6).

In graves north of the city, buckles and lamps appear to have been used in a similar fashion not related to ranking distinctions as indicated by high loadings on these objects in Factor 3 for the area-specific factor analysis. Buckles appear to be associated with certain decedents only, as the three graves with buckles from this area of the site contain only one buckle each. The use of lamps for commemoration even after secondary burial rituals have been completed implies a similarly focused interest in particular individuals. Since both of these objects are more often present in graves which formed a collective burial location for a number of individuals of different sexes and age classes than for single interments, but they are likely only directly associated with one decedent, these graves are considered likely to have been used by members of one community led by a single individual. The presence of a buckle in these contexts is consistent with the badge of leadership accorded to the person who held this political position (i.e., achieved status as interpreted in anthropological mortuary analyses, cf. O'Shea, 1984). Though the plates of these buckles are not preserved, two at least show evidence of being of the hinged buckle type which would have originally been paired with a decorated piece of flattened metal joined to the loop (Csallány, 1954). As it continued to be associated with certain individuals after their burial, this position transcended the status changes which accompanied their death.

For graves placed in the ancient city center, on the other hand, high loadings on buckles are associated with Factor 1, which likely represents hierarchical status distinctions. These objects were also were placed in graves in this area beside relatively young people, rather than older people who would have been able to "earn" them. The use of buckles as a correlate of ranked status in this area, as opposed to the use of buckles as a correlate of achieved status in graves north of the city, is a likely result of differences in its symbolic meaning for these communities. The association of buckles with ranked status in this area is also consistent with the grouped location of the graves containing these artifacts, and the fact that many of these mortuary contexts contained a number of buckles of varying types. Two of the built vaults with large numbers of interments placed on Temple Hill (Graves 1972.20, 1972.70) contain more than one buckle, as do three tombs with multiple interments from the western end of the South Stoa (Graves 1937.05, 1937.09/.15-.19, and 1937.25). The presence of more than one tomb in each location containing signifiers of high rank is consistent with these both being areas where high status families sought to bury their dead, rather than burial locations shared by a community among whom one or a few individuals achieved leadership positions. If buckles were issued as badges of office in the Eastern Roman Empire, and particularly ornate ones were awarded by the emperor in person in Constantinople (Poulou-Papadimitriou, 2005), it seems likely that such a prized possession would become an heirloom with great symbolic associations.

The presence of this object with relatively young people also makes it unlikely that buckles were placed in graves to mark the achievements of the decedent during life, and is consistent with the use of heirlooms of high symbolic worth in graves. In one case, the excavator suggested that one single adult interment with a buckle (cf. Davidson in NB 170: 184-5, Grave 1933.203/1937.20/1938.04) was a woman, though this assertion can not be verified osteologically. In another case, a buckle was placed in the grave of an adolescent, most likely around 16 years of age (Grave 1925.03/04). While this person may have been seen as an adult in Late Antique society, at least one other buckle was placed in the grave of much younger children (Grave 1926.22). While the proportion of subadult-only graves containing buckles (1 out of 72) is lower than that of adult-only graves containing buckles (3 out of 41), the majority of graves with buckles are multiple interment tombs and contained both age groups (6 out of 32). Though buckles appear to be correlated with rank differences, weapons and implements (Period III, F6) further separate the decedents in these graves from the remainder of the Late Antique cemetery population.

These objects may have been associated with political achievements available to the ruling class living in the ancient city center. For example, Grave 1938.10 contains a sword and a dagger along with a buckle. Though these items have been used previously to suggest this man was a member of the military (Weinberg, 1974), and that weapons were placed in graves to mark the profession of the deceased (Davidson and Horváth, 1937), Grave 1938.10 is fairly unique overall and the use of this grave to describe the likely mortuary correlates of an entire class or profession of Late Antique Corinthians is suspect. In fact, this mortuary context contains a number of uncommon artifacts, such as a hand-made pot of a form otherwise unattested in grave assemblages for this site, an implement, likely a fire-striker, a possible amulet, and a sword (Weinberg, 1974). The only other grave to contain an identical sword hilt is Grave 1932.100a placed along the western extent of the ancient city wall (Davidson and Horváth, 1937), and only one other grave contains a fire-striker (Grave 1937.09/.15-19, also from the South Stoa).

In addition, the sex association for these objects is also questionable; although the skeleton in Grave 1938.10 was originally sexed as a man (Angel quoted in Weinberg, 1974), preservation of these skeletal elements is poor and the only clearly male morphological feature preserved is the supraorbital margin (Buikstra and Ubelaker, 1994; Graw et al., 1999). As no other single interments placed anywhere in the city contain weapons, and two of the other graves which contain weapons also contain females, it is not clear whether the association between weapons and male interments is accurate given the abnormality of this grave. The fact that multiple interment graves containing weapons were distributed throughout a number of discrete burial clusters, however, supports the implication that individuals buried with weapons were not restricted to a socially segregated, garrisoned militia. Instead, this spatial distribution implies that the weapons were symbolically placed in the graves of individuals with unique, possibly administrative, positions in their respective communities who were buried with other members of their social group. In this, the use of weapons appears to be analogous to the use of buckles in Period II graves north of the city.

On the other hand, a number of mortuary behaviors are also shared among grave groups within geographically separated burial areas. Ceramic vessels are present in mortuary contexts in the former forum and placed throughout the cemeteries north of the city. In fact, with the exception of the highest status graves, no graves on Temple Hill contained these objects, suggesting the Corinthian tradition of placing ceramics in graves only connects the population utilizing the forum area with the cemetery north of the city. Since these objects were not present in the mortuary contexts which contain subadults, the funerary use of this particular object implies that differential treatment of subadults in mortuary contexts was also shared among these two areas, and provides support to the suggestion that these two communities conformed to the same burial liturgy and commemoration traditions throughout late antiquity.

5.2.3 Diachronic changes in mortuary behavior

Though many differences between site areas likely reflect the burial traditions commonly observed by individual communities, much of this variability also relates to diachronic change. Locally, shifts may occur in symbolic associations for individual grave objects, and grave groups which are a result of these chronological affects are almost indistinguishable from social distinctions within burial areas. Other trends are regional, such as the decline in the use of coins in mortuary contexts. Within individual factor analyses, I primarily used the loadings on period and burial location to discriminate among these possibilities.

For the graves placed north of the city, for example, Factors 2 and 3 in the area-specific factor analysis may identify high status groups at different periods of site occupation. In comparison, Factor 1 identifies those graves at the highest end of the status spectrum. Loadings for location and period are high for both F2 and F3, and taken together these variables may indicate diachronic change in status associations occurred at the same time as burial locations shifted within the burial area. Thus, the chronological separation suggested by the different loadings on period, and the presence of mutually exclusive items in these factors, may have arisen through change in the symbolic expression of social divisions in Late Antique Corinthian society. In earlier periods, the presence of coins along with jewelry and implements separate burials along the status spectrum, while in later periods, use of elaborate grave forms, especially rock-cut chamber tombs and reused architectural units, over the course of multiple burial events was associated with the presence of ceramics and grave markers (F1). Some of these later graves were the focus of extended commemoration, as they contain secondary burials and are associated with lamps which were used in post-burial gravesite practices, setting these graves further apart (F3) because they were selected for burial and visited over and over again by particularly large social groups or communities.

On the other hand, many of these factors may not correlate with hierarchical status distinctions in this burial area. For the North of the City FA, F1 accounts for 30.68% of the variance in this sample, and F2 only accounts for 12.80%. This much lower ranking of F2 may be more consistent with this grouping of variables highlighting mortuary correlates of a different societal distinction, and may be a result of the use of coins in pagan mortuary practices. This separation of burials containing coins is also supported by Factor 5, and the fact that the presence of coins also distinguishes a subset of graves in Period II (Period II, F4). Along with mounting proscriptions against adorning the corpse with costly items, Christian burials also gradually moved away from pagan mortuary practices. These changing conventions in the way the community dealt with funerals and the dead are one way in which temporal variation in mortuary practices may be observed (O'Shea, 1984: 256). Therefore, the presence of coins, together may indicate that some communities, possibly families from distinct religious traditions, also buried their dead in distinct ways, and membership in these communities fluctuated over time. Interestingly, this would mean that this particular pagan tradition is present at Corinth later than is generally accepted, as regional assessments of burial practices assume that coins were no longer placed in graves after the 6th century AD (Poulou-Papadimitriou et al., 2012).

Coins also continue to be present in later graves, suggesting that this practice may be more complex. In the ancient city center, coins are present in an increasing number of graves with time (Pooled, F7; City Center, F1; Period III, F2), making it appear as though this pagan tradition had a resurgence. In this case, however, the use and type of the graves in which coins are present implies a contradicting interpretation. These tombs were all multiple interment tombs, which were opened on numerous occasions for the deposition of additional burials and sometimes for secondary burial rituals. During these events, small items such as coins could easily have been lost in the tomb, and since the grave receptacle was not simply a clean cut, these items would not have likely been retrieved. The presence of coins in these late graves may, therefore, be attributed to accidental loss and not to deliberate associations with the dead.

5.3 Summary and Discussion of Mortuary Groups

Mortuary variability during late antiquity displays strong similarities to behavior observed at nearby sites in Greece (Poulou-Papadimitriou et al., 2012; Rife, 2012; Rife et al., 2007; Ubelaker and Rife, 2011) as well as a connection to local traditions. Mortuary variability is related to both biological and social identity, and can be used as a correlate for social distinctions in the Late Antique population of Corinth. Using the statistical results, a number of chronological and area-specific generalizations are possible for the site of Corinth. In this section, I briefly summarize these results and relate them to historical events and hypothesized social movements in the Eastern Roman Empire. I then go on to define the mortuary groups used to interpret the isotopic results in Chapter VII.

Subadults were buried differently than adults. In earlier periods, amphorae were only used for their burial, and some subadults may have been buried in a manner not visible archaeologically, or in an area of the site that has not yet been excavated. In later periods, subadults were buried in ways analogous to adults, but without the full range of mortuary behaviors. Likewise, liturgical services and burial treatment appears to have differed for adults as opposed to children, as children were rarely buried with ceramic vessels used to anoint and bathe the corpse. Instead, ritual cleaning may not have been necessary for such young people, or it is possible that they could be submerged in water, rather than needing it poured over them. Scented oils may also have been considered inappropriate accoutrements for children. Sex distinctions, on the other hand, are not reflected by differences in mortuary behavior.

Broad diachronic changes for the site of Corinth as a whole include gradual change in grave form and the nature of commemoration activities. Tile graves are present throughout late antiquity, as are the amphorae used for infant burials, though admittedly in lower numbers in later time periods. As both grave form and the presence of multiple interments change over time, different types of graves are used for multiple than for single burial events. Though grave-side commemoration and post-burial visitation also remained important throughout late antiquity, traditions in how Corinthians marked graves and interacted with the deceased shifted over time. Lit lamps were placed outside the grave at least through Period II. Inscriptions with formulae specific to late antiquity, however, were likely only placed on graves from the 6^{th} – 8^{th} centuries, and later gravestones in Greece are generally less likely to include the name of the deceased (Poulou-Papadimitriou et al., 2010; Walbank, 2010; Walbank and Walbank, 2006). In later periods, graves were typically reused for multiple, successive burial events, some of which included the removal of skeletal elements for secondary ritual.

Graves placed in the ancient city center are generally similar to those placed north of the city in these diachronic changes in tomb construction and corpse treatment as well as in the types of objects placed with the deceased. Other burial locations, such as Panayia Field, though largely similar to these two site areas, are distinct in the presence of glass objects and the association of ceramic objects with subadult skeletons. The earliest graves, especially those by the Asklepieion and Gymnasium, show evidence of the deliberate deposition of coins in mortuary contexts at the high end of the status spectrum.

During Period II, coins stop being placed in single interment graves and this practice most likely declined at this time. At this time, Corinthians started to bury subadults similar to adults, though both demographic and archaeological evidence implies they were treated distinctly prior to that point. This change coincides with a marked increase in the number of skeletons interred in grave constructs and the placement of ceramics in graves, and the use of inscriptions as legal documents as well as objects commemorating the deceased. In Period II, aspects of mortuary behavior also start to differentiate between the burial area north of the city and that in the city center. At this time, though high status mortuary contexts throughout Corinth general were elaborate graves which contained ceramics, grave markers, and jewelry, a subset of high status graves in the city center contain faunal remains, while buckles and lamps are present in graves north of the city. Although both grave markers and lamps are lacking from graves in the ancient city center during this period, this is likely a result of later building activity and the disturbance of these graves.

As these changes were implemented during the 6th century AD, it is possible that the city as a whole underwent an administrative or social shift at that time. Possible impetus for this change may be present in the codification of legislation under Justinian, tightening of administrative control following the raids and/or invasions of northerners, the famines and sickness present throughout the region around the time of the Bubonic plague, and the regional adoption of Christianity. As observation of new tax laws had an immediate effect on the form and use of epithets (Walbank and Walbank, 2006), it seems likely that other legislation would have similarly resulted in changes in other aspects of mortuary behavior. However, timing suggests that the neither the Slavic invasion (AD 580) nor the Bubonic plague (AD 542) had a considerable effect on mortuary behavior, as some of these changes are present in graves dating earlier than either event in the 6th century. In addition, the survival of earlier mortuary traditions and continuity in other aspects of grave morphology and status, especially those associated with high status, between Periods II and III makes it unlikely that any population turnover occurred as the result of invasion. Christianity, on the other hand, may have provided the impetus for other behavioral changes such as the presence of coins in mortuary contexts. Furthermore, their association with jewelry during Period I, though Christian apologetics condemned the practice of adorning corpses with luxurious items, may imply that these graves were used by the pagan community in Corinth, or at least that some elements of pagan burial traditions were retained syncretically (Sanders, 2005; Sweetman, 2015).

In Period III, while ceramics continue to mark high status graves in both the city center and north of the city, graves from the city center predominate among mortuary contexts at the high end of the status spectrum. In part, this is because graves in this area continue to contain faunal remains, and start to contain weapons in this period. As weapons are present suburban cemeteries other than the area near the ancient Asklepieion and Gymnasium, it is likely that its lack in tombs north of the city is a result of differences in the community using this area for burial. In addition, mortuary contexts containing the full range of mortuary behavior and on the highest end of the status spectrum during this period were primarily placed on Temple Hill. In this period, mortuary correlates of status such as buckles and jewelry are present in the graves of subadults, implying that inherited status was symbolically expressed through these objects at this time. Buckles in Period II and weapons and implements in Period III, on the other hand, may have been placed in graves to reflect political office or a leadership position in the community, as these items are found distributed almost equally in geographically separated grave clusters.

In the ancient city center artifacts in grave assemblages also appear to have correlated with a separate set of social identities than those with which they are associated in the northern burial area. Though very few graves in either location contain implements, in the city center implements are only found in graves also containing both buckles and weapons and are not associated with jewelry. On the other hand, no graves placed north of the city contain weapons, and implements are associated with jewelry, rather than buckles. These differences in grave assemblages may imply that the suburban community near the Asklepieion and Gymnasium did not share in the prestige or wealth associated with living near the administrative center, and the buckles awarded to those individuals north of the city to commemorate political positions in life were not kept as heirlooms. After the city center shifted and the former civic and administrative area of the forum was no longer in use, it seems possible that the people living to the north and the west of the city became increasingly isolated and autonomous. However, a number of mortuary practices still linked the population of this area with the people living in the former forum, such as the use of ceramics in graves. Thus, their differing use may coincide with changing perception in the meaning of these objects and with the relocation of political power from families residing in the suburbs of Corinth to those near the ancient city center. Some of the graves placed along the ancient western city wall, near the Acrocorinth fortification, also contain weapons and buckles, implying that the community burying their dead in this area was similar to the community in the ancient city center.

These changes in mortuary behavior during the 7th century are likewise also may be a result of administrative or social changes in the city of Corinth. Likely impetus for this change may be present in the wars between the Eastern Roman Empire and the Arabs, and the reorganization of the Eastern Roman Empire's army into the *theme* system. As a result of the Arab conquest of the Levant and portions of Armenia, refugees from these areas are documented settling in modern Sicily, Italy, and western Turkey

(Charanis, 1963; Garsoïan, 1998; McCormick, 1998), and others may well have relocated to Corinth. The isolated burials in Panayia Field may provide evidence of a refugee movement, as these graves are geographically separated from the rest of the burial areas and display unique mortuary behavior (the presence of glass objects) which further distinguishes them. In addition, the presence of weapons in high status mortuary contexts may be a result of the increasing militarization of the local population under the *theme* system (Charanis, 1953; Haldon, 1990, 1993). At this time, individual regions became responsible for their own protection, rather than relying on the presence of a militia sent by the empire and primarily recruited from the frontier provinces. Thus, glass objects may reflect ethnic identity through their placement in mortuary contexts, but weapons likely do not.

Christian burial liturgy did not allow for much variety in the kinds of objects placed in graves, and funerary assemblages dating to this time period rarely include anything other than ceramic vessels and objects of personal adornment. However, I am also not able at this time to compare the use of imported versus locally made ceramics with other aspects of burial treatment. It is possible that seemingly minor variations in choice of vessel used during the burial liturgy were influenced by family origin, community membership, or the intrinsic value of individual ceramic objects. Other variability relates to individual elaborations of mortuary ritual and concentration on a few graves within burial areas. A few anomalies also remain. One grave in the former forum area, that of the infamous “wandering soldier” (Ivison, 1996; Weinberg, 1974), though present alongside a number of graves of similar morphology, contains a number of rare items otherwise not present in Late Antique Corinthian cemeteries. In addition, a few other graves in the city center later became loci for burial activity, to the extent that churches were built on the site of the graves by the Bema and the graves on Temple Hill. Still other graves north of the city are separated from the rest of the cemetery by their placement in a recessed area cut into the bedrock. I used this spatial variability and the statistical identification of the covariation of burial behavior to define mortuary groups for Late Antique Corinth which correspond to vertical economic status as well as other social parameters.

5.3.1 Mortuary groups

Since status associations changed over time, in the following analyses I discriminate among chronological periods by picking out high status mortuary contexts for each period so they can be set against graves at the low end of the status spectrum. In Period II, mortuary correlates of status include the use of rock-cut chamber tombs, built cists, or reused architectural units with multiple interments in association with grave markers, ceramic vessels, and jewelry (**Status 1**). For Period III, the use of built vaults, built cists or reused architectural units and the placement of jewelry, buckles, weapons, and implements in graves is associated with high status (**Status 2**). In both periods, objects are present in graves regardless of the age-at-death of the decedent, suggesting this dimension of mortuary behavior reflects inherited divisions within Corinthian society. Within Period II, the use of buckles groups some of these high status burials separately, as these objects may be a mortuary correlate of achieved rather than ascribed status (**Status 3)**. In Period III, the use of weapons and implements may set apart some high status graves into their own mortuary group analogous to the use of buckles in Period II (**Status 4**). Graves containing these items were placed in the ancient city center as well as on the outskirts of the city, though none are present in the cemetery north of the city, implying differences in community membership between these two areas.

Other groups are community-specific or distinguish tombs within burial areas. The presence of coins, jewelry, and implements group together a subset of graves within the cemetery north of the city (**Group 1**). Other graves in this area (**Group 2**) were separated from the surrounding cemetery within an enclosure in the bedrock. Tombs placed north of the city do not contain weapons or faunal material, and the presence of weapons thus highlights the connection between tombs in the ancient city center and select graves placed near Acrocorinth along the ancient city walls (**Group 3**). Within the ancient city center, the graves placed in the former forum area share the presence of ceramics in grave assemblages with the burial area by the former Asklepieion and Gymnasium complexes (**Group 4**). This distinguishes them from the graves to the north of the forum, especially those placed on Temple Hill, which were also incorporated into a later church and became the focus of prolonged burial activity (**Group 5**). Another group in the city center may have been located at the site of the later Bema Church, though little archaeological evidence of these graves is present now and this group can not be defined by any particular mortuary behaviors. The Panayia Field burials, on the other hand, display unique burial traditions including the presence of ceramic vessels in the graves of subadults, and the placement of glass objects in one grave assemblage (**Group 6**). In addition, at least one true anomaly is present in this sample, as grave 1938.10 is the focus of many mortuary behaviors not otherwise found at Corinth (**Group 7**), though this individual may belong to a subset of Group 3 as these graves share many variables.

As a result, I chose skeletal material for isotopic analyses to provide as equal a sample as possible from these groups. Among those graves sampled include single and multiple interments as well as graves with and without ceramics, jewelry, coins, buckles, inscriptions, and weapons. However, at this time I have not sampled any of the skeletons buried in Panayia Field (Group 6), or any other skeletons from interments on the city outskirts apart from those placed north of the city.

In summation, funerary behavior in Late Antique Corinth is consistent with slow transitions between prescribed mortuary traditions among an endemic population. This result provides strong evidence against any invasion event resulting in population turnover in the city (Hypothesis 1C). There is also no evidence supporting the presence of a large group of migrants who held themselves distinct from the native population (the diaspora suggested under Hypothesis 2B). If state regulated population movement or some other form of mass relocation had occurred, larger numbers of graves displaying anomalous behavior would be expected, such as in the presence of metal or glass vessels. However, it is possible that this large migrant cemetery would have been located elsewhere on the city outskirts, and has not yet been excavated. Mortuary behavior at Late Antique Corinth does not discriminate between the remainder of my hypotheses. It is still possible that Corinth was isolated and insulated from the rest of the Eastern Roman Empire (Hypothesis 1A), that the city was taken over politically by foreigners who identified with the native populace and attempted to use mortuary ritual to authenticate their ties to the Eastern Roman Empire (Hypothesis 1B), or that economic connectivity led to the inclusion of foreigners in Late Antique Corinthian society, and that both migrants and natives confined themselves to funerary rituals common throughout the Eastern Roman Empire (Hypothesis 2A).

I test these hypotheses using isotopic analyses in the following chapters. On one hand, the presence of nonlocals in simple graves without mortuary correlates of high status would be one indication that foreigners who were buried in Corinthian cemeteries were simply passing through the city, and were accorded a simple burial only as prescribed by Christian liturgy and 6th century legislation (Fedwick, 1976; *Cod. Iust.* 1.11.7) (Hypothesis 1A). The level of integration of these nonlocals into high status graves and/or community-specific burial locations, as well as the chronological placement of these graves, will differentiate among the other hypotheses for population movement and the character of the Late Antique city.

CHAPTER VI

GEOCHEMICAL ANALYSES IN THE MEDITERRANEAN

Geochemical analyses of human bone and teeth can identify geographic residence at the time of tissue growth, and are now widely used in archaeology to study mobility. At the site of Corinth, their use in conjunction with mortuary behavior can further help to characterize identity through examination of geographic origin during late antiquity. During this period, the city formed a focal point for migrations or invasions due to its status as the capital of the province of Achaia and the seat of the Bishopric, its established harbors and markets specializing in long distance trade and regional distribution, and its position as a tourist and pilgrimage site (Athanasoulis and Manolessou, 2013; Brown, 2008, 2010; Sanders, 2004, 2005; Slane and Sanders, 2005). However, the number and integration of these migrants would have varied depending on the existing urban ethos towards foreigners (Brettell, 2000; Foner, 2007) and the degree to which the Eastern Roman Empire regulated population movements. Additionally, the migration process likely changed over the course of generations as migrant networks developed. Adding to these diachronic complications, the children of migrants may have lessened ties to their homeland as a result of acculturation, or have developed identities unique to their status as non-natives in their new country of residence (Barth, 1969; Burmeister, 2000; Cohen, 1974; Epstein, 1978; Phinney, 2003). Thus, the first step in discussing how foreigners integrated into Late Antique Corinthian society is through their geochemical identification.

In this chapter, I develop the foundations of isotopic analysis in the identification of residential mobility and geographic origin of archaeological populations. With stable oxygen isotopes ($\delta^{18}O$) and radiogenic strontium isotopes ($^{87}Sr/^{86}Sr$), I pinpoint skeletal individuals with non-local childhood residence patterns. I also use stable carbon isotopic ratios ($\delta^{13}C$) as a broad indicator of dietary differentiation in the use of edible C_4 as opposed to C_3 plants (millet versus wheat or barley). I first discuss the theoretical background for their use in archaeology. Following this, I examine the isotopic distributions of $\delta^{18}O$ and $^{87}Sr/^{86}Sr$ in the Mediterranean to provide a range of values expected from Corinthian skeletons. The use of both $^{87}Sr/^{86}Sr$ and $\delta^{18}O$ is preferable to either alone, as the two values can give much richer geographic information and may enable better characterization of migrant origins (Brettell et al., 2012a; Knudson and Price, 2007; Nafplioti, 2010).

6.1 Theoretical Background

6.1.1 Oxygen isotopic distribution in nature

Stable oxygen isotopic ratios have found great utility in archaeological provenience studies due to the high degree of geographic patterning in isotopic distributions. Oxygen, atomic number 8 on the periodic table, has a number of naturally occurring stable isotopic species differing from each other in atomic mass, or the number of neutrons present. The most abundant, ^{16}O (99.76%) is also the lightest, with heavier isotopes ^{18}O and ^{17}O forming only 0.2% and 0.04% of all available oxygen, respectively (Clark and Fritz, 1997b; Mook, 2000; Nier, 1950). As light isotopes react more readily and change state more quickly than heavier isotopes, incomplete reactions show enrichment of the heavier isotope in the unreacted fraction of any reaction, and its depletion in the product, a process known as fractionation. For oxygen, the natural distribution of isotopes is mainly dependent on fractionation occurring in change of state reactions in water, i.e., the production of water vapor from liquid water and vice versa (Cappa et al., 2003).

Early research on isotopic effects identified a strong geographic correlation with the distribution of heavier isotopes of oxygen through the hydraulic cycle resulting from the processes of Rayleigh distillation (Clark and Fritz, 1997b; Gat, 1996; Yurtsever, 2000). While the majority of meteoric water is taken up from the ocean near the equator, providing a baseline oxygen isotopic value, the twin processes of condensation and evaporation result in depletion of the heavier isotope over land (Clark and Fritz, 1997a; Gat, 1996; Gat et al., 2000; McGuire and McDonnell, 2007; Rozanski et al., 2000; Yurtsever, 2000). In the isotopic literature, this is reflected in the common report of $\delta^{18}O$, or the $^{18}O/^{16}O_{sample}$ ratio in terms of per mil (‰) departure from a standardized ocean water $^{18}O/^{16}O$ value, usually Vienna Standard Mean Ocean Water (vSMOW) or from a Cretaceous marine fossil (Vienna Pee Dee Belemnite, vPDB). This effect becomes pronounced with increased distance from main water sources (Cuntz et al., 2002) as well as with the decreased carrying capacity of colder air with increasing altitude and latitude (Clark and Fritz, 1997a; Dansgaard, 1964; Gat et al., 2000; Rozanski et al., 2000). Isotopic values become progressively lower in value with distance from the ocean as the heavier isotope becomes depleted in atmospheric moisture, allowing oxygen isotopes to be used as a tracer in hydraulic systems.

This tracer also has ecological applications as it is taken up by local plants and animals. Falling rainwater refreshes the $\delta^{18}O$ of fresh water reservoirs and streams at regular intervals, and may result in steady year-long averages in drinking water values for most locales. In mammals, body water is primarily governed by water intake and directly reflects the value of local meteoric water, with $\delta^{18}O$ values of biological tissues characterized by the $\delta^{18}O$ of body water ($\delta^{18}O_{bw}$) and the temperature at time of tissue formation (Assonov and de Groot, 2009; Hedges, 2003; Hoppe et al., 2004; Koch, 2007; Levinson et al., 1987; Luz et al., 1984). Even in modern forensic samples, where drinking water values could be expected to be influenced by bottled water, $\delta^{18}O_{bw}$ still primarily reflects the oxygen isotope ratio of local precipitation (Bowen et al., 2007).

While focusing originally on the application of these isotope systematics to paleoclimatology, fossil animal tissue was found to accurately reflect the original value of $\delta^{18}O$ (D'Angela and Longinelli, 1990; Longinelli, 1984). Subsequent investigations, however, highlighted their use as a geographic provenance indicator (DeNiro, 1987; Fricke and O'Neil, 1996), as in the initial application of stable oxygen ratios on archaeological human bone (Schwarcz et al., 1991; White et al., 1998). Since the $\delta^{18}O$ values incorporated into animal body tissues show a direct relationship to those of body water and local meteoric water at time of tissue formation, local environmental $\delta^{18}O$ can be reconstructed for the time they were alive. This strong theoretical foundation has led to the routine use of $\delta^{18}O$ in mobility studies as a tracer for human population movements in the Mediterranean as well as in other archaeological contexts (Baskaran, 2011; Dupras and Schwarcz, 2001; Keenleyside et al., 2011; Prowse et al., 2007).

After ^{18}O is taken up in drinking water, its incorporation into different tissue types is controlled by metabolic functions and biogenic fractionation. This partitioning has been examined in different taxa (Bryant and Froelich, 1995; Daux et al., 2008; Levinson et al., 1987; Pucéat et al., 2010) and body tissues (Chenery et al., 2012; France and Owsley, 2015; Levinson et al., 1987; Pellegrini et al., 2011). Physiological factors relating to fractionation and the flux of oxygen and water into and out of the body are relatively constant within taxa and are dependent on body size, thermoregulation, climate, and habitat preference (Bryant and Froelich, 1995; D'Angela and Longinelli, 1990; Daux et al., 2008; Koch, 2007; Kohn, 1996; Levinson et al., 1987; Longinelli, 1984; Luz and Kolodny, 1985; Luz et al., 1984).

As far as body tissues which are present in archaeological samples, original isotopic values are often retained in carbonate and phosphate found in enamel and bone (Chenery et al., 2012; D'Angela and Longinelli, 1990; France and Owsley, 2015; Hedges, 2003; Koch et al., 1997; Kohn and Cerling, 2002; Longinelli, 1984; Sharp, 2007a; Sharp et al., 2000; Shemesh et al., 1988). Early analyses focused on the characterization of isotopic values in mammalian bone phosphate ($\delta^{18}O_{PO4}$), as phosphate comprises a large component of the mineral phase of bone or hydroxyapatite/bioapatite ($Ca_{10}[PO_4]_6[OH]_2$, hereafter, “apatite” when referencing the mineral phase of bone or enamel) and it has been assumed to be a more reliable substrate for the preservation of isotopic variation than carbonate (Koch, 2007; Luz and Kolodny, 1985, 1989; Luz et al., 1984). Carbonate, however, was also identified to accurately preserve original $\delta^{18}O$ values ($\delta^{18}O_{CO3}$) in sedimentary environments (Shemesh et al., 1988) and in carbonated hydroxyapatite, such as that in human bones and teeth (Koch, 2007; Koch et al., 1997; Sharp, 2007a). In apatite, carbonate substitutes for hydroxyl and phosphate groups a few weight percent (Simkiss and Wilbur, 1989), and is more easily measured.

Though recent research suggests that the overall precision of phosphate in discriminating between water sources is better than that of carbonate (Kirsanow and Tuross, 2011), and phosphate is considered more resilient to inorganic isotope alteration than carbonate, Zazzo and colleagues have shown that microbial alteration proceeds much more rapidly for phosphate (Zazzo et al., 2004). Carbonate analysis is gaining in popularity due to its relative ease and lower cost. Of added benefit, carbonate analysis also yields stable carbon isotopic ratios related to diet, providing a second measure of skeletal geochemical variety. In this research, I use carbonate analysis on samples of human enamel to produce both $\delta^{18}O_{CO3}$ and $\delta^{13}C_{ap}$ values.

In order to relate $\delta^{18}O_{CO3}$ to local environmental $\delta^{18}O$ values, as well as to archaeological databases, these values need to be converted. For archaeological reports, comparison of $\delta^{18}O_{CO3}$ to $\delta^{18}O_{PO4}$ requires conversion equations because phosphate and carbonate do not precipitate simultaneously from body water, or even as a result of the same enzymatic processes (Pellegrini et al., 2011). Similarly, relating either analytical value to original body water and thus to meteoric (drinking) water values requires separate equations. Isotopic spacing between body water and phosphate ($\Delta^{18}O_{PO4\text{-}bw}$) is fairly well understood, and a number of conversion equations are available (Daux et al., 2008; Kirsanow and Tuross, 2011; Kohn, 1996; Levinson et al., 1987; Longinelli, 1984; Luz et al., 1984). In warm-blooded animals, a constant offset around 18‰ between $\delta^{18}O_{bw}$ and $\delta^{18}O_{PO4}$ ($\Delta^{18}O_{CO3\text{-}PO4}$) has been reported (Koch, 2007). In humans, however, the incorporation of cooked foods in the diet may offset human drinking water estimates from $\delta^{18}O_{bw}$ by +1.05 to 1.2‰ (Daux et al., 2008).

The relationship between the $\delta^{18}O$ value of structural carbonate in bone and enamel ($\delta^{18}O_{CO3}$) with that of body water, however, is even less well known, especially in humans (France and Owsley, 2015; Iacumin et al., 1996b). Carbonate and phosphate are assumed to precipitate from the same body water pool with a constantly renewed and therefore constant $\delta^{18}O_{bw}$ value, creating a predictable offset between $\delta^{18}O_{CO3}$ and

$\delta^{18}O_{PO4}$ ($\Delta^{18}O_{CO3-PO4}$) in stable climatic or experimental situations (Bryant et al., 1996; Iacumin et al., 1996a; Martin et al., 2008; Pellegrini et al., 2011). This offset can be as low as 8‰ in warm-blooded animals (Koch, 2007), and is reported to be around 9 to 10‰ in large-bodied mammals (Bryant et al., 1996; Iacumin et al., 1996a; Martin et al., 2008; Pellegrini et al., 2011). Previous research therefore converts $\delta^{18}O_{CO3}$ to $\delta^{18}O_{PO4}$ in order to relate analytical to environmental $\delta^{18}O$ values due to the relative lack of experimental data directly relating $\delta^{18}O_{CO3}$ to $\delta^{18}O_{bw}$. Recent experimentally obtained values for $\Delta^{18}O_{CO3-PO4}$ in human bone and enamel rests at an average of 7.8 ± 1.5‰, with the best correlation between these values in enamel (R=0.65) (France and Owsley, 2015).

Values computed through tissue-specific conversion equations can then be compared with the modern isotopic composition of rainwater, with the assumption that ancient meteorological conditions are comparable (Argiriou and Lykoudis, 2006; Bowen and Revenaugh, 2003; IAEA/WMO, 2015; Longinelli and Selmo, 2003; Lykoudis and Argiriou, 2007). While still limited in its application in pre-Medieval Greece, this approach is used globally in archaeological research, and comparative isotopic ratios are available for sites throughout the Roman Empire and its frontiers (Chenery et al., 2011; Dufour et al., 2007; Dupras and Schwarcz, 2001; Hakenbeck et al., 2010; Killgrove, 2010; Leach et al., 2009; Nafplioti, 2010; Perry et al., 2008; Prowse et al., 2007; Schweissing and Grupe, 2003).

On the other hand, cultural practices can also impact drinking water $\delta^{18}O$. Breastfeeding, for example, creates a trophic level shift in $\delta^{18}O$, which has been used in conjunction with carbon and nitrogen isotopic values to investigate the different times at which different human societies initiate weaning since $\delta^{18}O_{bw}$ varies for infants based on the proportion of water imbibed from breast milk as opposed to other sources (Britton et al., 2015; Dupras and Tocheri, 2007; White et al., 2004a; Wright and Schwarcz, 1998, 1999). In the Byzantine period, breastfeeding and weaning were dictated in medical works such as that of the 4th century physician Oribasius. In accordance with the established Roman tradition, his writings instructed mothers to withhold breastmilk from newborns for a few days, during which time nutrition was augmented with honey (Lascaratos and Poulakou-Rebelakou, 2003). The use of a wet-nurse was considered ideal, though not all families could afford to hire one (Beaucamp, 1982), and the weaning process was gradual, with solid foods only suggested to be introduced around 6 months of age but with continued supplementation by breastmilk for at least another year (Soranus, trans. by Temkin, 1991). The ancient doctor Soranus and later Oribasius considered weaning a serious step in infant development, and suggested that weaning be delayed in particularly weak children with the process unlikely to have been completed before age two (Laskaratos and Poulakou-Rebelakou, 2003; Soranus and Temkin, 1991). Bourbou and Garvie-Lok use $\delta^{15}N$ values to suggest moreover that fully adult diets were only present in children aged four and older (Bourbou et al., 2013; Bourbou and Garvie-Lok, 2009, 2015). However, breastfeeding and weaning practices in the Roman and Byzantine Mediterranean, particularly their correlation to wealth and status, remains poorly understood. In particular, the reliance on wet nurses in early infancy may have resulted in lessened access to breastmilk for upper class infants if a wet nurse could not be found, or could not be paid, after the mother's breast milk was unavailable.

Other cultural practices can include the use of open containers for storing drinking water which allow evaporation that leads to enrichment in the heavier isotope of oxygen, or the practices of brewing or stewing which enhance the fractionation effect of evaporation (Brettell et al., 2012b). Any of these cultural practices can be thought of as an extension of the reservoir effect, or enrichment in the heavier isotope of oxygen in water that has undergone prolonged evaporation (Darling, 2004; Rozanski et al., 2000). Consumption of processed fruits, such as olive oil and wine, may also cause enrichment in ^{18}O as a result of transpiration in these plants (Bréas et al., 1998; Breas et al., 1994). When imported, they also retain the $\delta^{18}O$ signature of their geographic origin (Angerosa et al., 1999; Breas et al., 1994; Camin et al., 2010; Roßmann et al., 1999), and may significantly impact the $\delta^{18}O_{bw}$ in archaeological samples (Lamb et al., 2014). The sensitivity of $\delta^{18}O$ in humans to both geographic location and cultural factors make it a powerful tool in human mobility research with the potential to even occasionally identify distinct communities within large, diverse archaeological sites (Garvie-Lok, 2001; White et al., 1998; 2004b).

6.1.2 Strontium isotopic distribution in nature

Of the four stable isotopes of strontium, ^{87}Sr is radiogenic and produced by radioactive decay of the rubidium isotope ^{87}Rb, which has a half-life of approximately 47 billion years (Baskaran, 2011). Its prevalence, as measured relative to ^{86}Sr, is dependent on the underlying geology of a region: the original abundances of rubidium and strontium in rocks and the time elapsed since the formation or deposition of that rock (Baskaran, 2011; Rogers and Hawkesworth, 1989). Older rocks will generally have a higher $^{87}Sr/^{86}Sr$ than younger ones with the same initial concentration of rubidium, and metamorphic rocks also tend to have a higher starting concentration of rubidium than volcanic rocks (Capo et al., 1998; Faure and Powell, 1972). The value in sedimentary rocks depends on the value in seawater at the time of deposition as this ratio has varied over time (Palmer and Edmond, 1989; Veizer, 1989). $^{87}Sr/^{86}Sr$ becomes incorporated into local food and water resources through erosional processes acting on local bedrock, which varies widely in bulk composition. Since it is then taken up into food crops, it can provide a tracer for natural systems independent from $^{18}O/^{16}O$.

As Greece is fairly diverse in the ages of geological substrate, correspondingly diverse strontium ratios are expected in local food webs (Asch, 2005; Higgins and Higgins, 1996; Nafplioti, 2011). Rocks more than 100 million years old that started with high Rb/Sr ratios, such as most granites and shales, have high $^{87}Sr/^{86}Sr$ ratios ranging from .710 to .740 (Tricca et al., 1999). The highest $^{87}Sr/^{86}Sr$ value observed in the Aegean, .715, is present on the island of Chios (Pe-Piper and Piper, 2002). In younger volcanic rocks and rocks where the original rubidium content is lower, such as basalts and limestones, $^{87}Sr/^{86}Sr$ values are closer to .704 (Rogers and Hawkesworth, 1989). The site of Corinth and the surrounding region is mainly situated on shallow-water Triassic to Palaeocene carbonates and locally developed bauxite deposits covered by flysch and late Eocene conglomerates (Ager, 1980: 509; Higgins and Higgins, 1996: 19). Thus, the local value for Corinth mainly reflects the presence of these younger rocks and limestones. This variability in geologic substrate has resulted in a fairly wide range of .70808 to .71187 in $^{87}Sr/^{86}Sr$ for the Aegean (Nafplioti, 2011).

On the other hand, the value of $^{87}Sr/^{86}Sr$ in biologic tissue, while it relates to the age of local geology, is not drawn directly from bedrock values, and measurement of this tracer for provenience studies is complex. The stable strontium isotopic composition ($^{87}Sr/^{86}Sr$) of human hard tissues is derived from the bioavailable strontium in an individual's diet (Ericson, 1985). While this value is dependent on the age and type of the local bedrock, more than one geologic formation may be present within a water catchment area and $^{87}Sr/^{86}Sr$ values in the local ecosystem generally do not show a one-to-one relationship with geologic age. An ecosystem's $^{87}Sr/^{86}Sr$ results from the mixing of soil parent materials, the weathering rates acting on bedrock as a result of precipitation rates and freezing and thawing, and the impact of wind and groundwater bringing in other potential parent materials (Capo et al., 1998; Elderfield, 1986; Palmer and Edmond, 1989). Moreover, this averaged value can also be affected by proximity to marine environments through the deposition of ^{87}Sr by sea spray (Veizer, 1989), and, in modern settings, the use of fertilizer. In the Mediterranean, weathering of magmatic rocks (Singer, 1999) can be combined with mixing models of crust and mantle due to regional levels of magmatism and geodynamics (Seghedi et al., 2004) to determine the value of biologically available strontium isotope values taken up by plants and entering the food web. For Greece and the Aegean, Nafplioti (2011) has shown that this value varies consistently with the underlying geologic formation. The $^{87}Sr/^{86}Sr$ value for individual water catchment areas can thus be derived by examining the environments contributing to the drainage system.

The heterogeneous distribution of strontium isotopes had clear applications to human mobility studies at an early junction (Burton et al., 2003; Ericson, 1985; van der Merwe et al., 1990). As strontium is incorporated into hydroxyapatite as a substitute for calcium, and strontium is discriminated against in favor of calcium during tissue formation (Baskaran, 2011; Michener and Lajtha, 2007), early use of strontium analysis in archaeology involved its dietary applications. Due to biopurification, the amount of strontium relative to calcium is depleted in higher trophic levels (Humphrey et al., 2007; Magou et al., 1995; Schoeninger, 1979; Sillen and Kavanagh, 1982). Instead, recent applications of strontium rely on the small mass difference between ^{87}Sr and ^{86}Sr isotopes as this prevents recognizable discrimination in their metabolic use. This means that $^{87}Sr/^{86}Sr$ values present in bone tissue accurately reflect dietary values (Baskaran, 2011; Michener and Lajtha, 2007) and these, in turn, should reflect the values present in the local ecosystem.

On the other hand, the lack of simple, proportional relationship between diet and the amount of strontium in bone hints at corresponding complications to archaeological provenance studies based on $^{87}Sr/^{86}Sr$. Nonlocal origins for food products can directly impact the $^{87}Sr/^{86}Sr$ value present in bone, even when foodstuffs are only transported regionally (Bentley and Knipper, 2005; Bentley et al., 2004; Price et al., 2002; Wright, 2005). Moreover, bone tissue formation is sensitive to the presence of high-calcium foods, causing sensitivity to minor dietary constituents such as salt or to culinary practices rather than to the overall values present in diet (Burton and Wright, 1995; Wright, 2005). A local range in $^{87}Sr/^{86}Sr$ needs to reflect the variable nature of strontium inclusion in plants from mixing of different potential parent materials and variation in animals from their own inherent mobility (Price et al., 2002) as well as the impact of any imported foodstuffs (Bentley and Knipper, 2005; Bentley et al., 2004; Wright, 2005).

One way to account for local variability in dietary strontium isotopic values is through the analysis of small animals with limited geographic areas to map microvariations in values (Price et al., 2002). While the territory inhabited by small animals and the territory utilized by human groups is unlikely to directly align, the approach should yield similar values when the archaeological faunal samples used are from animals likely to coexist with humans. Bentley and colleagues (Bentley and Knipper, 2005; Bentley et al., 2004) suggest that archaeological faunal remains of animals that would have lived in close proximity to humans and had a similar diet, such as pigs or vermin, may best document local $^{87}Sr/^{86}Sr$ when foodstuffs are likely to have been imported. Domesticated pigs are particularly useful, as these animals share similar amino acid requirements to humans, and may even be fed tablescraps (Bentley, 2006; van der Merwe et al., 2003).

It is also possible, however, that luxury imports and processed food will not contribute to animal diets (Wright, 2005). In these cases, the range present in individual archaeological populations may be used to define the local $^{87}Sr/^{86}Sr$ value. As the majority of the local population can be expected to subsist on a diet from similar sources, any local variation will be confined to a normal distribution. Nonlocals will display outlying values, allowing their identification through a more population- and culturally-specific model of food consumption (Wright, 2005).

6.1.3 Carbon isotopic distribution in nature

Variations in stable isotopic composition of fossil vertebrates have been studied since the 1970s, with applications in paleoenvironmental reconstruction, paleobiology, habitat preference, and diet (Koch, 2007). In archaeological populations, the potential of isotopes in characterizing diet was recognized early, and the use of stable carbon and nitrogen isotopes for this purpose remains popular in Greece and the Mediterranean (DeNiro, 1985; DeNiro and Epstein, 1978; Papathanasiou et al., 2015; Peterson and Fry, 1987). Of the two naturally occurring isotopes of carbon, ^{13}C is depleted in plant tissue compared to the atmosphere, indicating that fractionation occurs at the level of initial carbon assimilation and that carboxylation or carbon fixation during photosynthesis provides the ultimate source of carbon in biologic tissue (Sharp, 2007b).

While little to no further fractionation generally occurs with successive trophic levels in animals, early geochemical studies of the isotopic composition of plants established two populations with distinct $^{13}C/^{12}C$ ratios relating to photosynthetic pathway (Bender, 1968; Craig, 1953; Smith and Epstein, 1971; Wickman, 1952). The 20-40‰ discrimination in terrestrial plants undergoing only the Calvin cycle, or C_3

plants, is due to the large discrimination against ^{13}C by the primary enzyme in the C_3 pathway (ribulose biphosphate carboxylase-oxygenase or Rubisco) (Farquhar et al., 1989; Farquhar et al., 1980; O'Leary, 1981; Peterson and Fry, 1987; Sharp, 2007b; von Caemmerer, 2013). Rubisco discrimination is due to a kinetic isotope effect as continuous conversion of source CO_2 into the 3-carbon product brings ^{13}C and ^{12}C in continuous competition for the same active site on the enzyme (Götze and Saalfrank, 2012; McNevin et al., 2007).

In C_4 plants, discrimination is only 2-9‰, a result of sequestration of CO_2 around the site of final carboxylation, usually due to structural differentiation in anatomy where initial fixation of carbon occurs in the PEP pathway (by means of the enzyme phosphoenolpyruvate, or PEP) in mesophyll cells adjacent to the leaf surface, and final carbon fixation occurs in the Calvin cycle in bundle sheath cells adjacent to the vascular system (Farquhar, 1983; O'Leary, 1981; Peterson and Fry, 1987; von Caemmerer, 2013; von Caemmerer and Furbank, 2003). As PEP-based enzymatic discrimination against ^{13}C is low, and the product of the PEP pathway is actively transported to the bundle sheath cells and concentrated there, this produces an almost closed system in which most of the CO_2 transported to the bundle sheath cells becomes fixed as phosophoglyceric acid or PGA. As a result, plant-wide discrimination against ^{13}C is also low and dependent on CO_2 movement into the leaf and leakage of PEP-fixed CO_2 out of the bundle sheath cells (Farquhar, 1983; von Caemmerer and Furbank, 2003). In succulents with crassulacean acid metabolism (CAM plants), carbon fixation can resemble either C_3 or C_4 photosynthetic pathways, resulting in a range of $\delta^{13}C$ values overlapping that of C_3 and C_4 plants (O'Leary, 1981; Sharp, 2007b). This is due to the presence in CAM plants of mechanisms which sequester CO_2 during high temperature in a manner similar to that in C_4 plants, but allow simpler carbon fixation to occur through direct carboxylation in the Calvin cycle at low temperatures (O'Leary, 1981; Rodrigues et al., 2013).

In humans, the $\delta^{13}C$ value of body tissues is dependent on diet. While the $\delta^{13}C$ of apatite represents whole diet values, amino acids from dietary protein are partially routed to collagen synthesis, so that the $\delta^{13}C$ of collagen extracted from bone can be used to identify sources of dietary protein (Bocherens and Drucker, 2003; DeNiro, 1987; Katzenberg, 2008; Michener and Lajtha, 2007; Peterson and Fry, 1987). Bone collagen is enriched in ^{13}C relative to the diet by around 5‰ (Ambrose and Norr, 1993), and the offset for apatite has been approximated at -12‰ (Prowse et al., 2004). As C_3 plants range in $\delta^{13}C$ value from -35 to 20‰, an individual whose diet was composed mainly of C_3 plants such as wheat and barley would display a carbon isotope value of $\delta^{13}C_{co}$ around -20‰ or $\delta^{13}C_{ap}$ around -12‰ (DeNiro and Epstein, 1978; Katzenberg, 2008; Schwarcz and Schoeninger, 1991). An individual whose diet was composed mainly of C_4 plants such as corn, millet, or sorghum, with $\delta^{13}C$ values ranging from -14 to -9‰ (DeNiro and Epstein, 1978; Katzenberg, 2008; Schwarcz and Schoeninger, 1991), would therefore show a $\delta^{13}C_{co}$ of -10‰ or $\delta^{13}C_{ap}$ of -1‰.

For this analysis, only the $\delta^{13}C$ of apatite was obtained, i.e., the carbon isotopic values reported here are the result of the dietary sources for the majority of the Late Antique caloric intake at Corinth. However, the protein component of diet can impact human $\delta^{13}C_{ap}$ if aquatic resources are eaten, or because of the plants used as fodder for terrestrial animals. Access to marine resources may confound the use of $\delta^{13}C$ values in identifying C_4 plant use as increasing marine resource consumption also results in enriched ^{13}C ratios (Kellner and Schoeninger, 2007; Richards et al., 2006; Schwarcz and Schoeninger, 1991; Walker and Deniro, 1986). For example, Walker and Deniro (1986) used $\delta^{13}C$ and $\delta^{15}N$ values to discriminate between coastal and inland diet on the Santa Barbara Islands.

Similar to the diet offset found in humans, consumption of C_4 plants has been documented to affect $\delta^{13}C$ of body tissue in ruminants such as cows, goats, and sheep (Bahar et al., 2005; Camin et al., 2008; Masud et al., 1999; Moreno-Rojas et al., 2008; Schmidt et al., 2005), and to a more limited degree in poultry (Rhodes et al., 2010). In turn, dietary inclusion of animal products such as meat or milk from these animals can be reflected in human $\delta^{13}C$. Most research to date has focused on cattle products, with shifts in the $\delta^{13}C$ of muscle ranging from 0.9 to 1.0‰ and 1.0 to 1.2‰ in fat as a result of each 10% difference in inclusion C_4 plants in cattle fodder (Bahar et al., 2005). Camin and colleagues (2008) report a similar enrichment of 0.7 to 1.0‰ in $\delta^{13}C$ of milk casein with each 10% increase in maize in feed, demonstrating that dietary sources of carbon also influenced carbon isotopic values in cow dairy products. This enrichment by diet in milk is also present in other polygastric animals such as goats and sheep (Masud et al., 1999; Prache et al., 2005), though dietary impacts on carbon isotopic compositions of these small ruminants has mainly been limited to analyses of other body tissues. As a result, goat or sheep milk, yoghurt, or cheese consumption may result in a C_4 plant signature in human $\delta^{13}C_{ap}$ whether the actual plants were eaten or not.

In this research, dietary sources of ^{13}C will not be identified. For a more complete analysis of Late Antique diet, especially the protein source for the population, bone collagen would need to be analyzed. Standard isotopic determination of diet also calls for both carbon and nitrogen isotopic values from bone collagen, as the $^{15}N/^{14}N$ in body tissue is a direct reflection of protein source and trophic level (Bocherens and Drucker, 2003; DeNiro and Epstein, 1978; Hedges and Reynard, 2007; Katzenberg, 2008; Michener and Lajtha, 2007; O'Connell et al., 2012; Schwarcz and Schoeninger, 1991). Moreover, the use of $\delta^{15}N$ can differentiate between marine resources, due to the shift by trophic level between marine invertebrates and carnivorous fish or mammals (Barrett and Richards, 2004; Keenleyside et al., 2006; Little and Schoeninger, 1995; Pfeiffer and Sealy, 2006; Prowse et al., 2004; Schoeninger et al., 1983). A thorough analysis of Late Antique diet in Corinth along these lines was outside the scope of the current study and would have required access to well-preserved collagen.

6.2 Isotopic Distributions and Expected Values

In this dissertation, foreigners will be identified if dental isotopic composition indicates that their place of childhood residence was located in a region where the $\delta^{18}O$ of precipitation or bioavailable $^{87}Sr/^{86}Sr$ from the surrounding water catchment area was significantly different from that of Late Antique Corinth. Dietary sources of ^{13}C form a secondary line of inquiry, in that food preparation and C_4 plant consumption may differ among population groups or may vary along with social distinctions. Given this goal, the isotopic characterization of locals is central to the archaeological examination of provenience. Local values can be estimated in two ways, through given expected geographic variation in isotopic distributions, and via comparable values in archaeological datasets. I will also present a separate estimation of the local Corinthian range for each isotopic ratio by exploring the distribution of values present in this sample.

6.2.1 Diet in the Eastern Roman Empire

In the Roman Empire, current estimates are that grain composed almost three-fourths of the total diet (Garnsey and Whittaker, 1983; Rickman, 1980; White, 1988), and included the C_3 plants wheat and barley as well as the C_4 plant millet (Garnsey, 1999; Jasny, 1942). Although wheat appears to have been preferred for direct consumption, millet was commonly used as fodder for animals, or for use by humans during periods of food shortage (Garnsey, 1999; Purcell, 2003; Spurr, 1983). It is also possible that lower income families may not have shared this discrimination in diet and consumption of millet may be a mark of lower socioeconomic status (Bourbou and Garvie-Lok, 2015; Killgrove and Tykot, 2013; Spurr, 1983).

Mixed isotopic values from tooth apatite at Early Roman sites in Italy (Killgrove, 2010; Killgrove and Tykot, 2013) and Egypt (Dupras and Schwarcz, 2001) have led to the suggestion that these values are due to the use of millet or other C_4 grains as fodder for meat- or milk-producing animals. It is also possible, however, that the preference for C_4 plants is a result of foreign dietary habits. Starting in the Early Roman period in Italy, migrants have been identified in populations which consumed a diet including a C_4 component (Killgrove, 2010; Killgrove and Tykot, 2013), with increased reliance on these plants, including millet and sugarcane, generally suggested to be utilized later in the Eastern Mediterranean (Eideneier, 1991; Galloway, 1977; Lightfoot et al., 2012). In Egypt, $\delta^{13}C$ of human collagen indicates the presence of millet in the diet no earlier than the Roman period (Dupras, 1999). In Croatia, enriched $\delta^{13}C$ values after the erosion of Roman control has been used to suggest C_4 plants were introduced by migrants at this time (Lightfoot et al., 2012).

This dependence on C_3 terrestrial plants with significant dietary input from terrestrial animals continued into the later Byzantine period. While the majority of information regarding dietary composition is taken from contemporary literary sources and artistic representations (Brubaker and Linardou, 2007; Dembinska, 1985; Grant, 1987; Kislinger, 1999; Koder, 1995; Koukoúles, 1952; Papanikola-Bakirtze, 2005; Salamon et al., 2008), the limited zooarchaeological and paleobotanical research into this time period supports a reliance on C_3 grains with significant contributions from sheep, goats, and marine resources (Kroll, 2010; Nobis, 1993; Rautman, 1990). Wine and olive oil were also important dietary components, and were widely traded along with grain to supplement local foodstores (Kingsley and Decker, 2001). These three goods were also transported to Constantinople and the military frontiers as part of the tax-based *annona* (Karagiorgou, 2001). Wine and olive oil may have provided a significant source of calories for the lower classes (Bourbou and Garvie-Lok, 2015). Thus, dependence on olive oil for fat may have a significant impact on $\delta^{13}C_{ap}$ as its $\delta^{13}C$ values is relatively restricted around -30 to -27‰ (Bourbou and Garvie-Lok, 2015; Royer et al., 1999; Spangenberg et al., 1998). These values are on the more negative or lighter end of the range of $\delta^{13}C$ values of C_3 plants.

Marine resources may also have been particularly important to the Byzantine diet as a result of religious fasting prohibitions against meat (Bourbou et al., 2011). Though surviving recipes and descriptions of feasts during the Byzantine period make it clear that meat dishes were highly valued (Koder, 2005), their association with aristocratic contexts indicates meat products were likely expensive even when not proscribed (Dalby, 1996; Kazhdan, 1997; Koder, 2005). On the other hand, dairy products, especially from sheep and goats, were a staple for the lower classes that often used milk from their own animals to produce cheese, yoghurt, and butter (Kazhdan, 1997; Koder, 2005; Motsias, 1998). Recent isotopic analyses of Byzantine-era domesticated fauna yield $\delta^{13}C$ values consistent with a primarily C_3-based fodder (Bourbou and Garvie-Lok, 2015), but foddering practices likely varied as a result of local availability.

Other plants important to the Eastern Mediterranean diet included legumes (Dalby, 1996; Motsias, 1998), fruits including grapes, melons, and figs (Anagnostakis and Papamastorakis, 2005; Dalby, 2003; Grünbart, 2007; Koder, 1995; Littlewood et al., 2002), and domesticated and wild vegetables (Dalby, 2003), all of which would have been grown locally. Nuts and honey may have been included in the semi-luxuries trade (Sid. Apoll. *Carm*. 5.40-50; Motsias, 1998). Sugarcane, present in Arab-controlled regions after the 7th c AD, may have provided a C_4 contribution to the diet, though it is unlikely this plant was used significantly within the bounds of the Byzantine Empire (Eideneier, 1991; Galloway, 1977).

Paleodietary reconstructions from regions surrounding the Aegean using stable isotopic ratios support a primarily land-based C_3 diet in both inland and coastal populations, with significant amounts of both animal and marine protein (Bourbou et al., 2011; Bourbou and Garvie-Lok, 2015; Bourbou and Richards, 2007; Giorgi et al., 2005). Surveys of the isotopic composition of archaeological populations excavated throughout the Peloponnese and Crete found collagen values for $\delta^{13}C$ and $\delta^{15}N$ are relatively restricted (Bourbou et al., 2011; Bourbou and Garvie-Lok, 2015). $\delta^{13}C$ falls roughly between -16.7‰ and -20.1‰ – within the range of values expected from domesticated fauna. These results suggest that contemporary diet included a substantial reliance on meat or dairy products and was enriched from a purely C_3 plant-based diet.

Consumption of larger, carnivorous fish in particular may have further enriched the ^{13}C signal in populations of this time period (Bourbou et al., 2011). Sea bream and tuna from archaeological contexts in the Peloponnese display $\delta^{13}C$ values of -12.1‰ and -10.4‰, respectively (Pennycook, 2008). Bourbou and Garvie-Lok (2015) estimate the $\delta^{13}C$ contribution of larger fish such as these to contemporary human diets would likely fall around -15.2‰. Smaller, lower trophic level fish such as sardines are less enriched in ^{13}C and would have contributed to an intermediary value of $\delta^{13}C_{ap}$ (Bourbou et al., 2011), averaging around -17.0‰ (Bourbou and Garvie-Lok, 2015). However, it is possible that northern migrants would have been less inclined to utilize marine resources, as stable isotopic analyses of human populations in Croatia at this time period have been interpreted to show a decrease in marine consumption after the collapse of Roman authority in the area (Lightfoot et al., 2012).

6.2.2 Geographic distribution of isotopic values

As the isotopic composition of rainwater is a function of latitude and distance from the ocean, $\delta^{18}O$ values for the Mediterranean as a whole are relatively restricted. Modern rainwater $\delta^{18}O$ has been collected monthly since 1961 by the International Atomic Energy Agency with affiliated stations distributed globally in association with the World Meteorological Organization (IAEA/WMO, 2015). In the Eastern Mediterranean, these data highlight the fact that regional $\delta^{18}O$ in overland precipitation is relatively homogeneous (Argiriou and Lykoudis, 2006; Bowen and Revenaugh, 2003; IAEA/WMO, 2015; Lykoudis and Argiriou, 2007). Figure VI.1 shows that similarity in Mediterranean climates results in similar $\delta^{18}O$ in rainwater for this study area. As a result, many nonlocals may not be identified using oxygen isotopic data alone. The inclusion of $^{87}Sr/^{86}Sr$ values as a complimentary dataset reflecting the geologic substrates may enhance discrimination of migrants versus natives at Corinth (Nafplioti, 2010, 2011). As shown in Figure VI.2, the geology of the Eastern Mediterranean and especially Greece is heterogeneous (Asch, 2005; Higgins and Higgins, 1996).

The isotopic composition of precipitation over Greece published by Argiriou and Lykoudis (2006) confirms that the Mediterranean is a significant source of water vapor in this area, and it is likely that populations living a similar altitude and distance from the Mediterranean Sea would display similar $\delta^{18}O_{CO3}$ values (cf. Schmidt et al. 1999 for $\delta^{18}O$ of seawater in the region). The average yearly rainfall $\delta^{18}O_{VSMOW}$ for the nearby city of Athens to the east is -5.78‰, as calculated from 3 collection sites of varying altitude, and for Patras to the west is -5.08‰, as calculated from data collected by the National Observatory, Athens and the University of Patras, and presented in The

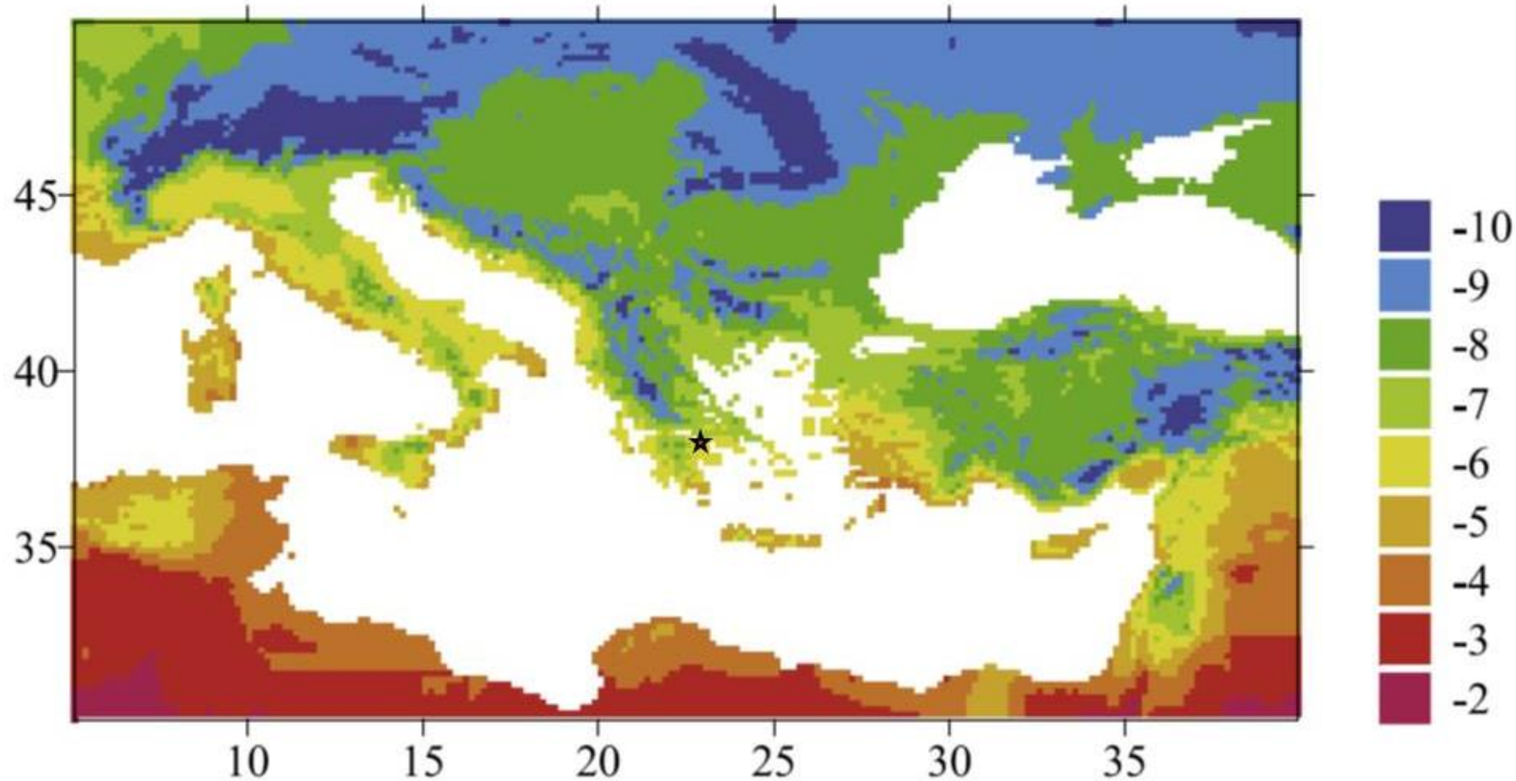

Figure VI.1. Color-coded representation of the oxygen isotopic composition of precipitation in the Mediterranean according to latitude and longitude. Meteoric water $\delta^{18}O$ is represented in terms of ‰ VSMOW according to gridded computations for the region (Lykoudis and Argiriou, 2007). Figure reprinted with minimal alteration from Lykoudis and Argiriou (2007), Figure 2b. The location of the city of Corinth is indicated by a star.

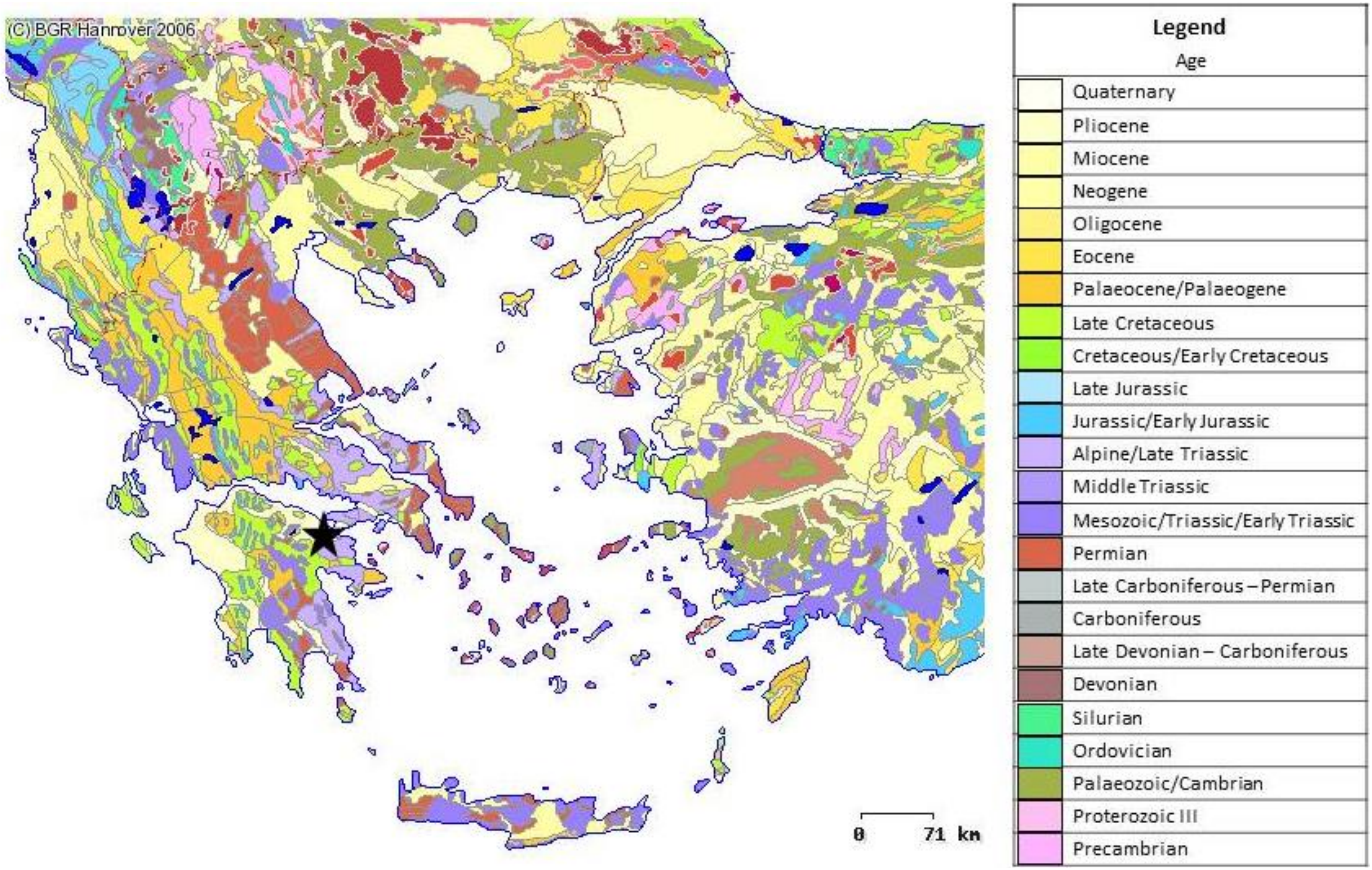

Figure VI.2. Geologic map of the Mediterranean, available online through the International Geological Map of Europe and Adjacent Areas (Asch, 2005). The location of the city of Corinth is indicated by a star. Geologic age is color-coded according to the legend to the right.

International Atomic Energy Agency's database of stable isotope values in precipitation (Argiriou and Lykoudis, 2006; IAEA/WMO 2015). The model used by Lykoudis and Argiriou (2007) produces a visual representation of the geographical distribution of oxygen isotopes in rainwater through the production of a gridded dataset (see Figure IV.1) but does not allow for the direct calculation of rainfall $\delta^{18}O$ values at specific, non-measured sites. Using the Online Isotopes in Precipitation Calculator, which draws on data from IAEA/WISER and takes elevation into account, annual rainfall $\delta^{18}O_{VSMOW}$ is calculated at -5.5 ± 0.4‰ for the site of ancient Corinth (Bowen, 2015; Bowen and Revenaugh, 2003). According to Lykoudis and Argiriou (2007), this model produces the best fit for annual estimations of $\delta^{18}O$ rainfall values.

As is visible in Figure VI.1, the resulting distribution of $\delta^{18}O$ in rainwater results in differences in only 1-2‰ between the city of Corinth and the majority of cities with which Corinth would have had close contact. Annual rainfall $\delta^{18}O_{VSMOW}$ is calculated at -5.5‰ for the site of ancient Corinth, and is within .5‰ for sites near Corinth on mainland Greece (-5.78‰ for the site of Athens, -5.78‰ for Patras, -5.90‰ for Thebes, and -5.5‰ for Sparta) (Argiriou and Lykoudis, 2006; Bowen, 2015; Bowen and Revenaugh, 2003; IAEA/WMO 2015). Average annual $\delta^{18}O$ in meteoric water for coastal Italy is also almost identical; Rome, for example, displays an average value of -5.65‰ (Longinelli and Selmo, 2003). For sites in the Southern Aegean and in modern Turkey, these values remain similar, with -5.6‰ for Eleutherna on the island of Crete, -5.4‰ for the island of Naxos in the Cyclades, -5.6‰ for the island of Samos near the coast of Asia Minor, -5.7‰ for Ephesus, and -6.0‰ for Pergamon (Bowen, 2015; Bowen and Revenaugh, 2003). In the Levant, -5.7‰ is calculated for the site of Antioch, and -5.3‰ for Arsinoe on the island of Cyprus. Farther north, $\delta^{18}O_{VSMOW}$ is calculated at -6.4‰ for Thessaloniki in Greece, -6.5‰ for Constantinople, the capital of the Eastern Roman Empire, and -6.6‰ for Ravenna in Italy (Bowen, 2015; Bowen and Revenaugh, 2003). Thus, substantial regional mobility may result in a fairly wide range in

$\delta^{18}O_{VSMOW}$ values at Corinth, but this distribution will not enable discrimination among geographic sources for migrants.

However, differences are greater for cities near the limits of the Eastern Roman Empire, such as in northern Africa, northern and eastern Turkey, the southern Levant, or along the Danubian frontier. For the border fortress Sucidava on the Danube River, annual rainfall $\delta^{18}O_{VSMOW}$ is calculated at -6.9‰, and for Alexandria in Egypt, this value is -4.2‰ (Bowen, 2015; Bowen and Revenaugh, 2003). Both of these sites would likely have had contact with Corinth due to the *annona*. Carthage, which produced AfRS (finewares popular early in late antiquity), and Gaza, which was famous for its exported wine, show similar enrichment in ^{18}O to that of Alexandria with $\delta^{18}O_{VSMOW}$ calculated at -4.7‰ (Bowen, 2015; Bowen and Revenaugh, 2003). Finally, the values expected from sites in ancient Armenia (northern and eastern portions of modern Turkey), are also lower than that of Corinth. The most enriched value calculated, -7.4‰, is from the site of Trapezus, Armenia's major port along the southern-most portion of the Black Sea, and the value for the site of Melitene, located inland and south of Trapezus, is -8.1‰ (Bowen, 2015; Bowen and Revenaugh, 2003). It is likely that migrants who originated outside the Empire's boundaries would display an even more distinct $\delta^{18}O$ value. In the case that foreigners arrived in Corinth as invaders or to take over the city administration (Hypothesis 1B or 1C), $\delta^{18}O_{CO3}$ values alone should be able to identify them. As the rulers of these successor kingdoms are considered to originate to the north and possibly in the Balkan area, oxygen isotopic ratios of these foreigners should be significantly lower (or lighter) than those of Corinthian natives.

On the other hand, with strontium isotopes it may be possible to identify migrants from a wider range of geographic origins closer to the site of Corinth. Local geology in Greece is heterogeneous as a result of high tectonic activity, as can be seen in Figure VI.2 (Asch, 2005; Higgins and Higgins, 1996). Figure VI.3 shows that the $^{87}Sr/^{86}Sr$ values found in human bone and enamel reflects the presence of major tectonic or isopic zones (i.e., the age of the underlying substrate) throughout the Aegean (Nafplioti, 2011). Corinth is located in the Parnassos zone in Figure IV.3, which

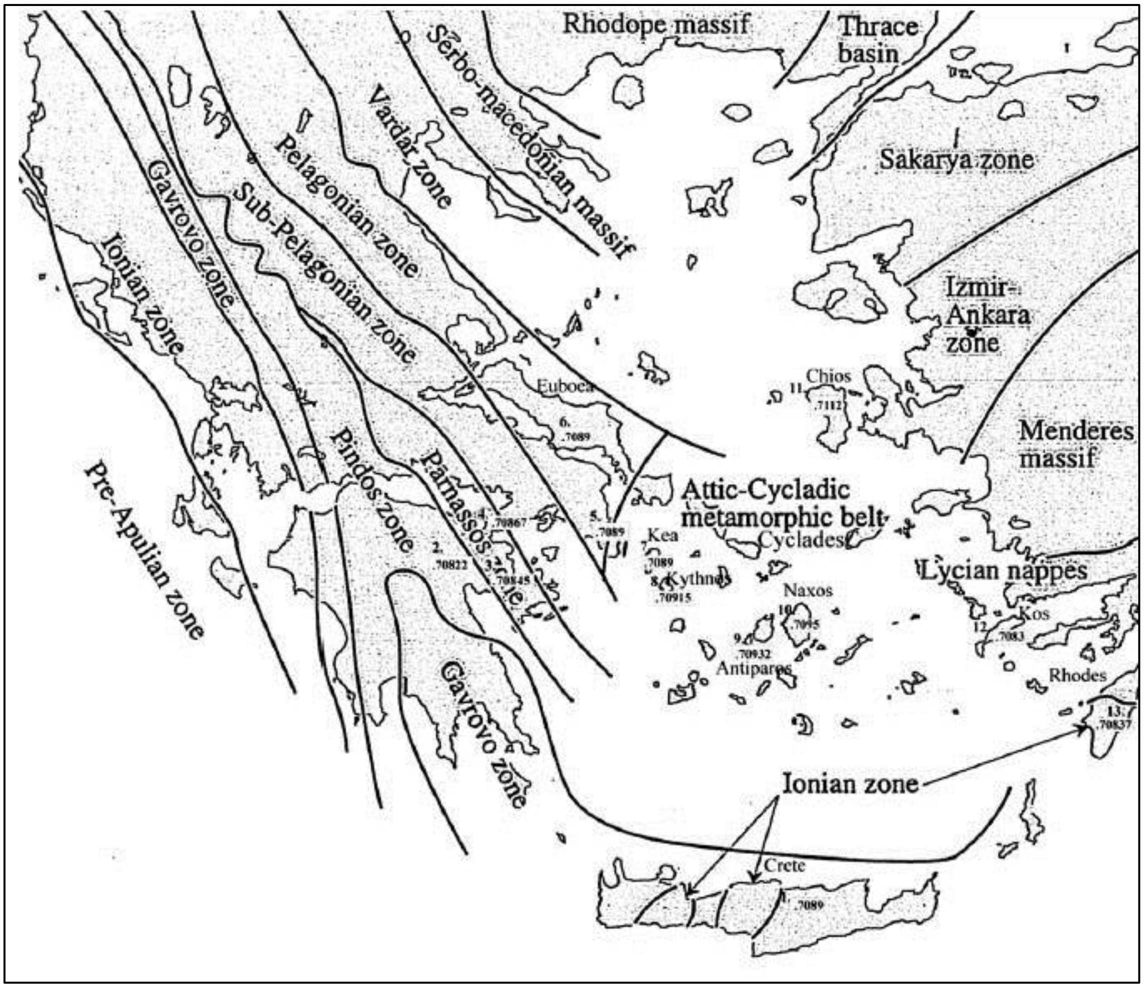

Figure VI.3. Correspondence between geologic age, represented as tectonic zones, and ratios of bioavailable $^{87}Sr/^{86}Sr$. Reprinted from Nafplioti (2011), Figure 3. The city of Corinth is located in the Parnassos zone, near the number 4 on the map. Numbers refer to sites where $^{87}Sr/^{86}Sr$ values are available for comparison with the current study (Nafplioti, 2011).

translates to a local, biologically available $^{87}Sr/^{86}Sr$ value of 0.7087 as averaged from snail shells and pig enamel from the site of Perachora, located across the Corinthian Bay from the city itself (Nafplioti, 2011). These values were almost the lowest values measured in the Aegean, though $^{87}Sr/^{86}Sr$ values of 0.7083 to 0.7084 were mapped in the neighboring Pindos and Sub-Pelagonian zones.

Nafplioti (2011) used these data to group these three tectonic zones into a single group (Group A) for isotopic reference. Group B in turn comprised the central Cycladic Islands and north-eastern Aegean (Attic-Cycladic metamorphic belt and Vardar zone); central Crete, central Euboea, and the western Cyclades were grouped into C. Groups A and B were particularly distinct in the observed range of bioavailable $^{87}Sr/^{86}Sr$ signatures, and the highest values recovered were from islands in the central Cyclades and north-eastern Aegean (0.7098 to 0.7093) (Nafplioti, 2011). These high $^{87}Sr/^{86}Sr$ values are consistent with the presence of granite in this area (Pe-Piper and Piper, 2002:337). The island of Chios, with local $^{87}Sr/^{86}Sr$ values measured at .7112, is geologically similar to the neighboring coast of modern Turkey which means the nearby sites of Pergamon and Sardis may have a similar local signature. This range of values for the Aegean makes it likely that mobility, even within this limited portion of the Eastern Roman Empire, would be identifiable. Migrants such as merchants and administrators present in Corinthian cemeteries should reflect a range of $^{87}Sr/^{86}Sr$ values reflecting the generally high levels of connectivity expected under hypothesis 2A.

On the other hand, if a large number of migrants were relocated to Corinth as refugees or otherwise through state-regulated population movement (Hypothesis 2B), both $\delta^{18}O$ and $^{87}Sr/^{86}Sr$ values should reflect a shared geographic origin. These large groups may not have their origins in the area mapped in Figure IV.1, and it will be difficult to securely locate provenience for these values. In the following section, I examine some of the reported isotopic values for archaeological populations to demonstrate the range of $\delta^{18}O$ and $^{87}Sr/^{86}Sr$ likely in migrants outside of the Aegean basin.

6.2.3 Local isotopic signals for archaeological populations

Though Figure VI.3 displays a map of $^{87}Sr/^{86}Sr$ likely to be obtained from archaeological populations living in those locations, Figure VI.1 only gives water $\delta^{18}O$ and not expected tissue apatite values. The distribution of isotopic ratios in the local environment is unlikely to exactly equate the values displayed by archaeological populations. In some cases, this discrepancy is due to averaging effects – e.g., seasonal rainfall patterns may determine the $\delta^{18}O$ of drinking water, or humans may consume foods grown or foddered from a variety of local environments. Both cultural and practical limits on diet can create differences between the range of values present in the natural environment and the range present in food and water. For this reason I will also compare the results of these isotopic analyses directly to the values obtained on other archaeological populations.

The ancient city of Corinth receives relatively little rainwater compared to nearby sites in the Peloponnese and instead is dependent on natural springs for its water supply which tap into the rainwater collected as runoff in the surrounding landscape (Landon, 2003). Numerous baths were constructed over a network of subterranean tunnels and cisterns designed to take advantage of these springs and transport and store ground water throughout the city (Biers, 1985; Hill, 1964; Sanders, 1999). As much of the surrounding landscape is elevated above the city, the $\delta^{18}O$ of drinking water may be averaged from these sources. In antiquity, the source of drinking water was often taken to be near the summit of nearby Acrocorinth, where a spring is located ca. 295 m above sea level (Landon, 2003; Strab. 8.6.21). If the water used in the city of Corinth was mainly derived from precipitation on Acrocorinth, annual rainfall $\delta^{18}O_{VSMOW}$ is calculated at -5.9 ± 0.4‰, or 0.4‰ lower than that calculated for the site of Corinth proper (Bowen, 2015; Bowen and Revenaugh, 2003). In a recent examination of $\Delta^{18}O_{PO4-bw}$ in humans which measured the $\delta^{18}O$ of tap water as well as meteoric water, the tap water in modern Athens is sourced in a reservoir 435 m above sea level while the city itself mostly lies at an altitude of 28 m above sea level, and this contributed to a -1.7‰ offset between measured and expected drinking water values (Daux et al., 2008).

Seasonal affects may also contribute to meteoric values, as well as the enrichment in ^{18}O in groundwater during the dry season. Though monthly data is not available for Corinth, at the nearest IAEA collection station in Athens, meteoric $\delta^{18}O_{VSMOW}$ varies seasonally as can be seen in Figure VI.4. The highest values reported

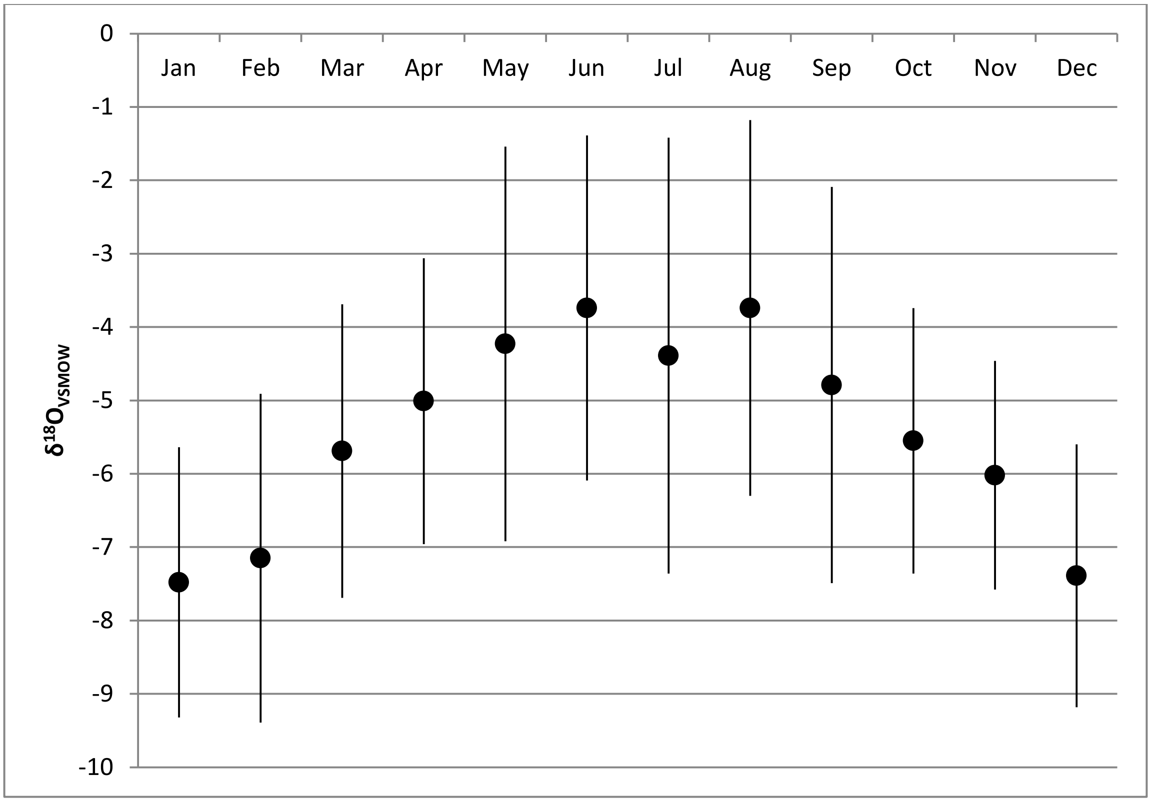

Figure VI.4. Monthly distribution of meteoric $\delta^{18}O$ for the city of Athens, Greece. Data collected by the IAEA at three collection sites (Argiriou and Lykoudis, 2006; IAEA/WMO, 2015).

are during the dry summer months (Argiriou and Lykoudis, 2006; IAEA/WMO, 2015). For this reason it is necessary to also describe the local signal in biological tissue, as well as the underlying geographic distribution of rainwater $\delta^{18}O$. In order to characterize this range, the sampling strategy was designed to incorporate natives from the population under study as well as non-locals.

The range in isotopic composition for modern native populations varies globally, and is thought to be dependent on local geography as well as human behavior (Daux et al., 2008; Levinson et al., 1987; Longinelli, 1984). Using $\delta^{18}O$ from enamel phosphate of 10 human populations each with a single drinking water source, Longinelli (1984) reported standard deviations ranging from 0.14 to 0.53, with the highest standard deviations present in Austria and Mogadishu. While the high value in Austria could conceivably be due to the influence of locals living both at high elevations as well as in nearby valleys, Longinelli relates the high variability in the Mogadishu sample to the nomadic habits of the people being studied. Later research reports higher intrapopulation variability in $\delta^{18}O_{PO4}$, with the lowest standard deviations (around 0.2) found in populations from the plains in central Alberta, Canada (Levinson et al., 1987) or from Iran (Daux et al., 2008). Most populations displayed standard deviations around either 0.5 or 0.8 (Daux et al., 2008; Levinson et al., 1987).

Using this data as a proxy in archaeological contexts, Mitchell and Millard (2009) estimate the expected range in $\delta^{18}O$ for a non-mobile human population where little to none of the population has a foreign origin and the food and water is locally sourced to be around 1.12‰. White and colleagues (2004b) assertion of a range of 2‰ for non-mobile Mesoamerican populations is more in keeping with experimental data using well-known, 18th-19th century North American archaeological human remains. France and Owsley (2015), who assert that their populations consumed a “more localized diet than modern humans,” report $\delta^{18}O_{CO3}$ standard deviations of 1.03 and 1.48. It therefore seems probable that the range in $\delta^{18}O$ values will be geographically and population-specific. For this study, the experimental data will be statistically evaluated assuming a normal distribution in $\delta^{18}O$ values as incorporated into tooth apatite within a population sharing the same water source, and outliers will be assumed to be non-natives as advocated in the characterization of local values for other isotopic indicators of migrant human populations (Wright, 2012).

Useful comparative data for defining the local value at Corinth during the premodern period are also reported by Garvie-Lok (2009). This study used oxygen isotopic ratios in 12th century AD skeletons from Frankish Corinth to identify individuals who spent their childhood in the Balkan area to the north of Greece. While based on a small sample size (N=17), locals were found to exhibit $\delta^{18}O_{CO3(VSMOW)}$ values of 25.4‰ to 27.7‰ with two outliers considered to be migrants based on $\delta^{18}O_{CO3}$ and $\delta^{13}C_{ap}$ values. One of these displays a $\delta^{18}O_{CO3(VSMOW)}$ of 29.2‰, and is therefore most likely a migrant from a warm, arid region. Both this individual and one other display $\delta^{13}C_{ap(VPDB)}$

enriched in ^{13}C compared to the remainder of the cemetery population (-6.0‰ and -1.9‰, respectively), indicating heightened dietary inclusion of C_4 plants in the foreign-born populace. During the Frankish period while Corinth was under the direct control of Western Europeans, a large number of immigrants, including merchants, pilgrims, and administrators, are hypothesized to have made their way through the city. It is therefore likely that the sampled geochemical variation underestimates mobility and diversity in geographic origins among the cemetery population (Garvie-Lok, 2009).

This likelihood is enhanced by the restricted distribution of rainwater $\delta^{18}O$ throughout the Mediterranean region. Similar $\delta^{18}O_{ap}$ to those found in Corinth are present at sites in the Western Mediterranean, such as Rome, where converted $\delta^{18}O_{CO3(VSMOW)}$ values for the imperial port of Isola Sacra range from 26.8 to 24.7‰ ($\delta^{18}O_{ap(VPDB)}$ = -4 to -6‰, Prowse et al., 2007). Archaeological bone from the Eastern Mediterranean are also comparable, with $\delta^{18}O_{PO4(VSMOW)}$ of enamel phosphate from archaeological fish bones excavated from Sagalassos ranging from 17.5 to 21.9‰ (Dufour et al., 2007), and $\delta^{18}O_{CO3(VSMOW)}$ = 28.0 to 31.1‰ from a Late Roman mining camp in Jordan (converted from $\delta^{18}O_{ap(VPDB)}$ = -2.83 to 0.23‰, Perry et al., 2009, 2011). Oxygen isotopic distributions are sufficient, however, to discriminate between individuals born in Corinth and any migrants from more northern areas in Europe such as Bulgaria, where Greek colonial populations along the Black Sea display $\delta^{18}O_{ap(VPDB)}$= -6.2 ± 0.6‰ (converted to mean $\delta^{18}O_{CO3(VSMOW)}$= 24.5‰ on third molars, Keenleyside et al., 2011), or from north Africa. The average $\delta^{18}O_{CO3(VSMOW)}$ from upper Egypt during the Roman period is 28.2‰ (Dupras and Schwarcz, 2001), and the $\delta^{18}O_{CO3(VSMOW)}$ ranged from 30.0 to 31.5‰ from a Roman provincial capital in Northern Egypt (converted from $\delta^{18}O_{ap(VPDB)}$ = -1.1 to 0.6‰, Prowse et al., 2007). Farther north than the Balkans, rainwater is more depleted in ^{18}O resulting in lower $\delta^{18}O_{CO3(VSMOW)}$, and enamel phosphate ranges from 16.4 to 18.4‰ in the Netherlands (McManus et al., 2013), or mean $\delta^{18}O_{PO4(VSMOW)}$ = 17.7 ± 1.4‰ for a pooled sample of archaeological sites throughout Britain (Evans et al., 2012). As nonstandard mortuary behavior has been used to suggest a northern origin for Corinthian foreigners, oxygen isotopic analysis will therefore be sufficient to test these archaeological hypotheses, though it may underestimate total mobility.

Similar local $^{87}Sr/^{86}Sr$ values are also available from archaeological populations throughout the Roman Empire. Lê (2006) reports the local value for Frankish remains at Corinth as .7087 ± .001 based on faunal remains and .7083 to .7091 from human samples, which is consistent with the expected local value reported by Nafplioti (2011). These values are distinct from human archaeological samples of Mycenaean age from Mycenae (.7082) (Nafplioti, 2008), even though this site is in the same isotopic group as Corinth (Nafplioti, 2011). However, at the nearby site of Stymphalos, a much wider local range in $^{87}Sr/^{86}Sr$ values from .7079 to .7101 was reported (Leslie, 2012), though this range is based on comparison with archaeological faunal values. Mobility in the animal population due to animal husbandry practices covering a higher than expected area of land at this rural site may have established too wide of a range for the identification of non-local humans. Additionally, the faunal specimens analyzed by Leslie (2012) date to different time periods than the human archaeological samples, which may have introduced additional variation in cultural practices of animal husbandry and animal transport. However, it is also possible that the people living at Stymphalos enjoyed a highly mobile subsistence strategy, such as herding, which resulted in a wide range in $^{87}Sr/^{86}Sr$ values. This possibility will also be explored in the Corinth dataset.

In Greece overall, the heterogeneity of the underlying bedrock appears to be reflected in a variety of distinct local $^{87}Sr/^{86}Sr$ values for archaeological populations, such as .7098 for the eastern coast of the Peloponnese (Richards et al., 2008), .7089 to .7091 for Mycenaean age archaeological human bone from Crete, and .7095 ± .0002 for human samples from Naxos in the Cyclades (Nafplioti, 2011). The $^{87}Sr/^{86}Sr$ signature provided by New Kingdom Egyptian samples is further distinct at .7075 (Buzon et al., 2007). In contrast, samples from Rome dating to the early Empire display an average value of .7090 (Killgrove, 2010), though a wide range in this data may reflect the necessity of importing grain to feed the populace. Coastal Levantine archaeological samples of Frankish date fall between a minimum range of .7078 to .7090 (Mitchell and Millard, 2009), while inland Roman sites in modern Jordan range from .7075 to .7083 (Perry et al., 2008, 2011). A range falling between .7078 and .7165 is also reported for Britain (Evans et al., 2012), though any British migrants will be further identified by the accompaniment of distinct $\delta^{18}O$ values. Similarly, the range of .7089 from Danube River water samples (Palmer and Edmond, 1989), .7094 to .7097 for local $^{87}Sr/^{86}Sr$ values from archaeological populations located along the Danube in modern Hungary (Price et al., 2004), and .7091 to .7107 for Neolithic Hungarian populations (Giblin et al., 2013) can be used in conjunction with $\delta^{18}O$ values to identify migrants from the northern frontier of the Eastern Roman Empire. Even further north, contemporary archaeological populations from the site of Oosterbeintum in the Netherlands display a local $^{87}Sr/^{86}Sr$ value around .7092 or ranging from .7090 to .7094 (McManus et al., 2013).

However, even with the incorporation of strontium isotopic data, it may not be possible to assign a clear geographic origin to human migrants (Brettell et al., 2012a; Dufour et al., 2007). $^{87}Sr/^{86}Sr$ values can be impacted by proximity to the sea, and port sites may particularly reflect the influence of strontium input from seaspray or marine resources (Nafplioti, 2011). In the modern ocean, this value is dictated by flux from global drainage basins and oceanic mixing, and is usually measured as a constant 0.7092 (Palmer and Edmond, 1989; Veizer, 1989). Even inland, local $^{87}Sr/^{86}Sr$ values are the result of complex interactions between water catchment areas. In one study examining the use of both oxygen and strontium isotopic values in archaeological fish provenance for lacustrine and riverine as well as coastal environments in Turkey, most samples could not be assigned to a clear source (Dufour et al., 2007). While the local $^{87}Sr/^{86}Sr$ is characterized at a steady value of .7080 for inland Turkey, the value for fish ranges from .7078 to .7093 along the southern coast.

Possible complications to the definition of a local isotopic range, as identified in isotopic research at Stymphalos (Leslie, 2012), may include high levels of regional or local mobility. In the case that Corinth was isolated from interregional exchange networks, regional trade networks within the province of Achaia may have intensified in order to augment local production and diversify income. If isolation, agricultural intensification, or animal husbandry practices entailed high mobility, it is possible that neither oxygen isotopic ratios ($\delta^{18}O$) nor the $^{87}Sr/^{86}Sr$ of human teeth will provide a readily identifiable local signature. If the Corinthian dataset displays a range in $\delta^{18}O_{CO3}$ exceeding 2‰, then it is assumed this increased variation is a result of variations in local geography when local subsistence incorporates the use of a wide range of landforms (Longinelli, 1984). Local stable oxygen isotopic values for this study will be evaluated assuming a population sharing a local water source will exhibit a normal distribution in $\delta^{18}O$ as incorporated into human tooth enamel in order to control for this possibility and identify if the population displays an unusually wide range in $\delta^{18}O_{CO3}$ values.

Heightened mobility within the region surrounding Corinth will also be examined using $^{87}Sr/^{86}Sr$. Given the ready exchange of stable foodstuffs in late antiquity, I expect strontium isotope ratios would have averaged to a relatively stable value within each region (Bentley, 2006; Ericson, 1985; Price et al., 2002; Price et al., 1994). For this study, local variation in $^{87}Sr/^{86}Sr$ for Late Antique Corinth will be obtained by examining the distribution of these values within the Late Antique dataset (Wright, 2005). $^{87}Sr/^{86}Sr$ ratios from diet will be further defined based on samples from domesticated faunal remains (*Sus scrofa*) likely to have shared their diet with humans (Price et al., 2002), and compared with the range of .7083 to .7091 obtained for Frankish Corinth (Lê, 2006) and for neighboring archaeological populations from the same general time period (Leslie, 2012). While these values have the potential to discriminate between regional mobility and interregional migrants, fewer $^{87}Sr/^{86}Sr$ samples are available at this time due to budgetary constraints; I primarily chose samples for strontium isotopic analysis in order to discriminate among geographic sources for those samples identified as possibly nonlocal according to the $\delta^{18}O_{CO3}$ distribution.

CHAPTER VII

ISOTOPIC ANALYSIS AND RESULTS

Isotopic analysis has considerable potential to examine archaeological hypotheses of mobility, population movement, and invasion around the ancient Mediterranean Sea. Tooth enamel, which is formed at specific ages during development and does not undergo remodeling, is often used to identify the skeletons of individuals who spent their childhood far away from their place of burial. The Late Antique city of Corinth forms an ideal location to test their use, thanks to its network of trade connections, its importance in the administration of the Eastern Mediterranean, and the large number of excavated burials dating to this time period. Previous studies utilizing both oxygen and strontium have even identified migrants to the city in later time periods (Garvie-Lok, 2009; Lê, 2006).

For this study, I chose isotopic samples from among the skeletal material excavated by the American School of Classical Studies in Athens (ASCSA) in ancient Corinth. I chose human remains in graves which I determined to date from the late 5th through 8th centuries AD from two major areas of the site. These graves span the observed range in mortuary variability discussed in Chapter V. Of particular interest is whether the presence of individuals of foreign origin corresponds with anomalous funerary treatment, and the placement of these burials. I chose isotopic samples from this range of site locations and mortuary treatments in order to characterize local isotopic signatures as well as identify any non-locals in the cemeteries. Accordingly, the treatment of foreigners will be compared to that of skeletons buried in close proximity, both locals and non-locals, in order to discuss acculturation and discriminate among hypotheses of Late Antique population movement.

In this chapter, I first discuss the sampling strategy employed to choose 71 skeletons from 37 graves that I targeted for isotopic analysis using mortuary behavior. Following this, I describe laboratory treatment and statistical analysis, and go on to describe oxygen and carbon isotopic distributions within the sampled graves. I obtained $\delta^{18}O_{CO3(VSMOW)}$ and $\delta^{13}C_{ap(VPDB)}$ values for all 71 individuals and used these results to choose a subset of 24 individuals from 15 graves for $^{87}Sr/^{86}Sr$ analysis. Both sample sets selected include both locals and individuals whose childhood residence, and therefore their geographic origin, was elsewhere in the Mediterranean. Finally, I describe the strontium isotopic ratios obtained from these samples.

7.1 Sampling Strategy

Skeletal preservation is not equal for all areas of the site. Of the 630 graves from ASCSA excavations that I determined to be securely dated to the Late Antique period, skeletal material was only available from 112, 64 of which were located north of the city near the ancient Asklepieion and Gymnasium. Though osteological analyses imply an almost equal number of skeletons were buried in each area, tombs near the ancient city center were mainly multiple interment mortuary contexts. Bones were also removed from some of these graves in antiquity during secondary burial activity. Thus, of the 176 separate dentitions, over half are from graves excavated north of the city. Due to this distribution of skeletal data and budgetary concerns, I selected a subset for isotopic analysis using mortuary behavior.

7.1.1 Mortuary treatment and identity

Because grave form and the presence of key grave goods such as weapons or belt buckles have led archaeologists to identify many burials as belonging to foreigners (Charanis, 1952; Curta, 2010b; Davidson, 1952; Davidson and Horváth, 1937; Ivison, 1996; Setton, 1950, 1952; Weinberg, 1974), I first selected a number of these individuals in order to test these arguments. However, only one of these burials, Grave 1938.10 in the South Stoa, is truly anomalous given the wide range of mortuary behavior identified in Late Antique Corinth (see Chapter V). Given the observed variability, it is unclear how biological and cultural identities intersect with the full range of mortuary behavior, especially the extended use of individual tombs for multiple, successive interments or collective graves, and I chose other samples for isotopic analysis with this in mind.

Three graves are otherwise differentiated by forming the receptacle for an unusually large number of burial episodes (MNIs of 22, 55, and 52 individuals, respectively) that is distinctive burial behavior at this time period. For Late Antique Corinth, the presence of these collective burials and the geographic distribution of graves may be explained by the Saxe-Goldstein model (Chapman, 2003; Goldstein, 1976, 1981; Kurtz and Boardman, 1971; Metcalf and Huntington, 1991; Morris, 1987, 1992; Saxe, 1970). As foreign origin may be one of the factors resulting in corporate group membership, I sampled skeletons from mortuary contexts from multiple burial locations and all of the skeletons in these three graves for isotopic testing.

On the other hand, a common notion of the rights and responsibilities of the living, a so-called “idealized lifeway” (Metcalf and Huntington, 1991), could affect death rituals despite the presence of multiple belief systems or ethnicities coexisting within the city. In such a situation, the individual ethnic identities of burial occupants might be displayed through the use of grave goods. These considerations led me to select samples from mortuary contexts comparing the full range of artifacts placed in grave assemblages.

Table VII.1 lists the site context for the 36 graves from which I took samples. The dataset includes information from 19 males or probable males, 14 females or probable females, and 21 adults for whom sex identification was not possible. Isotopic analyses also included ten children and seven adolescents, totaling to 71 samples. Of these 71 individuals, 35 are from 22 graves from the area outside the northern extent of the ancient city wall. The remaining 36 individuals are from 15 graves from the ancient city center.

The mortuary context of the samples taken from graves north of the city includes tombs hollowed out of the bedrock and those built out of tile and stone. I sampled five of the chamber tombs cut into the bedrock foundations of the Greek and Roman temple to

Table VII.1. Mortuary and osteological context for sampled graves. The number of individuals sampled from the overall number of skeletons present in each age class or sex designation is given in parentheses. Osteological information was collected over the course of this research using current standards (Buikstra and Ubelaker, 1994).

Grave Context			**Osteological Information from Sampled Contexts**				
Burial Location	Grave Type	Number of Graves	MNI	Adults Males	Females	Sex Indeterminate	Subadults
North of the City							
Asklepieion	Rock-Cut Chamber	5	14 (5)	5 (5)	0	7	2
Gymnasium	Tile Grave	2	2 (2)	1 (1)	1 (1)	0	0
	Cist	1	11 (6)	1	1	6 (4)	3 (2)
	Rock-Cut Chamber	4	30 (7)	3 (1)	3 (1)	11 (4)	13 (1)
	Built Cist	1	6 (1)	1	3 (1)	0	2
Recessed Bedrock Burial Area	Cist	2	4 (2)	1 (1)	0	2	1 (1)
	Rock-Cut Chamber	7	36 (12)	5 (2)	3 (3)	14 (4)	15 (3)
Ancient City Center							
South Stoa West	Re-used Drain	1	8 (2)	2	3 (2)	3	0
	Built Cist	2	16 (2)	3 (2)	2	Yes, not preserved[1]	Yes, not preserved[1]
Northeast Forum	Morphology Unknown	1	1 (1)	0	1 (1)	0	0
Temple Hill	Pit	2	2 (2)	1 (1)	1 (1)	0	0
	Tile Grave	3	5 (3)	2 (2)	1 (1)	2	0
	Built Cist	3	57 (10)	5 (3)	4 (1)	12 (4)	14 (2)
	Built Vault	1	55 (14)	3 (1)	2 (1)	29 (5)	21 (7)
Temple G	Built Cist	2	2 (2)	0	1 (1)	0	1 (1)

[1] For this grave, more individuals were present during excavation than were kept. According to the excavation notes (NB 173: 53), 15 individuals were buried in this grave, including a number of subadults, but this information could not be verified osteologically.

Asklepius excavated in the 1930's (de Waele, 1933, 1935; Roebuck, 1951). I also included samples from 17 rock-cut chambers, tile graves, and built and rock-cut cists excavated as part of the Gymnasium complex in the late 1960's and early 1970's on a low hill to the west of the sanctuary of Asklepius (Wiseman, 1967a, b, 1969, 1972). One of the rock-cut chamber tombs, Grave 1965.14, had an anomalously high number of interments for this burial area with an MNI of 22. I sampled all of the individuals in this grave along with a selection of interments from nine other rock-cut tombs which were set into a large cutting in the bedrock, and two cist graves which were connected to these tombs. As the continued use of one structure such as 1965.14 for burials and the construction of tombs within this bedrock cutting effectively offset these interments from the rest of the surrounding cemetery, these individuals could be said to have been grouped together in death. By comparing the geographic origin of closely associated interments with that of skeletal remains buried elsewhere in the cemetery, it may be possible to infer the social composition of the community using these discrete areas for burial activity.

The 15 graves sampled from the ancient city center include two loci of long-term burial activity. I sampled nine graves from one burial location on Temple Hill, the site of which was later the focus for the construction of a 13th century AD church excavated from 1969 to 1976 (Ivison, 1993; Robinson, 1976). Two of the graves sampled include two of the multiple interment tombs which contained an anomalously large number of interments. In particular, I was interested in comparing the social composition of these two graves which appear to have been used slightly differently. Grave 1971.22 was in use from the 7th century AD through the late 12th century and corpse treatment changed during that time from primary interments to its use as the initial resting place for corpses prior to their secondary burial elsewhere. However, no stratigraphic gap is present implying that no break in the use of the grave accompanied this transition. Almost half of these interments were subadult in age class at time of death, and secondary burial activity was selective since primarily the bones of the upper body, particularly the skull, were removed. Grave 1972.20, on the other hand, was used for primary burials followed by a period of disuse, after which point it was reopened as a charnel house facility. The final use of this tomb occurred after it was incorporated into the construction of the church in the mid- to late-12th century (Ivison, 1993), whereupon it was used for more primary interments. Secondary burial activity in this grave appears to have involved the comprehensive removal of bones after decomposition, and during this period of use the demographics of who was buried in this grave also differed from that of 19721.22 since it was mainly used for adults (30 out of 32 individuals were at least adolescent in age). Given the position of this grave near the entrance to the church, and its targeted reuse, access to this grave for burial purposes may have been privileged.

Comparison of the origins of the skeletons interred in Graves 1972.20 and 1971.22 with seven other graves in their vicinity has implications regarding the social standing of any individuals of foreign origin buried in this area. I also sampled representatives from the relatively simpler graves in the area for which archaeological dating is less secure. Though TH grave A and B, and Graves 1968.06 and .07 may date later than the rest of the sampled graves, I have included them here as they form a useful comparative sample for the later interments in Graves 1971.22 and 1972.20.

The other burial cluster I sampled was located at the west end of the South Stoa. As the skeletal material was not kept from many of the graves excavated in the western end of the South Stoa due to the early date of those excavations, the only individuals available for isotopic analysis from this area were those buried in ways which the original excavators considered anomalous (Davidson and Horváth, 1937; Weinberg, 1974). I sampled three of these graves for isotopic testing. I also sampled three other isolated burials in the surrounding area of the ancient Roman forum. These individuals form a comparative sample with the South Stoa burial cluster. One of these samples is from an individual buried in a grave of unknown morphology in the northeastern portion of the forum (Forum NE grave at j : 66). The other two samples are from a three-grave unit constructed against the north side of Temple G, located to the west of the South Stoa (Graves 1969.30 and 1969.37). Williams et al. (1974: 11) noted that these graves were all placed in the same cut dug into the side of the temple which was divided into three compartments for one interment each: a man, a woman, and a child. While the skeleton of the man is not preserved, I sampled the woman and the child for isotopic analysis.

7.1.2 Dental sampling criteria and methodology

In order to identify the skeletons of individuals who spent their childhood far from Corinth, I sampled tooth enamel from second molars to characterize geographic residence of the deceased when they were 3-7 years of age. I did not sample bone from these graves. While adult cortical bone remodels over the course of an individual's life, and therefore could be used to estimate geographic residence nearer to the time of death (Price et al., 2000), this value changes slowly in response to local conditions as bone remodels, and a bulk sample might represent up to 20 years of mobility and migration events (Montgomery, 2002). As enamel does not remodel, it reflects the geochemical signature of an individual's place of residence during childhood development of the enamel crown itself (Sealy et al., 1995). Since amelogenesis or enamel formation is an incremental process, some mobility research focuses on collecting sequential samples from these enamel layers in order to characterize seasonable movement (Fricke and O'Neil, 1996; Pellegrini et al., 2011). Due to the scope of this study in identifying locals versus nonlocals to one city, however, I used bulk enamel samples in order to average seasonal differences in rainfall and short distance migratory events.

The focus on enamel as a tissue choice is particularly useful in environments with poor bone preservation and commingling of skeletal remains, such as at Corinth. On one hand, it is difficult to match postcranial elements with individuals from commingled contexts. On the other, diagenesis of the chemical composition of apatite related to preservation is reduced in enamel (Hoppe et al., 2003; Kohn et al., 1999; LeGeros, 1991; Shellis and Dibdin, 2000). Since contaminants from the burial environment are concentrated on the outer surface and do not penetrate the inner enamel layers, they can be removed via mechanical removal of the outer enamel surface and pretreatment in weak acid (Bentley, 2006; Budd et al., 2000; Montgomery et al., 1999;

Price et al., 1992; 1994; Waldron, 1981, 1983). In the process of sampling enamel, however, tooth dentine was also collected from many skeletal individuals and could be used as a comparative tool in the future. This focus is outside the scope of the current study.

This research focused on second molars as these enamel crowns form between 3-7 years of age (Smith, 1991). By this age the oxygen isotopic composition of enamel should no longer be markedly enriched by breastfeeding (Bourbou et al., 2013; Bourbou and Garvie-Lok, 2009, 2015; Lascaratos and Poulakou-Rebelakou, 2003; Wright and Schwarcz, 1998). According to Late Antique legislation, betrothal was common for girls before they turned 10, and marriage required to follow within the next 2 years or risk having the betrothal legally broken (*Cod. Theod.* 3.5.4-5, 3.5.7-11). These laws imply that women reached the age of majority at around 10-12 years. It is likely that men remained minors for longer than women; men were recruited to the imperial army when 19 (*Cod. Theod.* 7.13.1). The use of second molars provides data on childhood residence in order to differentiate it from post-marital residence. As it is possible that some migrations would have involved entire family units, children and adolescents were also analyzed, especially those from multiple interments.

In order to ensure that each individual was only sampled once, molar side and the choice of a maxillary or mandibular molar was held constant for age class for each grave. This focus on osteological inventory and tooth identification allowed me to preferentially use loose teeth, even from commingled contexts. I collected these samples during the summer of 2014 using a dremel rotary hand tool with a diamond disc. After careful examination of dental morphology, pathology, and damage, including use of the Arizona State University Dental Anthropology System to score dental nonmetric traits (Turner et al., 1991), a transverse section was taken from the cusp showing the least diagnostic morphology. This section of tooth enamel spanned the cement-enamel junction to the crown, and was large enough to enable both oxygen and strontium isotopic analyses to be completed (Tables VII.2 and VII.3). This bulk sample was transported to Texas A & M University for laboratory analysis.

7.2 Laboratory Methodology

7.2.1 Preparation for isotopic analysis

I prepared the samples for isotopic analysis at the Texas A&M University Biological Anthropology Isotope Laboratory following methods established by Wright et al. (2010) and based on standard treatment for diagenesis (Bentley, 2006; Knudson, 2009; Koch et al., 1997; Price et al., 1992). Using a dremel hand tool, the surfaces of each enamel fragment was manually cleaned by abrasion to remove outer surface contamination. I visually examined each fragment to makes sure this procedure removed any discolored enamel or adhering dentine. As carbonate content increases with distance from the outer surface, this process also increases the concentration available for oxygen isotope analysis in the mass spectrometer (LeGeros, 1981; Legeros et al., 1996; Sydney-Zax et al., 1991). Samples were then subdivided for oxygen and strontium analysis, and I continued treatment of the strontium isotopic samples separately in the R. Ken Williams '45 Radiogenic Isotope Geosciences Laboratory (hereafter RIGL, https://geosciences.tamu.edu/facilities/radiogenic-isotope-geosciences-facility/index.php) under the supervision of Dr. Debbie Thomas.

For oxygen isotopic analysis, each enamel chunk was then cleaned with 0.25 M HCl for one minute, rinsed, and then dried overnight. Once completely dry, each sample was ground with an agate mortar and pestle to produce a fine powder less than 50 µm in size. Enamel powder was then treated for organic contaminants through soaking for 48 hours in a ~1.5% sodium hypochlorite solution then rinsed. Following this, samples were subjected to a series of washes to treat for diagenesis: first for 15 minutes in 1 M acetic acid buffered to 4.5 pH with NaOH, and then with distilled water. Samples were then dried overnight in a low temperature oven prior to isotopic analysis.

Following receipt of the oxygen isotopic results, I removed between 5 to 20 mg of tooth enamel for each of the 25 samples selected for strontium isotopic analysis. Strontium samples were processed in the ultra-clean chemistry room at RIGL following methods established by Knudson (2004). I first chemically cleaned the enamel fragments to remove the remainder of diagenetic contaminants. Each chunk was sonicated in Milipore (MQ) water for 30 minutes and the supernatant discarded, then rinsed with 1 M acetic acid and sonicated for another 30 minutes. The acetic acid was discarded, and then the acetic rinse was repeated one more time. After discarding the supernatant, the enamel chunk was rinsed again in 1 M acetic acid and sonicated for 5 minutes, then finally rinsed three times with MQ. These clean enamel samples were then dissolved in 1000 μL of 3 N HNO_3 overnight. I then evaporated the samples and redissolved them in 500 μL of 3 M nitric.

This dissolved sample was then loaded into SrSpec columns to separate the strontium from the sample matrix. I loaded SrSpec pre-soaked in MQ into the tip of each column, and then cleaned the resin using repeated washes of MQ to remove any strontium already present. After conditioning the resin to the sample matrix with 3 N HNO_3, 0.5 mL of each sample was loaded to each column. Strontium from the samples was fixed to the resin using a rinse of 3 drops of 3 N HNO_3, and then each sample was washed four times with 0.3 mL of 3 N HNO_3. Strontium was eluted with 2 washes of 0.5 mL, then 0.3 mL MQ. The day before loading into the mass spectrometer, one drop of 0.3 N H_3PO_4 was added to each elution, and the samples were evaporated. To load samples onto filaments for analysis, I first dissolved each sample in 1 μL H_3PO_4, then dried and sealed it onto the filament using about 0.5 μl of TaF activator.

7.2.2 Isotopic analysis

At the Stable Isotope Geosciences Facility (SIGF, http://stableisotope.tamu.edu/), $\delta^{18}O$ was measured using the Kiel IV Automated Carbonate Device coupled to the 10-kV Thermo Scientific MAT 253 Isotope Ratio Mass Spectrometer. Based on current estimates of carbonate content in hydroxyapatite of enamel of about 2.5-5 wt% (LeGeros, 1981; LeGeros et al., 1996; Syndney-Zax et al., 1991), a target analysis weight was established at 1.5 mg. 1.8-2.0 mg of enamel powder was preferentially

Table VII.2. Sample information and oxygen and carbon isotopic ratios for graves located north of the city of Corinth.

Burial Location	Grave Number	Sample ID[a]	Sample (mg)	Analysis (mg)	$\delta^{13}C_{PDB}$ (‰)	$\delta^{18}O_{PDB}$ (‰)	$\delta^{18}O_{SMOW}$ (‰)
Asklepieion	1931.24	01 : M, YA, RM^2	84	2.046	-11.95	-3.23	27.58
	1931.26	02 : M?, MA, RM^2	163	1.975	-12.40	-3.25	27.56
	1931.29	03 : M?, MA, RM^2	147	2.069	-13.35	-3.10	27.71
	1931.30	04 : M? MA[c]	148	1.900	-8.15	-2.17	28.68
	1931.31	05 : M?, MA, RM_2	179	2.092	-12.78	-3.02	27.80
Gymnasium	Gym.2	13 : F[d], OA[d], LM_2	72	2.000	-8.17	-3.89	26.90
	1965.14/Gym.5	14 : skel B, I, YA, LM_2	157	1.936	-12.29	-3.43	27.37
		15 : skel C, I, AO, LM_2	164	2.144	-12.50	-4.51	26.27
		16 : skel D, I, YA[b], LM_2	160	1.992	-13.33	-2.00	28.85
		17 : skel E, I, YA[b], LM_2	170	2.142	-12.95	-3.09	27.72
	Gym.17	18 : M? [d], YA, LM_2	125	2.011	-12.64	-2.87	27.95
	1966.07/Gym.29	19 : M?, MA[b], LM_2	101	1.958	-12.45	-3.63	27.17
	1966.04/Gym.53	20 : skel E, I, YA[b], RM_2	134	1.936	-12.55	-4.26	26.52
		21 : skel G, I, AO, RM_2	157	2.084	-12.55	-3.76	27.04
		22 : skel I, I, YA[b], RM_2	265	2.121	-11.43	-3.06	27.75
		23 : skel K, I, MA[b], RM_2	136	1.946	-12.50	-4.52	26.25
		24 : skel L, I, YA[b], RM_2	254	1.981	-12.16	-2.32	28.52
		25 : skel M, I, AO, RM_2	158	2.083	-12.38	-2.55	28.28
	1967.03/Gym.73	26 : F?, YA[b], LM_2	134	2.17	-12.77	-3.07	27.74
	1967.13/Gym.86	27 : F?, YA[b], RM_2	176	2.087	-12.49	-3.25	27.56
	Gym.80	28 : I, MA[b], LM_2	188	2.095	-13.04	-3.41	27.40
Recessed Bedrock Burial Area	1967.10/Gym.69C	29 : C, LM_2	122	2.125	-12.79	-2.58	28.25
	1967.10/Gym.69A	30 : skel A, C, RM_2	92	1.969	-12.72	-1.63	29.23
		31 : skel D, I, MA[b], LM_2	109	2.235	-12.47	-2.32	28.52
	Gym.89	38 : C, LM_2	202	2.170	-10.38	-3.11	27.70
	1967.04/Gym.70	32 : F, YA[b], RM_2	138	1.042	-12.50	-2.59	28.24
	Gym.83	35 : M?, YA[b], RM_2	121	2.068	-8.37	-3.60	27.20
	1967.12/Gym.77	33 : skel B, I, YA[b], RM_2	101	2.030	-12.07	-3.50	27.31
		34 : skel A, I, MA[b], LM_2	268	2.065	-11.93	-2.65	28.18
	1967.08/Gym.84	36 : skel A, C, LM_2	244	1.888	-12.42	-4.18	26.60
		37 : skel B, I, MA[b], LM_2	146	1.921	-12.06	-3.65	27.14
	1969.49-50/Gym.96	43 : skel B, M?, YA[b], LM_2	208	1.396	-12.18	0.61	31.54
	1969.53/Gym.97	44 : skel A, M?, MA, RM_2	173	1.518	-12.67	-2.94	27.87
		45 : skel B, F, YA, LM_2	198	1.345	-12.74	-3.43	27.37
		46 : skel E, F, YA, RM_2	175	1.434	-12.82	-2.83	27.99
				Mean	-12.11	-3.05	27.8
				Standard Deviation	1.31	0.93	0.96

[a] During osteological analyses, I sorted skeletal remains and dentitions from commingled contexts among individual skeletons, here represented by letter. Age estimates are: C, child, 3-12 yrs; AO, adolescent, 12-20 yrs; YA, young adult, 20-35 yrs; MA, middle adult, 35-50 yrs; OA, old adult, 50+ years. Sex estimates are: M, Male; M? probable male; F, Female; F? probable female; I, sex indeterminate. Tooth identification by position in the dental arcade: RM_2, right mandibular molar; LM_2, left mandibular molar; RM^2, right maxillary molar; LM^2, left maxillary molar.

[b] Age class estimated using dental attrition with comparison to the rest of the archaeological population.

[c] Angel, 1942

[d] Angel quoted in Wiseman, 1969

Table VII.3. Sample information and oxygen and carbon isotopic ratios for graves located in the ancient city center.

Burial Location	Grave Number	Sample ID[a]	Sample (mg)	Analysis (mg)	$\delta^{13}C_{PDB}$ (‰)	$\delta^{18}O_{PDB}$ (‰)	$\delta^{18}O_{SMOW}$ (‰)
South Stoa	1937.15-9	06 : F?, YA, RM^2	166	1.937	-12.63	-2.84	27.98
		07 : F?, YA, RM^2	150	1.981	-12.09	-3.98	26.80
	1937.25	08 : M?, MA, RM^2	128	1.907	-11.80	-2.26	28.58
	1938.10	10 : M?, MA[c], LM$_2$	45	1.822	-10.45	-3.91	26.88
Forum NE	Agora NE j : 66	09 : F, MA, RM^2	215	0.968	-12.06	-3.74	27.05
Temple Hill	TH gr A	11 : F?, YA, RM$_2$	200	1.992	-12.84	-2.77	28.06
	TH gr B	12 : F?, MA, RM$_2$	180	1.929	-12.35	-4.07	26.72
	1968.06	39 : M? [d], YA, RM$_2$	202	2.194	-12.20	-4.03	26.76
	1968.07	40 : F?, YA[b], RM$_2$	136	2.069	-10.27	-4.27	26.51
	1970.01	47 : M?, OA, LM$_2$	157	1.467	-12.73	-3.23	27.58
	1971.19-20	48 : skel A, M, MA, LM$_2$	203	1.505	-12.52	-3.86	26.93
		49 : skel B, M?, MA, RM$_2$	211	1.465	-12.77	-3.95	26.84
		50 : skel C, I, YA, RM$_2$	323	1.508	-12.55	-3.11	27.70
		51 : skel D, M, YA, RM$_2$	130	1.544	-12.00	-3.13	27.68
	1971.21	52 : M?, YA, RM$_2$	215	1.364	-12.36	-2.66	28.17
	1971.22	53 : skel A, I, AO, LM$_2$	245	1.450	-12.05	-3.52	27.28
		54 : skel C, I, YA[b], LM$_2$	151	1.456	-7.48	-2.96	27.86
		55 : skel D, I, MA[b], LM$_2$	232	1.347	-11.81	-3.32	27.49
		56 : skel E, I, MA[b], LM$_2$	198	1.446	-8.33	-2.48	28.35
		57 : skel F, C, LM$_2$	166	1.629	-11.91	-3.52	27.28
	1972.20 (12th c +)	58 : skel C, I, MA[b], RM$_2$	241	1.023	-12.72	-3.31	27.50
		59 : skel D, I, AO, RM$_2$	277	1.450	-12.30	-2.76	28.06
		60 : skel E, I, AO, RM$_2$	266	1.424	-12.00	-3.15	27.66
		61 : skel G, C, RM$_2$	160	1.400	-12.05	-4.20	26.59
		62 : skel I, I, MA[b], RM$_2$	187	1.457	-12.43	-1.56	29.30
	1972.20 (8th c +)	63 : skel K, I, YA[b], RM$_2$	207	1.475	-11.92	-3.50	27.30
		64 : skel M, I, YA[b], RM$_2$	231	1.530	-12.05	-4.03	26.76
		67 : skel P, I, YA[b], RM$_2$	173	1.382	-12.31	-3.40	27.41
		71 : skel V, I, AO, RM$_2$	181	1.505	-12.47	-3.17	27.64
	1972.20 (6th-8th c)	65 : skel N, C, LM$_2$	128	1.189	-8.96	-4.48	26.30
		66 : skel O, C, RM$_2$	63	1.406	-11.39	-4.45	26.33
		68 : skel Q, F?, YA, RM$_2$	295	1.504	-13.03	-5.09	25.66
		69 : skel R, I, AO, RM$_2$	293	1.467	-11.64	-3.25	27.56
		70 : skel S, M, YA, LM$_2$	299	1.460	-6.86	-4.71	26.05
Temple G	1969.30	41 : F? YA, RM$_2$	127	1.492	-11.34	-4.00	26.79
	1969.37	42 : C, LM$_2$	50	1.481	-10.96	-3.37	26.51
				Mean	-11.60	-3.50	27.3
				Standard Deviation	1.48	0.73	0.76

[a] During osteological analyses, I sorted skeletal remains and dentitions from commingled contexts among individual skeletons, here represented by letter. Age estimates are: C, child, 3-12 yrs; AO, adolescent, 12-20 yrs; YA, young adult, 20-35 yrs; MA, middle adult, 35-50 yrs; OA, old adult, 50+ years. Sex estimates are: M, Male; M? probable male; F, Female; F? probable female; I, sex indeterminate. Tooth identification by position in the dental arcade: RM$_2$, right mandibular molar; LM$_2$, left mandibular molar; RM^2, right maxillary molar; LM^2, left maxillary molar.

[b] Age class estimated using dental attrition with comparison to the rest of the archaeological population.

[c] Angel quoted in Weinberg, 1974

[d] Burns, 1982

loaded into the individual septum-free vials when this amount was available to ensure an adequate CO_2 pressure during analysis. CO_2 gas was evolved in individual acid baths using phosphoric acid under 75°C, and diffused into the mass spectrometer under medium vacuum pressure. Based on long term daily measurements of the international carbonate standard, NBS-19, the SIGF facility reports analytical uncertainties of 0.04‰ for $\delta^{13}C_{VPDB}$ and 0.06‰ for $\delta^{18}O_{VPDB}$. Both $\delta^{18}O$ and $\delta^{13}C$ collection was reported relative to the NBS-19 standard (vPDB) with an external precision (1σ) of 0.03‰ for $\delta^{13}C$ and 0.07‰ for $\delta^{18}O$. Analyses were calibrated with the standard every 11^{th} run.

At SIGF, sample runs were monitored carefully to determine data quality, and samples were run in duplicate if CO_2 evolution was lower than expected, as this can be an indication of low carbonate content in samples. Instrumentation was not able to determine the amount of CO_2 evolved for samples 09, 21, and 32 despite each being run more than once. However, both values obtained for each of these samples were consistent relative to the standard, which indicated that the obtained $\delta^{18}O_{ap(VPDB)}$ represent original carbonate values for all analyses. Tables VII.2 and VII.3 report these data. I have converted the $\delta^{18}O$ values to their ratio relative to the vSMOW standard (noted as $\delta^{18}O_{CO3(VSMOW)}$) in the following report to enhance comparability with published studies.

I measured $^{87}Sr/^{86}Sr$ ratios using the Thermo Scientific Triton Plus multicollector thermal ionization mass spectrometer (TIMS) at RIGL. The internal $^{86}Sr/^{88}Sr$ value of 0.1194 was used to correct for mass fractionation, and rubidium interference was determined along with $^{87}Sr/^{86}Sr$ and corrected using $^{87}Rb/^{85}Rb = 0.386$. Sample $^{87}Sr/^{86}Sr$ was calibrated with strontium standard NBS 987, which yielded an average value of 0.7102393 ± 15.2‰ from 2013 through 2016. Internal precision for strontium carbonate runs on this machine for this research varied between .000004 to .000006 standard error.

7.3 Oxygen and Carbon Isotopic Results

Tooth enamel exhibits $\delta^{18}O_{CO3(VSMOW)}$ of 25.66 to 31.54‰, with a mean value of 27.53‰ and standard deviation of 0.88 ($\delta^{18}O_{CO3(VPDB)}$ = -5.09 to 0.61‰, mean -3.82‰, s = 0.86‰). Stable isotopic values of $\delta^{13}C_{ap(VPDB)}$, which were obtained simultaneously from these enamel fragments, range from -13.35 to -6.86‰ with a mean of -11.84‰ and a standard deviation of 1.41‰. Individuals from both areas of the site display $\delta^{18}O_{CO3(VSMOW)}$ and $\delta^{13}C_{ap(VPDB)}$ values distributed throughout the observed range. These data are summarized in Figure VII.1 for Corinth.

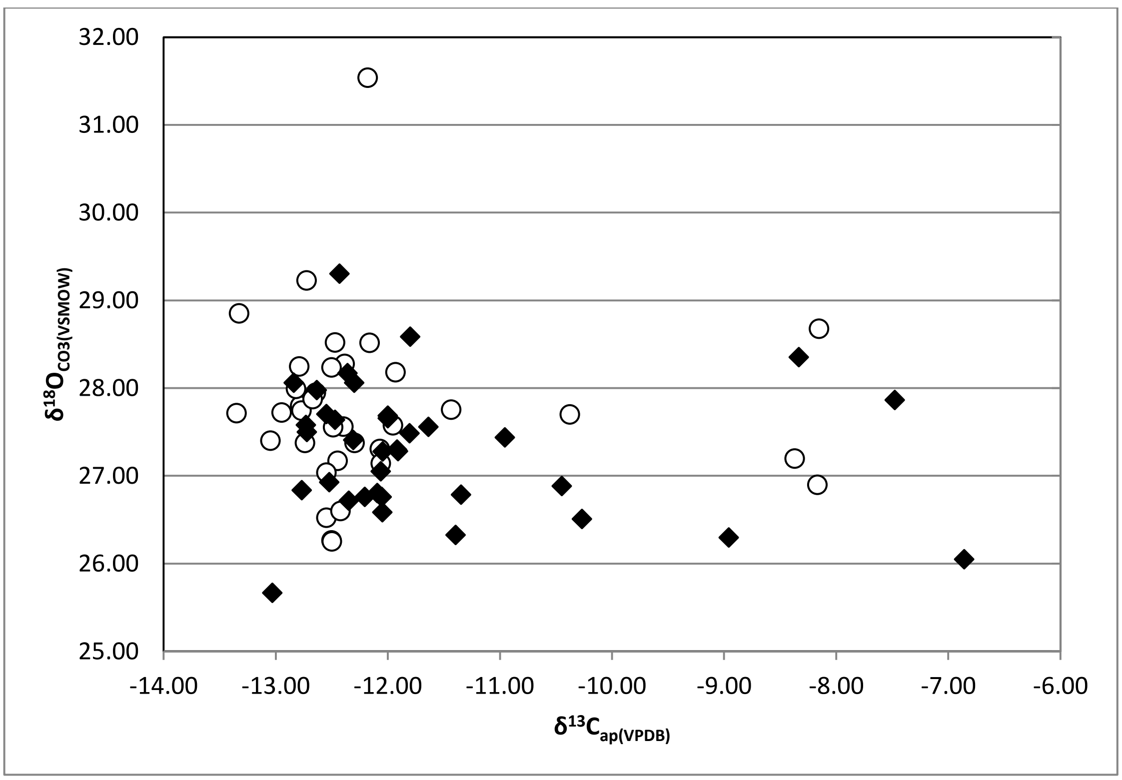

Figure VII.1. Late Antique Corinth $\delta^{18}O_{CO3(VSMOW)}$ and $\delta^{13}C_{ap(VPDB)}$. Samples taken from graves north of the city are represented by open circles, while samples taken from graves in the ancient city center are represented by closed diamonds.

7.3.1 Sample distribution

Visual survey of this data identifies a number of clear outliers in both $\delta^{13}C_{ap}$ and $\delta^{18}O_{CO3}$ values, though this variation does not correspond with the locations these individuals were buried on site. Figure VII.2 shows the frequency distribution of oxygen isotopic values for this population. This distribution includes one outlier, Sample 43, a probable male young adult buried north of the city (Corinth Grave 1969.49-50/Gym.96). Sample 43 is enriched in ^{18}O compared to the majority of individuals, with a $\delta^{18}O_{CO3(VSMOW)}$ of 31.54‰ ($\delta^{18}O_{ap(VPDB)}$ = 0.61‰). When this individual is removed from the analysis, $\delta^{18}O_{CO3(VSMOW)}$ is consistent with a normal distribution of values (kurtosis = -.01, skewness = .07, Shapiro-Wilk W=0.9934, p=.98), as would be expected in a population with a shared water source. Thus, the conservative estimate of local $\delta^{18}O_{CO3(VSMOW)}$ for Late Antique Corinth is 27.5 ± .74‰.

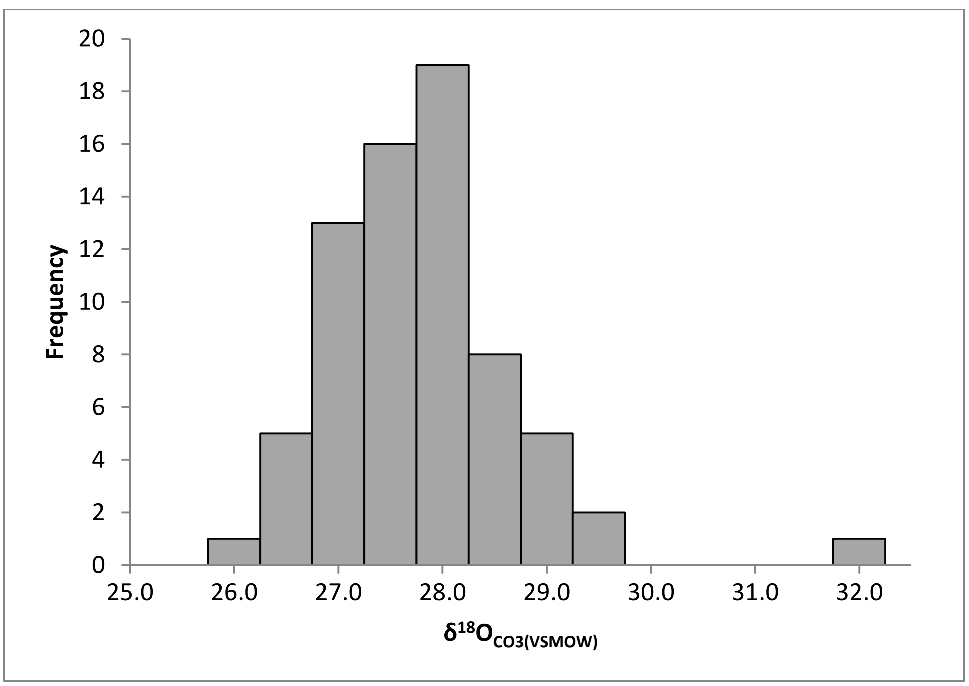

Figure VII.2. Histogram showing distribution of $\delta^{18}O_{CO3}$ relative to vSMOW (‰). One clear outlier is present in these data.

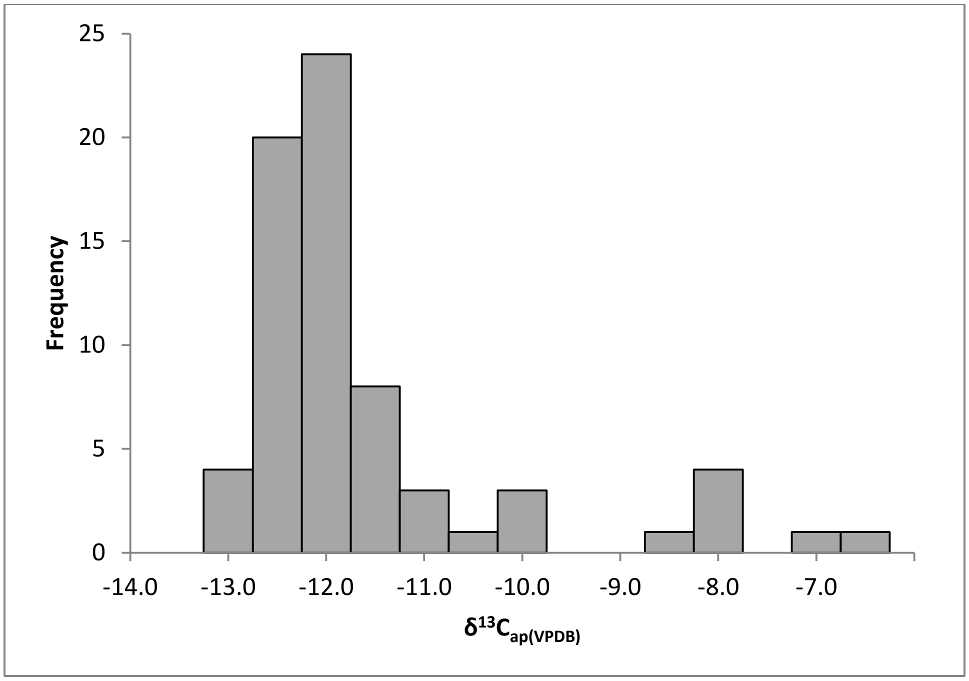

Figure VII.3. Histogram showing distribution of $\delta^{13}C_{ap}$ relative to vPDB (‰). A bimodal distribution is present in these data, indicating dietary differences within this population.

Figure VII.3 shows the distribution of carbon isotopic data in this sample. Two clear groups are visible, and both include individuals buried north of the city and in the city center. The cluster showing lower $\delta^{13}C_{ap(VPDB)}$ values ranges from -13.35 to -10.27‰, and is skewed to the right. Higher $\delta^{13}C_{ap(VPDB)}$ values, from -8.96 to -6.86‰, are present in the other group. A smaller portion of the population, N=7, is present in the group relatively enriched in ^{13}C. The histogram of these data highlights this bimodal distribution. The $\delta^{18}O_{CO3}$ outlier, Sample 43, falls within the group of samples with lower carbon isotope ratios, with a $\delta^{13}C_{ap(VPDB)}$ of -12.18‰. Thus, dietary differentiation is present among these samples, though it may not be a result of geographic origin. Differences in diet may be a result of the incorporation of C_4 as well as C_3 plants, consumption of meat or milk products from animals foddered on C_4 plants, or increased reliance on marine resources for a subset of the population.

7.3.2 Local values

In order to discuss residential mobility in the Corinthian sample, individuals whose $\delta^{18}O$ values appear nonlocal must be identified in comparison to those of others buried in the area. This is dependent on reliable characterization of locals. When the one clear $\delta^{18}O$ outlier, Sample 43, is removed from the population, sampled tooth enamel displays a mean $\delta^{18}O_{CO3(VSMOW)}$ of 27.5‰ with a standard deviation of 0.74‰. Thus, the majority of the Late Antique samples fall within the range identified as local for 13th century AD Corinth by Garvie-Lok (2009), $\delta^{18}O_{CO3(SMOW)} = 26.3 \pm 0.7$‰, though with a slight shift toward heavier values. If 27.5 ± .74‰ is taken to reflect the true distribution of $\delta^{18}O_{CO3(VSMOW)}$ for the Late Antique population, 95% of local $\delta^{18}O_{CO3}$ values would be expect to fall within 2 standard deviations from the mean, or 28.95 to 25.99‰. Using this criterion, three individuals are outside the expected range of values along with Sample 43. Sample 68 is depleted in ^{18}O relative to the rest of the population, and Samples 62 and 30 are relatively enriched in ^{18}O.

Archaeological populations in which few individuals are of foreign origin and food and water is locally sourced have been suggested to show a $\delta^{18}O$ range around 2‰ or lower (France and Owsley, 2015; Mitchell and Millard, 2009; White et al., 2004b). Under this criterion, the proposed local range calculated above might overestimate population variability. A more restricted estimate of local variation would suggest local $\delta^{18}O_{CO3(VSMOW)}$ ranged from 28.5 to 26.5‰. However, as Figure VII.4 shows, only those individuals on the lower end of the distribution of $\delta^{18}O$ values are bending out of the expected plane. This includes Samples 15, 23, 65, 66, 68, and 70 that are relatively depleted in ^{18}O. Though Samples 4, 8, 16, 24, 30, 31, and 62 are enriched in ^{18}O, only Sample 30 is far from the expected value. Using Chauvenet’s or Peirce’s criterion, Sample 43 is the single individual who can be excluded from this population (Gould, 1855; Ross, 2003; Taylor, 1997). The rest of these data cannot be excluded, despite their presence outside the range usually considered “local” for archaeological populations.

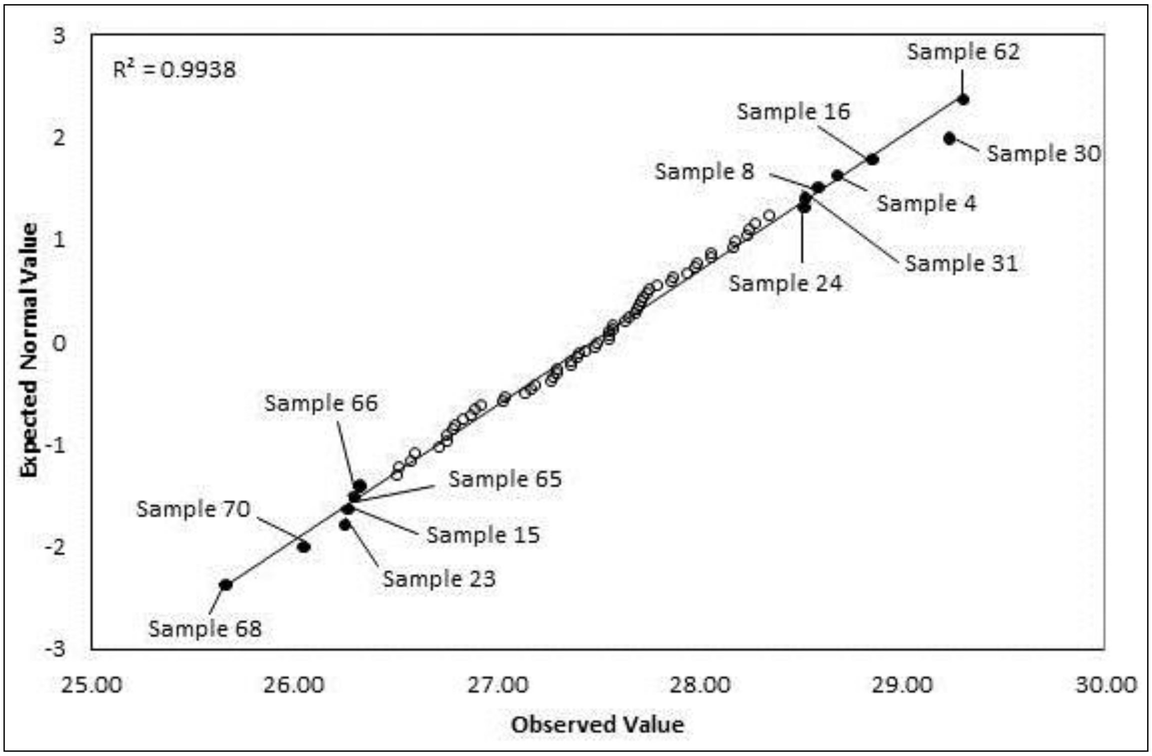

Figure VII.4. Normal Q-Q probability plot for average $\delta^{18}O_{CO3}$ values in Corinth tooth enamel. The outlier (Sample 43) is excluded. Filled circles are individuals more than 2‰ from the mean.

Thus, in the following discussion I retain the conservative estimate of 26.76 – 28.24‰ to refer to the "local" range for Late Antique Corinth. However, based on a visual inspection of the normality plot in Figure VII.4, samples displaying values in the tails of the normally distributed values, especially those bending out of the expected plane, may also represent nonlocals. It is also possible that this large range is a result of high mobility, and I will use strontium isotopic results for these samples to further test the meaning of $\delta^{18}O_{CO3(VSMOW)}$ variation.

Conversion equations are necessary to calculate drinking water values ($\delta^{18}O_{bw}$) from human tissue $\delta^{18}O$ values. For this study, I use France and Owsley's (2015) equation for the isotopic spacing between structural carbonate and phosphate in humans (Equation 1, below) and the relationship observed by Daux et al. (2008) for $\Delta^{18}O_{PO4\text{-}bw}$ (Equation 2) to calculate the isotopic ratio of local drinking water. Using the average y-intercept at -33.7‰$_{SMOW}$, the range for local drinking water falls at -2.99 ± 1.82‰$_{VSMOW}$. If the y-intercept is shifted to reflect the lowest value in the range covered by Daux and colleagues' (2008) relationship, this in turn lowers the $\delta^{18}O_{dw}$ to -4.50 ± 1.82‰$_{VSMOW}$.

Equation 1: $\delta^{18}O_{CO3} = 0.63\ (\delta^{18}O_{PO4}) + 14.9$ (France and Owsley, 2015).

Equation 2: $\delta^{18}O_{bw} = 1.54\ (\pm 0.09) \times \delta^{18}O_{PO4} - 33.72\ (\pm 1.51)$ (Daux et al., 2008).

This range is higher than that estimated from modern rainwater at Corinth, which I calculate to be -5.5 ± 0.4‰$_{VSMOW}$ using the OIPC (Bowen, 2015; Bowen and Revenaugh, 2003). However, it is roughly congruent with expected values given the time difference and the error built into these calculations. Rainfall $\delta^{18}O$ during late antiquity may reasonably have differed from modern values, especially as climatic conditions during these years may have had an additional impact on rainfall patterns. In fact, a dust veil event in AD 536 resulted in a cooler, drier climate for half a decade throughout the Northern Hemisphere, as evidenced by dendrochronology (Baillie, 1994; Baillie and Munro, 1988). In the Mediterranean, this climate change is thought to have resulted in drought and famine as well as the AD 542 outbreak of the bubonic plague (Baillie, 1994; Hirschfeld, 2006). Rainfall in the latter half of the 6th century AD can be expected to display $\delta^{18}O$ relatively depleted in ^{18}O than that in modern records. Recent estimates further suggest that human body water would typically be offset by +1.05 to 1.2‰ above drinking water $\delta^{18}O$ values due to the incorporation of cooked foods in the diet (Daux et al., 2008).

These values are, thus, also consistent with expected rainwater $\delta^{18}O$ from much of the Peloponnese, Athens, the Cycladic Islands, and Turkey, such as along the coast on the islands of Chios and Lesbos and the site of Pergamon, and much of Italy, including Rome. In comparison to other archaeological populations, the local range of 26.76 to 28.24‰ at Corinth overlaps with a number of sites around the Mediterranean Sea. In comparison, the range 26.8 to 24.7‰ reported for Roman archaeological samples is slightly depleted in ^{18}O (Prowse et al., 2007). Ranges for sites on the Levantine coast

(24.26 to 27.07‰; Mitchell and Millard, 2009), inland Jordan (28.0 to 31.1‰; Perry et al., 2009, 2011), and upper Egypt (averaged at 28.2‰; Dupras and Schwarcz, 2001) also partially overlap that of Corinth. It is therefore possible that at least some of the samples that cannot be excluded from the local range may also be of foreign origin.

7.3.3 Oxygen isotopic distribution at Corinth

These data span three centuries of occupation at the site of Corinth, and it is reasonable to assume that cultural or societal factors may have changed during that time period in addition to shifting climatic conditions. For example, defined waves of foreigners may have migrated to the city over a relatively short period of time, or trade patterns may have shifted, enabling contact with different areas of the Mediterranean basin. Therefore, I first used statistical analyses to examine the impact of chronological change on the pooled dataset. These data are summarized in Table VII.4. Figure VII.5 shows how these ranges overlap, though Period III displays the lowest $\delta^{18}O_{CO3(VSMOW)}$ overall. Using only the data from burials securely dated to late antiquity, differences between time periods are significant in a one-way ANOVA ($F=3.19$, $df=2$, $p=.049$).

The samples from the tails of the normal distribution may be responsible for this trend. Four of the six samples displaying the lowest $\delta^{18}O_{CO3(VSMOW)}$ values date to Period III (Samples 65, 66, 68, and 70 are from Period III, while Samples 15 and 23 are from Period II). This concentration may imply an influx of migrants from a relatively cooler environment during this time period. On the other hand, the seven samples with relatively high $\delta^{18}O_{CO3(VSMOW)}$ are present in all three periods, implying foreigners from a relatively warmer and drier environment may have migrated during a longer and more gradual process. When all of these possible nonlocals are excluded from the ANOVA comparing $\delta^{18}O_{CO3(VSMOW)}$ for different time periods, these chronological divisions are not significantly different, though the mean value drops steadily slightly with each archaeological period ($N=47$, $df=3$, $F=.97$, $p=.415$). As a result, it appears chronological differences may be a result of period-specific mobility.

Table VII.4. Chronological distribution of oxygen isotopic ratios ($\delta^{18}O_{CO3(VSMOW)}$).

Archaeological Age of Sample	N	Mean $\delta^{18}O_{CO3}$ (‰)	St. Dev.	Minimum Value (‰)	Maximum Value (‰)
Period I: late 5th – 6th c AD	7	28.0	.79	26.90	29.23
Period II: mid- to late 6th – 7th c AD	31	27.7	.95	26.25	31.54
Period III: mid-7th – 8th c AD	20	27.2	.76	25.66	28.58
Late Antique (NPD)	2	n/a	n/a	26.51	26.76
8th c AD or later	11	27.6	.77	26.59	29.30

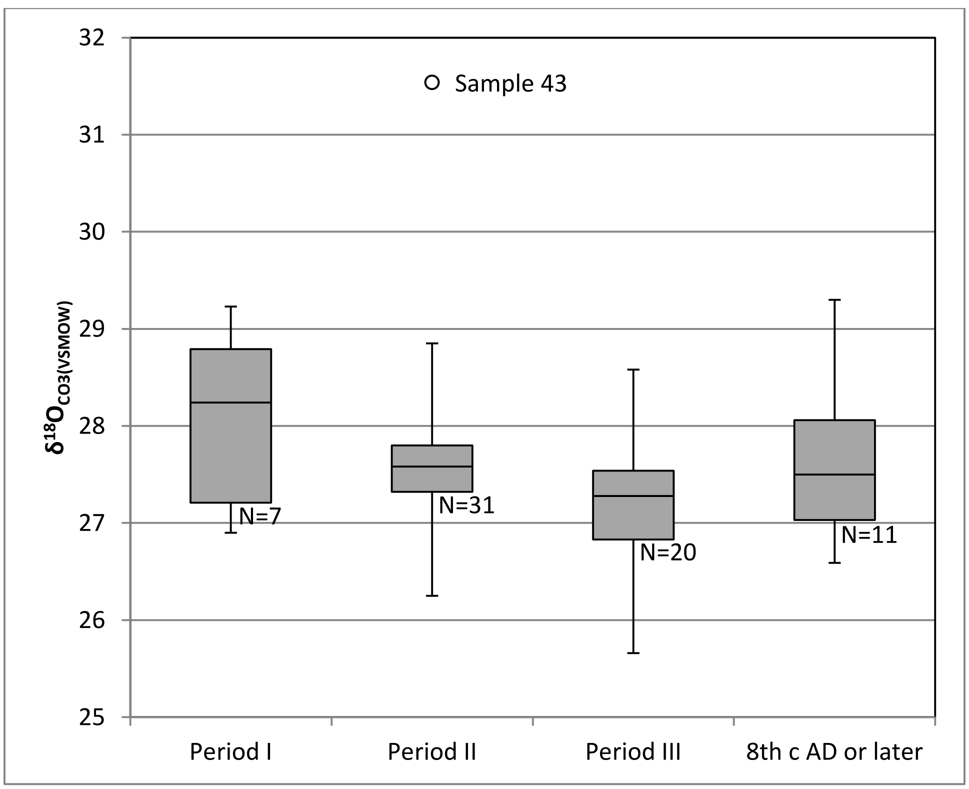

Figure VII.5. Oxygen isotopic ratios ($\delta^{18}O_{CO3(VSMOW)}$) by archaeological period. Box plots display the median value for each period with a horizontal line, and the filled boxes show the interquartile range of the data. The outlier is labeled.

Possible nonlocals are also found in both burial areas and are not restricted to a particular sex or age at death. After excluding all possible non-locals, $\delta^{18}O_{CO3(VSMOW)}$ is not significantly different between burial areas ($t=.93$, $df=45$, $p=.356$). Mean values within this group are also almost identical between sexes (males $N=14$, $27.5 \pm .42‰$; females $N=8$, $27.5 \pm .58‰$; $t=.19$, $df=20$, $p=.852$), and among age classes ($N=5$ children, 5 adolescents, 22 young adults, 13 middle adults, and 2 old adults, ANOVA $F=.16$, $df=4$, $p=.955$). Additionally, both adults and children are included among the possible nonlocals from both tails of the $\delta^{18}O_{CO3(VSMOW)}$ distribution. Of the three adults depleted in ^{18}O, sexing criteria was only preserved for one (a female), and only for three of the six adults enriched in ^{18}O, including the outlier (all male). Poor preservation may account for this sex discrepancy.

Though isotopic distributions are not meaningfully patterned according to demographic criteria, they may correspond with other social divisions within the city of Corinth. Mortuary correlates of status, especially buckles in Period II grave assemblages or weapons in Period III, may have been placed at the side of particularly important community leaders. Social membership may also have been more often displayed through burial placement than by the inclusion of burial objects. Multiple interment tombs are present in all burial locations, and graves are clustered together in a number of places. Thus, the deceased were associated with one another within both cemeteries and grave structures. These spatial groupings may provide a more useful line of inquiry regarding the integration and distribution of individuals of foreign origin in Late Antique Corinth. In this section I examine how spatial variability in mortuary behavior and mortuary correlates of status correlate with isotopic variability through ANOVAs and chi-square tests in the following section. For these analyses, I only include the 61 samples that are from graves that I was able to securely date to late antiquity.

7.3.3.1 Mortuary context of potential migrants

The single clear outlier to the $\delta^{18}O_{CO3}$ data, Sample 43, is from a multiple interment tomb constructed in the recessed bedrock burial area by the ancient

Gymnasium (Grave 1969.49-50/Gym.96). Along with this probable male young adult, the grave contains four other primary burials including two other adults, one adolescent, and an infant. Commemorative lamps are associated with the exterior of the grave, and small ceramic pitchers were placed in the tomb chamber. Two other samples from the upper tail of the $\delta^{18}O$ distribution, Samples 30 and 31, are also from a grave (1967.10/Gym.69A) constructed at the entrance of this burial location and thus connected to the rest of these graves. This triple-chambered rock-cut tomb also contained ceramic vessels, as well as a coin, making it similar to Grave 1969.49-50. The mortuary contexts of the outlier and the other two possible nonlocals does not set them apart from the locals buried in neighboring tombs in this burial area, and implies that migrants may have been buried in the same manner as other Corinthians sharing their social standing or class.

Table VII.5 compares the grave assemblages of possible nonlocals. When all potential migrants are grouped together, compositional differences in grave assemblages are not significantly different for these samples as compared to locals. However, significant differences are present in the artifacts placed within the graves of particular groups of $\delta^{18}O_{CO3(VSMOW)}$ values. The clear outlier, Sample 43, is the only one of these skeletons who was buried in a grave associated with a grave marker or with lamps. This grave is also marked with a stucco mound, and none of the seven samples from graves with associated inscriptions display possible nonlocal $\delta^{18}O_{CO3(VSMOW)}$. Additionally, only those skeletons displaying relatively low $\delta^{18}O_{CO3(VSMOW)}$ values were buried with weapons, and only those with relatively high $\delta^{18}O_{CO3(VSMOW)}$ values were buried with coins. The fact that four of the six skeletons present in the lower tail were all buried in one grave is also highlighted by this table. This mortuary context can thus be considered unique in the types of artifacts present and the concentration of possible nonlocals. Ceramics and jewelry, on the other hand, are present in grave assemblages from all three groups, and differences in the presence of buckles and glass by isotopic group are not significant. As fragments of a glass object is present in a grave containing a skeleton from the lower tail as well as one from the upper tail, this object is also not specifically

Table VII.5. Artifacts in grave assemblages of possible nonlocals identified through oxygen isotopic analysis.

	Grave #	Marker	Lamps	Ceramics	Jewelry	Coins	Buckles	Weapons	Glass
Outlier	1969.49-50/Gym.96	X	X	X					
High $\delta^{18}O_{CO3}$	1931.30								
	1937.25			X	X		X		
	1967.10/Gym.69A (N=2)			X		X			
Low $\delta^{18}O_{CO3}$	1972.20 (N=4)				X		X	X	
Both tails represented	1965.14/Gym.5 (1 low, 1 high)			X	X				
	1966.04/Gym.53 (1 low, 1 high)			X	X				X

associated with one isotopic group, though it is also not present in a tomb containing only locals.

These differences in the types of artifacts associated with isotopic groups are a result of their chronological distribution and mortuary status groups identified in Chapter V. For example, buckles were only placed within two graves containing nonlocals, and both of these interments date to Period III. This implies that one of the samples enriched in ^{18}O (Sample 8 from Grave 1937.25) and four of the six samples depleted in ^{18}O (Samples 65, 66, 68, and 70, buried together in Grave 1972.20) may have all been of similar high social rank despite their disparate geographic origins. This association with high status mortuary correlates also explains the presence of weapons in Grave 1972.20, and in this case also implies that at least one of the deceased interred in this grave held a high status position in the community. In fact, five out of eight of the possible nonlocals are associated with mortuary correlates of the highest tier of status differentiation for Period III as compared to eight out of 39 locals, implying locals may have been less likely to be buried in high status graves (Fisher's exact 2.76, p=.103 in a one-tailed comparison). Possible nonlocals from either tail are also equally likely as locals to be placed in graves with mortuary correlates of ranked status for Period II such as ceramics and jewelry, especially since two of these mortuary contexts each contain a skeleton showing relatively low and relatively high $\delta^{18}O_{CO3(VSMOW)}$ (Fisher's exact .81, p=.292 in a one-tailed comparison).

Mortuary groups which appear to reflect social distinctions such as community membership, on the other hand, are found in all three isotopic groups. A coin was placed in the grave of Samples 30 and 31 (Grave 1967.10A), implying that these skeletons with high $\delta^{18}O_{CO3(VSMOW)}$ are members of mortuary Group 1. Nonlocals are also present in mortuary Group 4 since ceramics were placed in their graves. These samples include the outlier (Sample 43 from Grave 1969.49-50), samples from the upper tail of the normal distribution (Sample 8 from Grave 1937.24, Sample 16 from Grave 1965.14, Sample 24 from Grave 1966.05, and Samples 30 and 31 from grave 1967.10A), and two samples from the lower tail (Samples 15 and 23) as these skeletons were buried in the same graves as Samples 16 and 24, respectively. Among these communities, social distinctions preserved in the mortuary realm thus appear to have included both locals and nonlocals.

Figure VII.6 shows that possible nonlocals are also only present in graves of certain morphologies. The individuals from rock-cut chamber tombs tend to display $\delta^{18}O_{CO3(VSMOW)}$ values relatively enriched in ^{18}O, including the outlier, as compared to the general population of Corinth (ANOVA F=2.53, df=5, p=.04). Samples from built vaults, on the other hand, tend to be relatively depleted in ^{18}O. No samples taken from interments in relatively simply constructed tile graves or pits display a foreign or possibly foreign $\delta^{18}O_{CO3(VSMOW)}$ signature, and neither do the two individuals buried in a reused architectural feature (a drain). Individuals from the tails of the $\delta^{18}O$ distribution are also present in cists and built cists. When the outlier is treated as the high point in the range of values on the upper end of the normal distribution (i.e., pooled with other samples displaying relatively enriched $\delta^{18}O_{CO3(VSMOW)}$), differences in grave morphology among isotopic groups are significant (chi-square=7.63, df=3, p=.054). When compared to probable locals, these differences remain significant (chi-square=18.86, df=10, p=.042), in part due to the fact that the almost half of the samples from built vault tombs

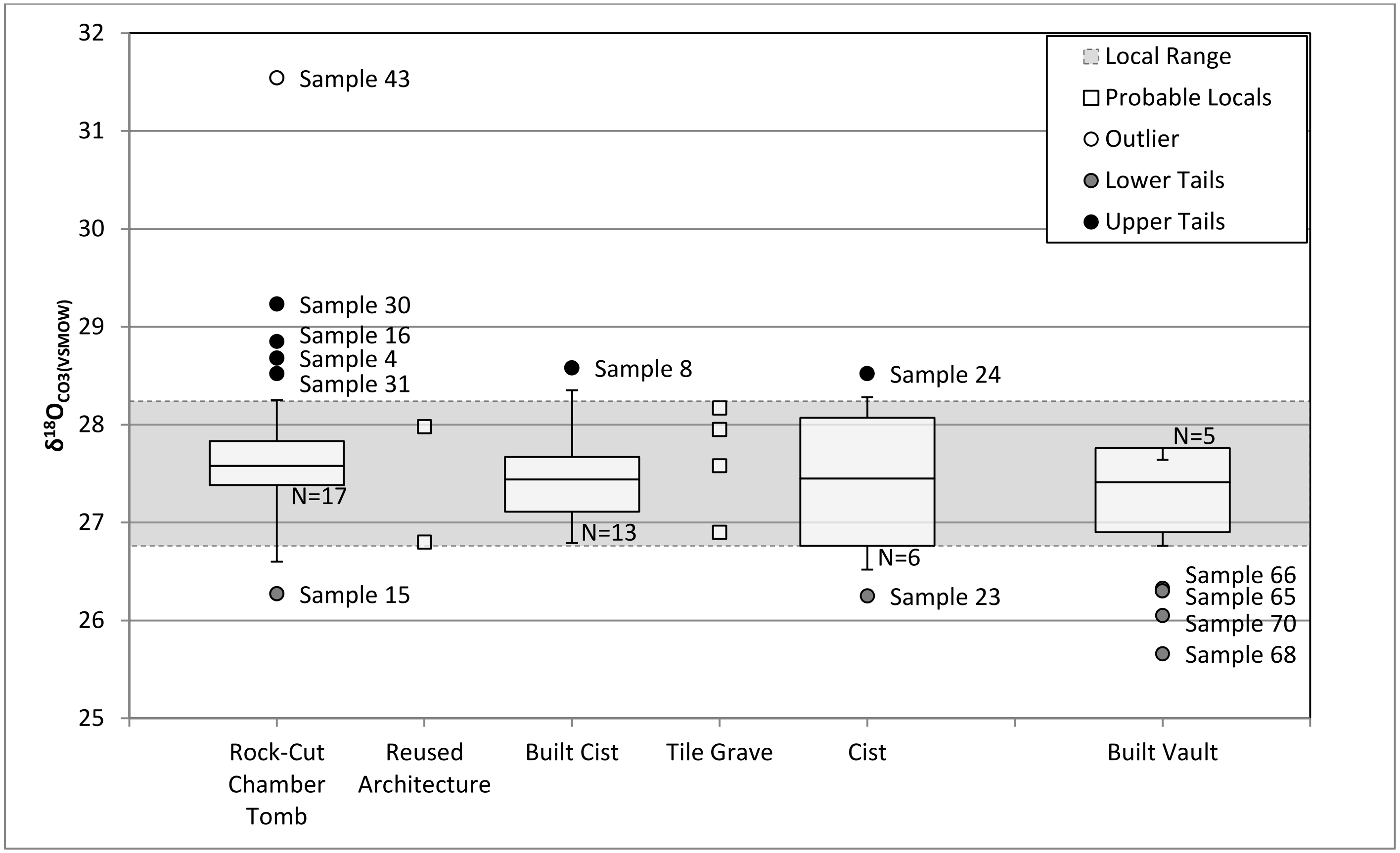

Figure VII.6. Oxygen isotopic ratios ($\delta^{18}O_{CO3(VSMOW)}$) in graves of different morphology. Median values, indicated by the horizontal line dividing the box showing the 95% confidence interval, are given for N>5. For N<5, individual samples' values are marked. Possible nonlocals are labeled. The shaded area corresponds with the calculated local range in $\delta^{18}O_{CO3(VSMOW)}$ (26.76 – 28.24‰).

display $\delta^{18}O_{CO3(VSMOW)}$ in the lower tail of the normal distribution (N=4 out of 9, chi-square=14.96, df=5, p=.011).

Major differences in the spatial distribution of these skeletons are also present. Two of the samples depleted in ^{18}O are from graves constructed near the Gymnasium complex, and four are from Temple Hill. The majority of the samples displaying enriched $\delta^{18}O_{CO3(VSMOW)}$, on the other hand, are from skeletons buried by the Gymnasium, as is the clear outlier. Only two additional samples, one from a grave by the South Stoa, and the other from a tomb cut in the bedrock on Asklepieion hill, are enriched in ^{18}O. Thus, the majority of samples present in the upper tail of the $\delta^{18}O_{CO3(VSMOW)}$ distribution are from Temple Hill, while the Gymnasium burial area was the burial location for skeletons displaying both relatively high and relatively low $\delta^{18}O_{CO3(VSMOW)}$ values. The isotopic group displaying relative enrichment in ^{18}O also displays greater variability in burial placement. These differences in geographic placement and tomb morphology also correspond with chronological divisions among these samples.

7.3.3.2 Isotopic and mortuary variability within the local $\delta^{18}O$ range

For the following analyses of oxygen isotope distributions, I excluded all possible nonlocals to examine patterning for locals at the site of Corinth. There are no significant differences in oxygen isotope ratios within the local range according to the mortuary correlates at the extremes of the status spectrum for Period II (N=9 out of 47, t=-.14, df=45, p=.889) or for Period III (N=8 out of 47, t=1.30, df=45, p=.201). Patterning among the isotopic data is also not present according to differences in grave assemblages which may reflect community membership (Group 1, N=9 out of 33, t=.78, df=31, p=.444; Group 4, N=28 out of 60, t=-1.50, df=58, p=.139). Interestingly, despite the placement of artifacts in Grave 1938.10 in the South Stoa not otherwise present in grave assemblages at Corinth, the $\delta^{18}O_{CO3(VSMOW)}$ of Sample 10 from this grave (26.88‰) is well within the local range for this site. On the other hand, isotopic variation correlates with the presence of specific artifacts in grave assemblages.

Figure VII.7 shows $\delta^{18}O_{CO3(VSMOW)}$ grouped by presence of specific mortuary artifacts. No statistical difference is present for the ranges in $\delta^{18}O_{CO3(VSMOW)}$ associated with or without grave markers (t=.54, df=24, p=.591), ceramics (t=.69, df=45, p=.493), jewelry (t=.16, df=45, p=.874), or coins (t=-.96, df=45, p=.340). However, those individuals buried with weapons and buckles are relatively depleted in ^{18}O. Individuals whose graves were commemorated with lamps, on the other hand, are significantly more enriched in ^{18}O than expected from local $\delta^{18}O$ values (t=-2.23, df=23, p=.036). The relative enrichment in ^{18}O values for those individuals whose burial place was the focus of extended commemoration is interesting.

The difference in $\delta^{18}O_{CO3(VSMOW)}$ between samples grouped by buckle presence is also statistically significant (t=2.03, df=45, p=.048), though not when grouped by weapon presence (t=1.30, df=45, p=.201). However, there is considerable overlap in these samples as all eight of the individuals buried with weapons were also buried with buckles, including Sample 10 from Grave 1938.10. While I only sampled graves from the ancient city center with weapons, I included an additional three individuals buried with buckles but not with weapons from the cemetery north of the city. These twelve samples (6, 7, 10, 27, 36, 37, 42, 63, 64, 67, 69, and 71) are from graves active in Periods II-III and one tomb that was in use after the 8th century AD. The depletion in ^{18}O evident among the majority of individuals buried with buckles may indicate that many of these high ranking members of the community had an origin slightly north of Corinth. Given the fact that buckles are also present in the graves of possible nonlocals from both tails of the $\delta^{18}O$ distribution, the association of buckles with a nonlocal geographic origin is reinforced.

Next, I examined the distribution of oxygen isotopic values for different burial locations. Since it is possible that the funerary chapels and the cemeteries they serviced were used by a local population, geographic separations between cemeteries may correspond with social differentiation. Using an independent t-test, I compared samples within the proposed local $\delta^{18}O$ distribution buried north of the city of Corinth (N=26) to those placed in the former city center (N=21). As shown in Figure VII.8, individuals

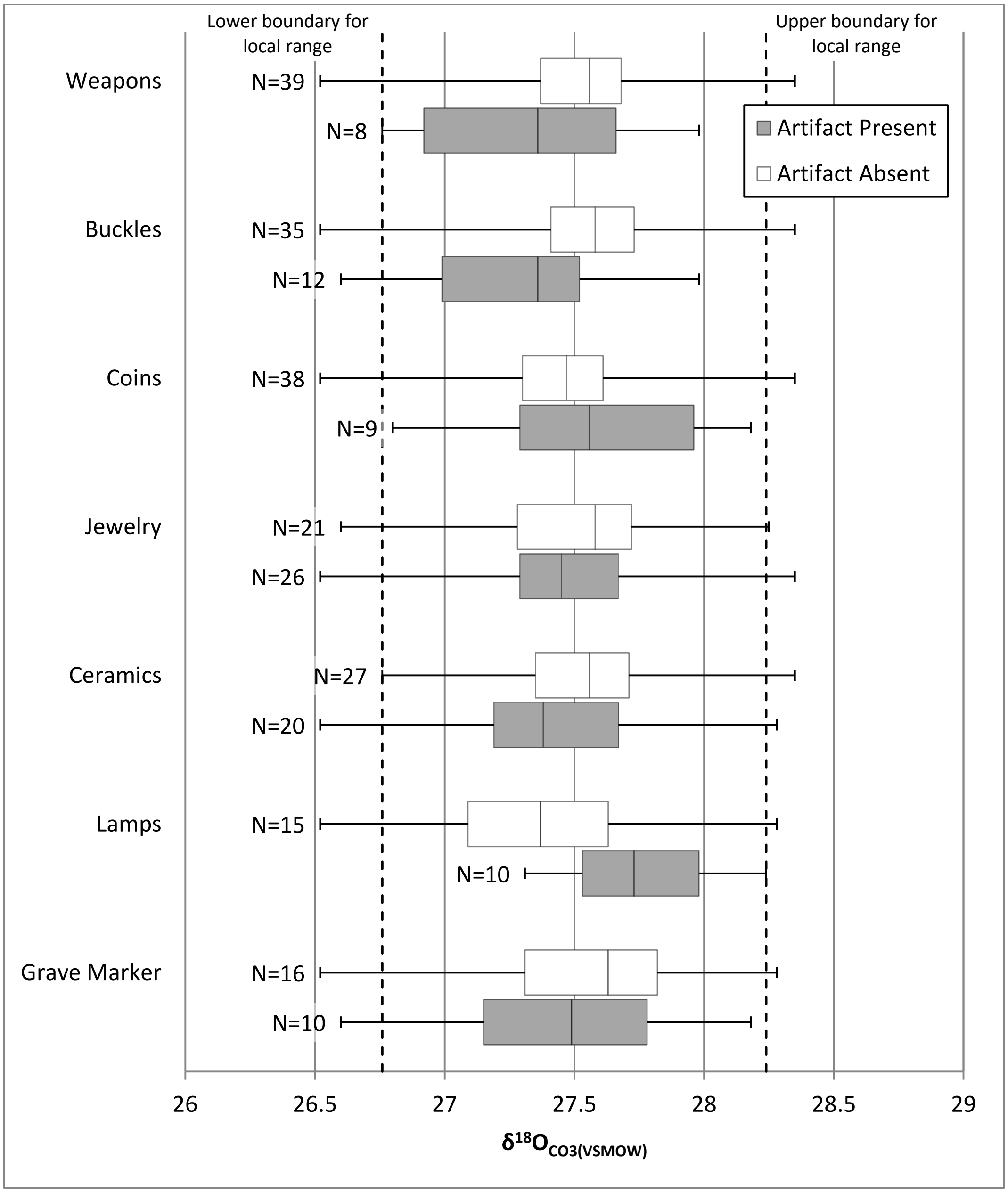

Figure VII.7. Distribution of $\delta^{18}O_{CO3(VSMOW)}$ by association with grave goods for samples excluding possible nonlocals. Median value for each category is indicated by a vertical line dividing the filled box showing the 95% confidence interval to each side of the mean. Whiskers to each side of the interquartile range show the full range of values for each category. Dashed lines mark the upper and lower boundaries of the calculated local range in $\delta^{18}O_{CO3(VSMOW)}$ (26.76 – 28.24‰).

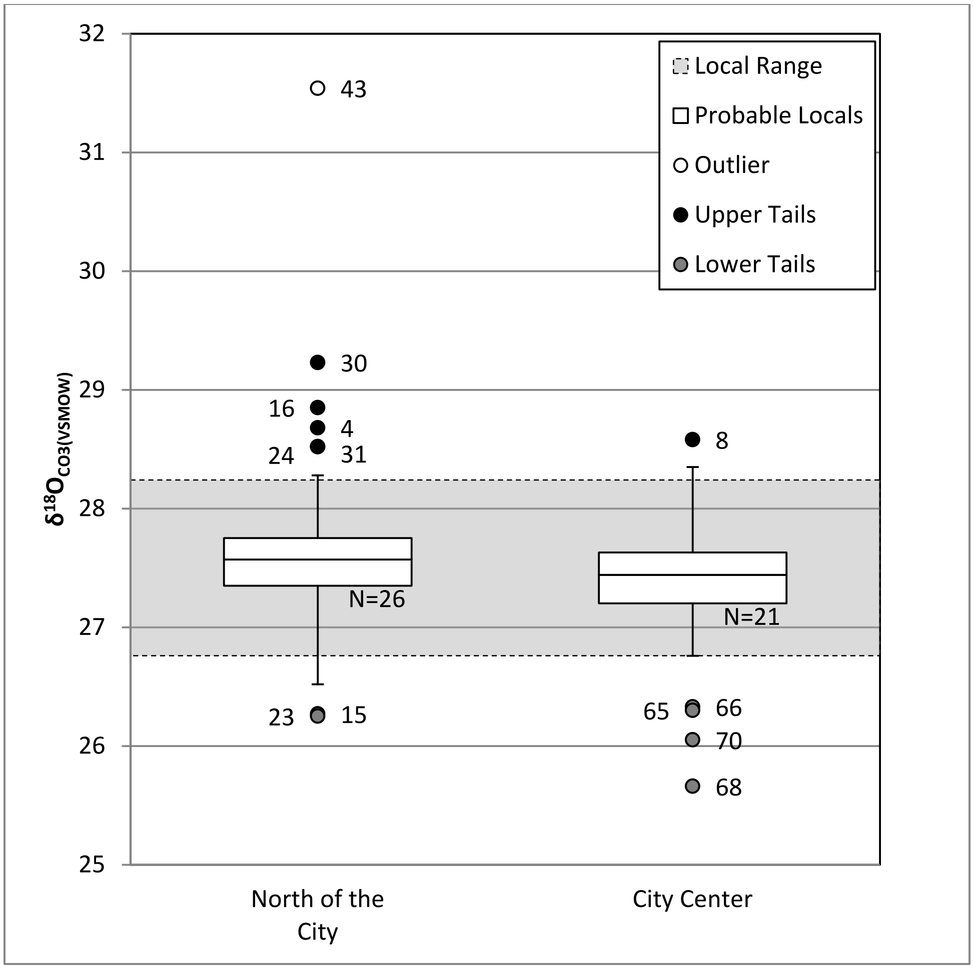

Figure VII.8. Comparison of oxygen isotopic ranges ($\delta^{18}O_{CO3(VSMOW)}$) by burial area. Box plots show sample distribution for samples falling within the local $\delta^{18}O$ distribution. Possible nonlocals are labeled by sample number (see Tables VII.2 and VII.3). The calculated local range in $\delta^{18}O_{CO3(VSMOW)}$ (26.76 – 28.24‰) is shaded.

buried north of the city have slightly higher $\delta^{18}O_{CO3(VSMOW)}$ values (27.5 ± .48 as compared to 27.4 ± .46‰), though this difference is not significant (t=.93, df=45, p=.356). On the other hand, as Figure VII.8 shows, the presence of more possible migrants from the lower tail of the $\delta^{18}O$ distribution in the city center burial area, and more from the upper tail in the burial area north of the city matches this trend in values. When I exclude only the outlier, differences in $\delta^{18}O_{CO3(VSMOW)}$ between these two burial areas are statistically significant (t=2.12, df=57, p=.038). Thus, these two burial areas may have been used by communities with different levels of local mobility or distinct water sources in late antiquity, and this may account for the tails appearing to bend out of the normal plane.

7.3.3.3 Distribution of isotopic values within cemeteries

Within cemeteries, the likelihood that individuals with similar bone chemistry were buried together is also tested. I sampled four or more individuals each from five multiple interment tombs: two located north of the city and three in the ancient city center. I also examined whether burial clusters within these geographic areas were the graves of individuals with distinct $\delta^{18}O_{CO3(VSMOW)}$ values. To do this, I compared the 14 individuals sampled from the nine graves associated with each other within the recessed bedrock cutting in the Gymnasium to the rest of the samples from graves north of the city, and compared the samples from graves in the former forum area to those taken from graves on Temple Hill. These analyses include samples from the tails of the normal distribution but not the outlier.

Figure VII.9 shows the distribution in $\delta^{18}O_{CO3(VSMOW)}$ values from burial locations north of the city. The samples from multiple interment tombs and grave groups are juxtaposed against the range of values from the pooled dataset from burial locations near the ancient Gymnasium. I sampled five of the 14 skeletons buried on Asklepieion Hill, four out of 22 from Grave 1965.14/Gym.5, six out of eleven from Grave 1966.05/Gym.53, and 13 out of 40 buried in the recessed bedrock cutting. Burial loci from the Gymnasium area contain individuals who span the observed range in $\delta^{18}O_{CO3(VSMOW)}$ for this cemetery. Skeletons from the recessed bedrock cutting are slightly more enriched in ^{18}O compared to the rest of these samples, as are the samples taken from Asklepieion Hill graves.

However, the recessed bedrock burial area is not significantly different in $\delta^{18}O_{CO3(VSMOW)}$ as compared to the rest of the samples from graves north of the city ($t=-1.07$, $df=31$, $p=.295$). On the other hand, when these 13 individuals are compared to the Corinthian data as a whole, these $\delta^{18}O_{CO3}$ values are nearly significantly different from

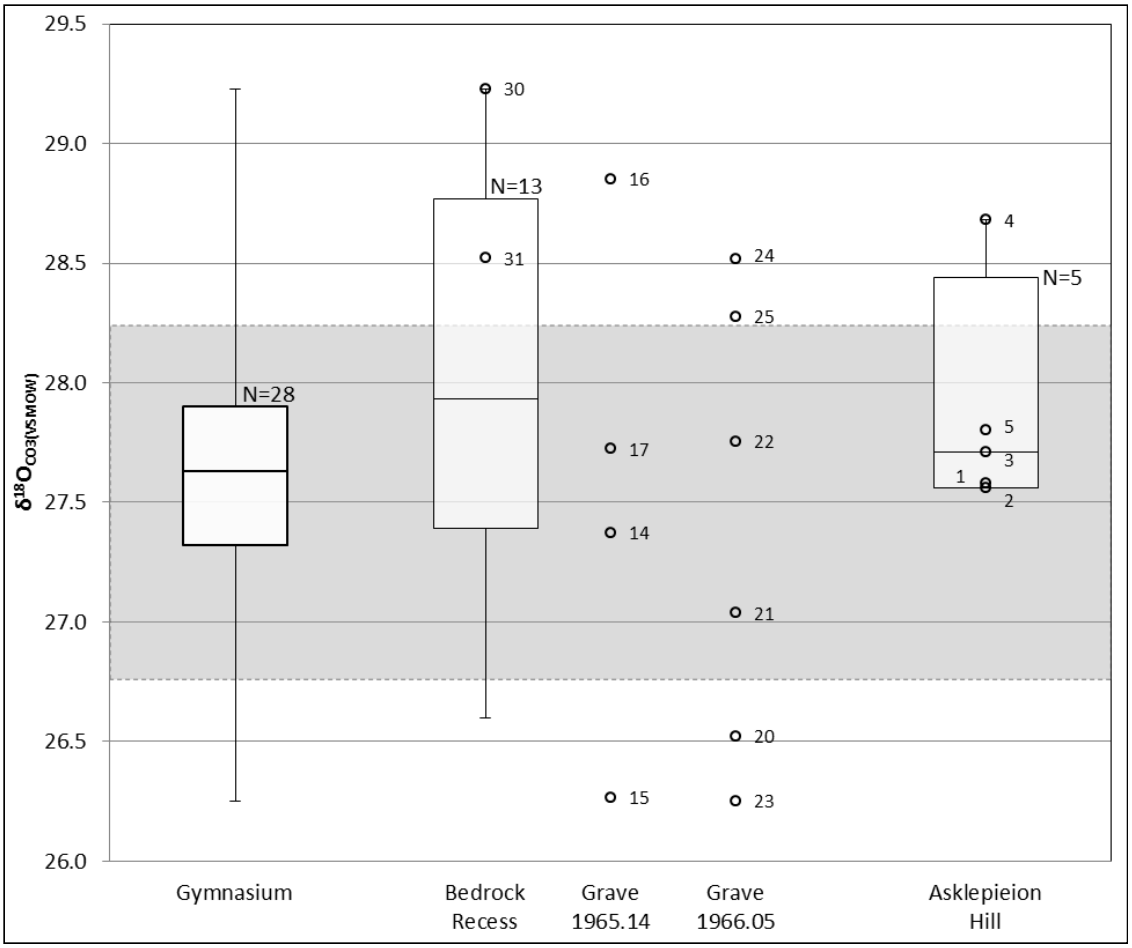

Figure VII.9. Comparison of $\delta^{18}O_{CO3(VSMOW)}$ of separate burial locations for samples from graves north of the city. Two grave groups and two multiple interment tombs are displayed relative to the data for all mortuary contexts near the ancient Gymnasium. Box plots are given for samples from grave groups. All of the samples from Graves 1965.14 and 1966.05 are labeled by sample number (see Table VII.2), as are the samples from the Asklepieion Hill burial location and two possible nonlocals from the recessed bedrock burial location. The shaded area corresponds with the calculated local range in $\delta^{18}O_{CO3(VSMOW)}$ (26.76 – 28.24‰).

the overall population (t=-1.93, df=57, p=.058), despite including at least one individual near the lower tail of the normal distribution. Though not included in these analyses, Sample 43, the outlier, is also from a tomb in the recessed bedrock cutting. Thus, the individuals buried in these graves appear to be distinct from the rest of the Late Antique skeletal population. As these individuals' tombs were also offset from the rest of the cemetery, this cohesion could indicate these individuals were all members of the same social group or otherwise shared a social identity.

As can be seen in Figure VII.9, samples from Graves 1965.14 and 1966.05 display a more dispersed range in values, and are not distinct from the majority of values recorded for individuals buried north of the city. Both graves contained individuals from opposite ends of the $\delta^{18}O_{CO3(VSMOW)}$ distribution as well as samples displaying isotopic ratios consistent with the local $\delta^{18}O_{CO3(VSMOW)}$ range. Due to this wide range of values, neither tomb is statistically distinct from the rest of the graves placed north of the city (Grave 1965.14, t=.29, df=31, p=.775; Grave 1966.05, t=.97, df=31, p=.338). When compared to the rest of the data from Corinth, these graves remain undifferentiated (Grave 1965.14, t=-.21, df=57, p=.832; Grave 1966.05, t=.29, df=57, p=.772).

Figure VII.10 shows the distribution of $\delta^{18}O_{CO3(VSMOW)}$ by burial location for those graves placed in the city center. The values for the Temple Hill grave cluster is almost identical to that of all graves from the city center, which is not surprising as these individuals make up the bulk of the sample available for this area (N=20 out of 26). However, $\delta^{18}O_{CO3(VSMOW)}$ for samples from the Temple Hill cluster are also not significantly different from those displayed by individuals buried in the area of the former forum (t=.61, df=24, p=.546).

I also sampled multiple skeletons from three of the multiple interment tombs constructed on Temple Hill, including five out of the 52 individuals from Grave 1971.22, 14 of the 55 individuals buried in Grave 1972.20, and all four of the individuals buried in Grave 1971.19-20. Although the ranges in $\delta^{18}O_{CO3(VSMOW)}$ for these graves are consistent with a "local" $\delta^{18}O$ rainwater value (see Figure VII.10), the nine samples from Grave 1972.20 which date to late antiquity are depleted in ^{18}O relative to other individuals buried in this location ($\delta^{18}O_{CO3(VSMOW)}$ = 26.78 ± .73‰ compared to 27.51 ± .56‰). This relationship is statistically significant (t=2.85, df=24, p=.009). The four samples from Grave 1971.19-20, on the other hand, are not significantly different from the rest of the city center burials (t=-.10, df=24, p=.923), and neither are the five samples from Grave 1971.22 (t=-1.43, df=24, p=.165). When the data from these graves is

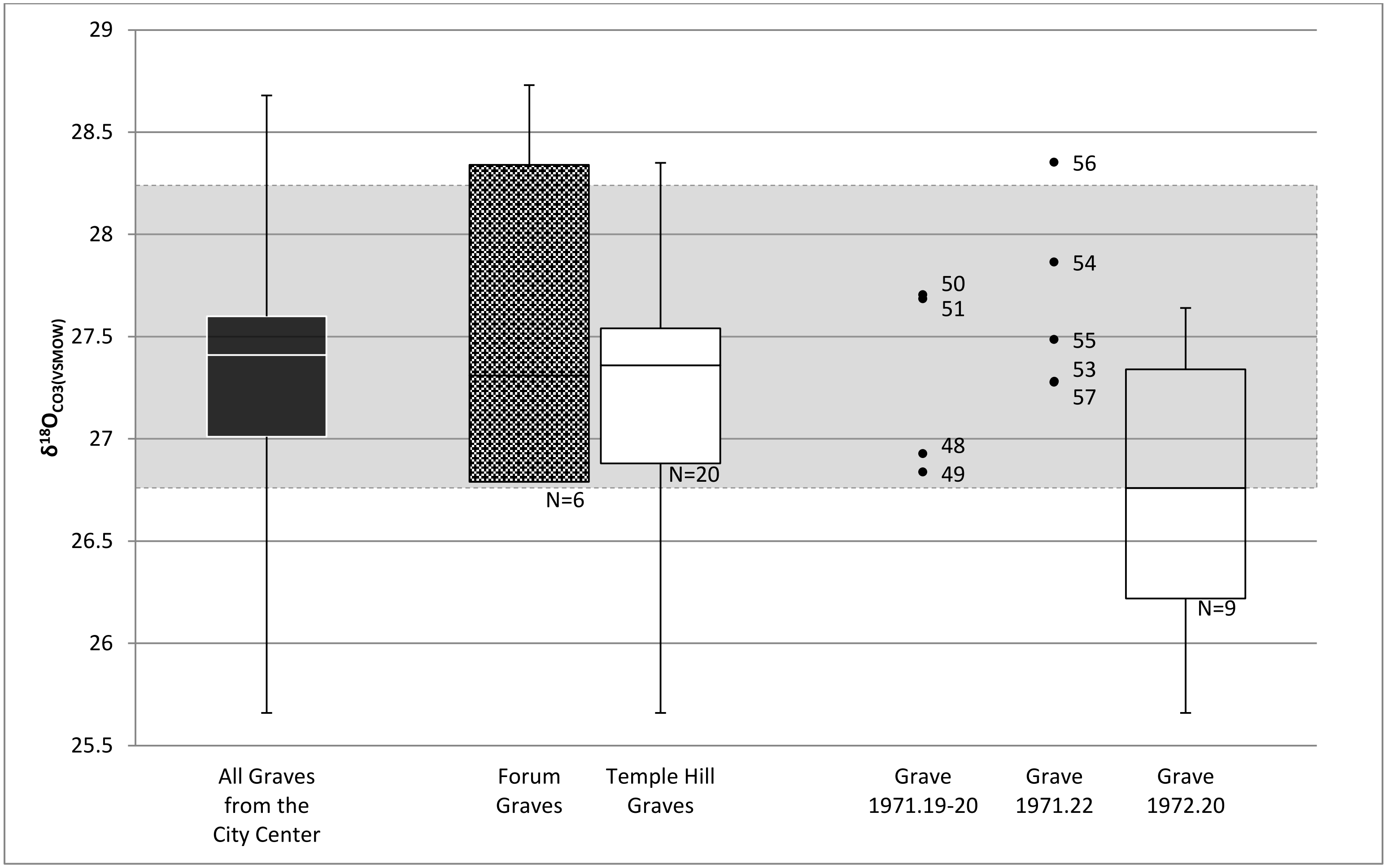

Figure VII.10. Comparison of $\delta^{18}O_{CO3(VSMOW)}$ by burial location for the city center. The range for the city center as a whole is the black box on the left. Box plots are given for N>5. For N<5, individual samples are labeled by sample number (see Table VII.3). The shaded area corresponds with the calculated local range in $\delta^{18}O_{CO3(VSMOW)}$ (26.76 – 28.24‰).

compared to the $\delta^{18}O_{CO3(VSMOW)}$ from all Late Antique samples at Corinth, Graves 1971.19-20 and 1971.22 are statistically identical to the majority of values (for 1971.19-20, t=.53, df=57, p=.597; for 1971.22, t=-.56, df=57, p=.580). The values for Grave 1972.20, on the other hand, are still significantly distinct (t=3.37, df=57, p=.001).

Since Grave 1972.20 continued to be used after the 12th century AD for burials, and was important enough in this later period that it was incorporated into the entrance of the church constructed at that time, I also analyzed an additional five samples from this tomb to incorporate this later burial activity. Due to the stratigraphic separation of burial events in the grave and the change from primary to secondary and back to primary burial activity, I was able to divide these samples among three layers. I sampled five of the nine individuals from the lowest layer, representing the original interments in this tomb, four of the 32 individuals from the middle layer, and five of the 14 final burials. I then compared the values present in the initial interments in this tomb to those from later periods to determine whether the origins of this community changed over time.

Figure VII.11 shows the distribution of $\delta^{18}O_{CO3(VSMOW)}$ values in this grave by stratigraphic layer. Based on a one-way ANOVA, the earliest interments in this grave are significantly more depleted in ^{18}O than individuals buried later in the same structure (df=2, F=4.59, p=.036). Only Sample 69, an adolescent from this layer, displays a $\delta^{18}O_{CO3(VSMOW)}$ within the proposed local range for Corinth. Two adults (Samples 68, a female young adult, and 70, a male young adult) and two children (Samples 65 and 66) all display lower $\delta^{18}O_{CO3(VSMOW)}$ values than expected for this population. All of the individuals buried during the second phase of use of this tomb (Samples 63, 64, 67, and 71) fall within the local range for Corinth, as do three of the five samples from its final use period (Samples 58, 59, and 60). However, two samples dated to the 12th century (Samples 61 and 62) fall on opposite ends of the $\delta^{18}O$ distribution, and may provide evidence for additional migration activity in the Byzantine period.

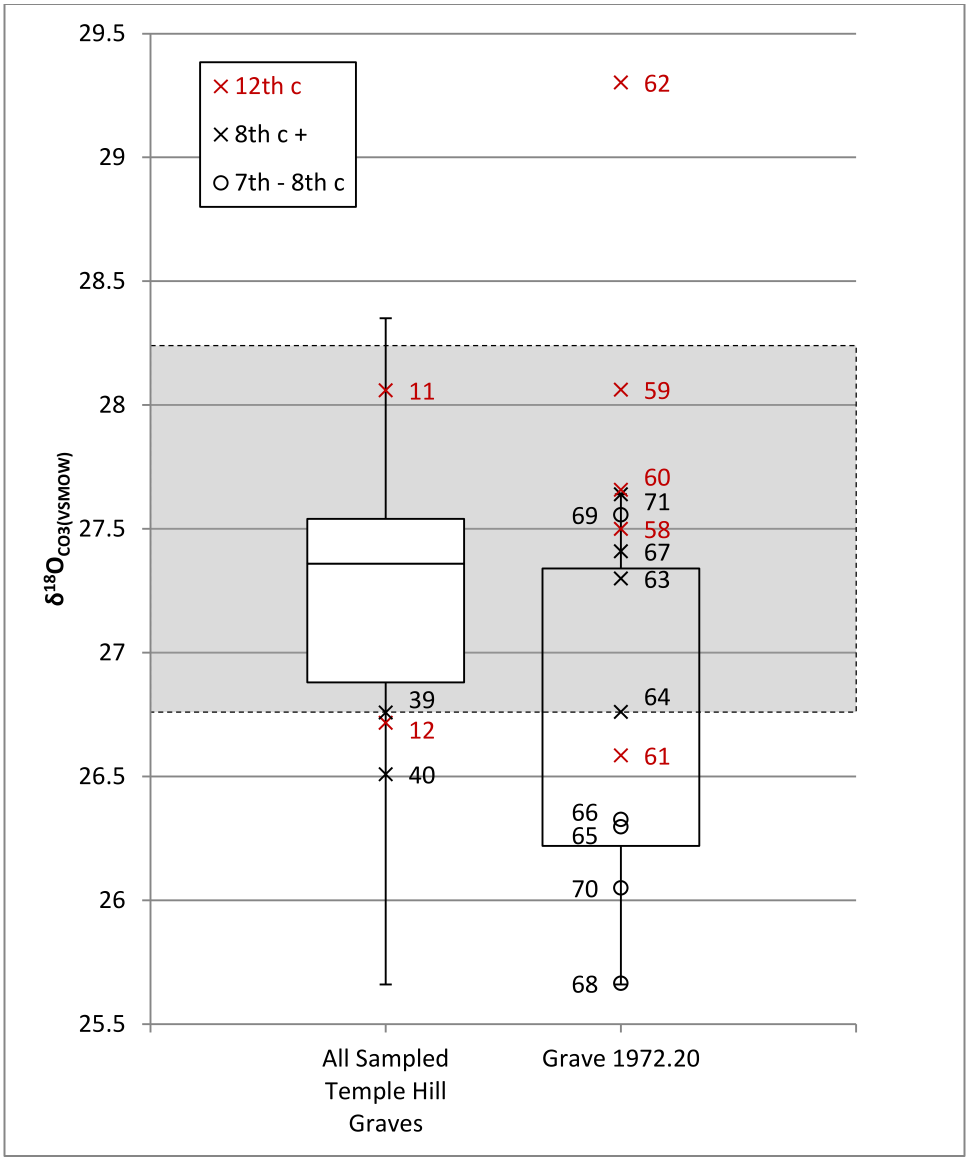

Figure VII.11. Distribution of oxygen isotopic ratios for Grave 1972.20. All samples from this grave are labeled by sample number (see Table VII.3), and their archaeological date indicated, overlying a box plot for the $\delta^{18}O_{CO3(VSMOW)}$ of the Late Antique samples from this grave. These values are compared to the distribution in $\delta^{18}O_{CO3(VSMOW)}$ for samples from the surrounding burial location (on the left). Only the 4 samples dating after late antiquity are labeled on this box plot. The shaded area corresponds with the calculated local range in $\delta^{18}O_{CO3(VSMOW)}$ (26.76 – 28.24‰).

7.3.4 Carbon isotopic values and diet at Corinth

At least seven individuals analyzed here show a diet that, while predominated by a C_3 plant signature, also shows signs of ^{13}C enrichment, including Samples 65 (a child from Grave 1972.20 on Temple Hill), 35 (a possible male young adult buried north of the city), 56 (a middle adult of indeterminate sex from Grave 1971.22 on Temple Hill), 13 (a female old adult buried north of the city), 4 (a possible male middle adult buried north of the city), 54 (a young adult of indeterminate sex found together with Sample 56 in Grave 1971.22), and 70 (a male young adult found together with Sample 65 in Grave 1972.20).

These individuals do not seem to conform to any single demographic or archaeological criterion. First, I examined whether $\delta^{13}C_{ap}$ values changed over time; these data are summarized in Table VII.6. Figure VII.12 shows that these ratios are highly similar across archaeological periods, though the largest amount of variability in this sample is present in Period II, and $\delta^{13}C_{ap}$ displays a slight shift toward more positive values in Period III as compared to Period II. It is interesting to note that these differences are significant when only those individuals securely dated to late antiquity are analyzed in a one-way ANOVA ($F=4.08$, $df=2$, $p = 0.022$). In other words, though C_3 consumption is present in all time periods, a wider diversity of food sources is evident in Period III.

The interpretation of these results is dependent on whether more enriched $\delta^{13}C_{ap}$ is a result dietary incorporation of marine or animal resources or C_4 grasses, and if dietary diversity is a result of necessity, availability or foddering practices. C_4 plants such as millet may have been consumed because of its relatively low cost or availability during periods of food shortages. In this case, the presence of a C_4 signal in the diet indicates that intervals of relatively high levels of nutritional stress were present in every period. However, since the dust cloud and attendant climatic event in AD 536 (Period II) is not associated with a significant difference in $\delta^{13}C_{ap}$ for this period, i.e., the historically documented famines at this time did not result in greater dietary

Table VII.6. Chronological distribution of carbon isotopic ratios ($\delta^{13}C_{ap(VPDB)}$).

Archaeological Age of Sample	N	Mean $\delta^{13}C_{ap}$ (‰)	St. Dev.	Minimum Value (‰)	Maximum Value (‰)
Period I: Late 5th – 6th c AD	7	-11.4	2.13	-12.79	-8.17
Period II: mid- to late 6th – 7th c AD	31	-12.3	.94	-13.35	-8.15
Period III: mid-7th – 8th c AD	20	-11.1	1.80	-13.03	-6.86
Late Antique (NPD)	2	n/a	n/a	-12.20	-10.27
8th c AD or later	11	-12.3	.30	-12.84	-11.92

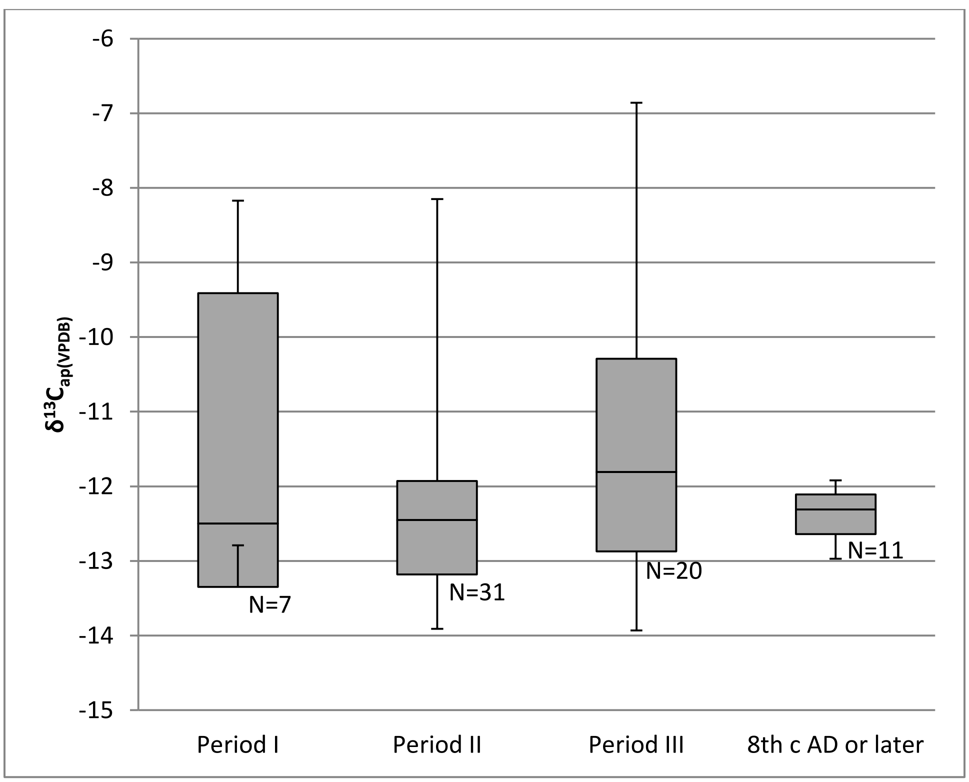

Figure VII.12. Carbon isotopic ratios ($\delta^{13}C_{ap(VPDB)}$) by archaeological period. Box plots used to display isotopic distributions.

differentiation, this appears unlikely. Higher $\delta^{13}C_{ap}$ may also have resulted from consumption of meat or animal products when animals were preferentially foddered on otherwise undesirable C_4 plants. If C_4 plants were only consumed as a result of the incorporation of animal products in the diet, high $\delta^{13}C_{ap}$ values would be present as a result of differential access to meat and dairy for specific social groups or hierarchies. If body tissues were enriched in ^{13}C as a result of consumption of fish, then elevated $\delta^{13}C_{ap}$ values would likewise indicate segments of the population enjoyed differential access to marine resources based on status or proximity. Alternatively, some individuals may have chosen to observe fasting requirements. While further isotopic testing of the collagen from these individuals would more thoroughly examine these hypothetical scenarios, social differentiation in diet was examined further using this dataset by determining whether $\delta^{13}C_{ap}$ varied by sex, status, or incorporation into social or ethnic groups.

I examined demographic effects first. While skeletal age at death was observed for all sampled individuals, it should be emphasized that the same tissue, that of the second molar enamel, was analyzed for each individual. Therefore, diet was tested over the same age range regardless of skeletal age at death, so a correlation between skeletal age at death and $\delta^{13}C_{ap}$ values would be unexpected unless childhood diet shaped later life survivorship. If only adults displayed signs of ^{13}C enrichment in their diet when they were 3-7 years old, this difference might be hypothesized to be due to post-childhood migration. If dietary differences instead result from differential access to foodstuffs among sexes or social classes or groups, both children and adults would be expected to be enriched in ^{13}C.

There does not appear to have been any significant difference in the $\delta^{13}C_{ap}$ of subadults (N=17, mean $\delta^{13}C_{ap}$ = -11.85‰, StDev = .98) as opposed to that of adults (N=54, mean $\delta^{13}C_{ap}$ = -11.84‰, StDev = 1.53) with a two-tailed t-test (t=.05, df=58, p = .96). Among adults, there is also no difference in $\delta^{13}C_{ap}$ between individuals who died at different ages (ANOVA F=.69, df=2, p=.506), and no correlation exists between skeletal sex and carbon isotopic ratios. The dietary carbon of men (N=17, mean $\delta^{13}C_{ap}$ = -11.86‰, StDev = 1.49) is not significantly different than that of women (N=9, mean

$\delta^{13}C_{ap}$ = -11.98‰, StDev = 1.51) in an independent t-test ($t=.20$, $df=24$, $p=.845$). If any dietary differences existed among sexes, these differences did not pertain earlier in childhood.

Next, I examined the impact of societal differentiation in access to food resources through the correlation of $\delta^{13}C_{ap}$ values with suggested mortuary correlates of the highest status divisions within each time period. As shown in Figure VII.13, samples from high status graves in both periods display relatively lower $\delta^{13}C_{ap}$. When only those samples from high status mortuary contexts from Period II are compared with the remainder of the pooled dataset, this difference is nearly statistically significant ($t=1.72$, $df=58$, $p=.090$). The seven samples from graves with inscriptions show additional evidence for dietary differentiation by status. Only one sample (the child buried in Gymnasium Grave 89) displays a $\delta^{13}C_{ap}$ value higher than -11‰. Inscriptions previously suggested to denote high status interments (I-1020 and I-1021, Corinth Grave 1931.31; I-2680, Corinth Grave 1966.07/Gymnasium Grave 29; and the inscription carved in bedrock above Corinth Grave 1967.08/Gymasium Grave 84; see Roebuck 1951: 166 and Walbank and Walbank 2006 for high status attribution) correspond with some of the lower observed $\delta^{13}C_{ap}$ values for this sample (-12.55 ± .37‰), and the individual interred in the tomb of "Venenatos" (Gymnasium Grave 80) displays a $\delta^{13}C_{ap}$ value of -13.04‰.

On the other hand, significant differences in $\delta^{13}C_{ap}$ values are not present for samples from graves containing the majority of artifacts suggested to be associated with social hierarchies. The ten individuals from graves associated with visible grave markers are not significantly different ($t=.33$, $df=29$, $p=.744$), nor are the 35 individuals associated with jewelry ($t=-.46$, $df=57$, $p=.648$). Although buckles may be correlated with achieved and ascribed status in mortuary contexts, the 16 samples from graves containing buckles were not significantly different from the rest of the population ($t=-.82$, $df=57$, $p=.413$). Significant differences are also lacking for the 12 individuals buried with weapons ($t=-1.26$, $df=57$, $p=.214$). Thus, if dietary incorporation of C_3 plants was related to status, this association may have been restricted to earlier periods at Corinth, or in Period III, dietary incorporation of marine resources by members of the upper class

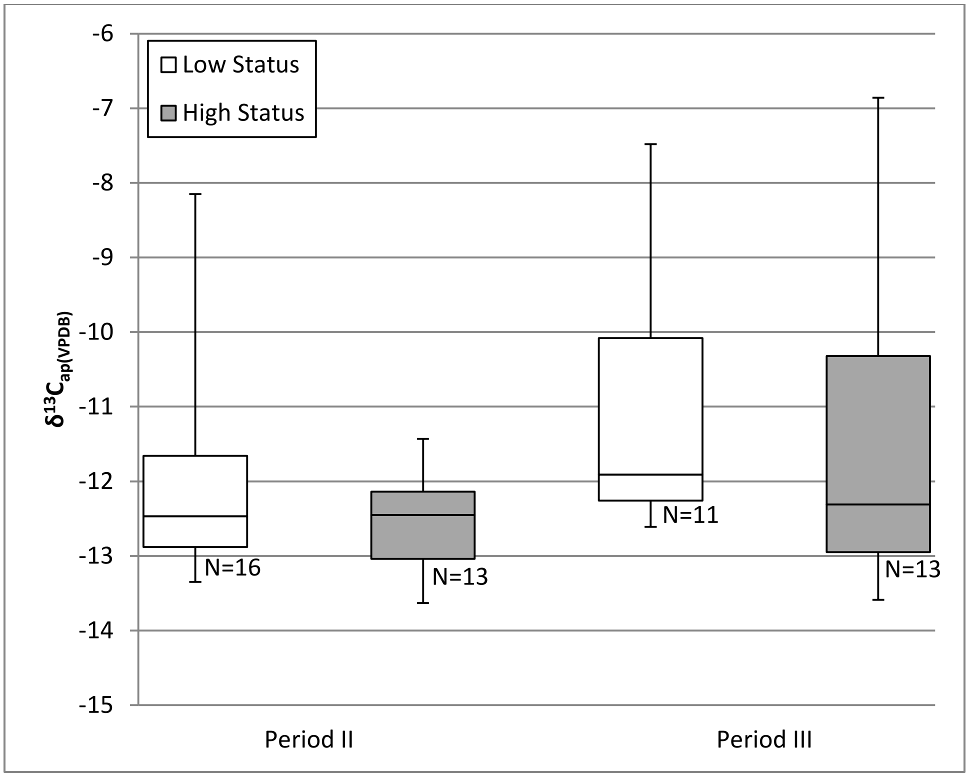

Figure VII.13. Comparison of $\delta^{13}C_{ap(VPDB)}$ among status groups. Box plots used to display isotopic distributions.

may have resulted in a wider range in $\delta^{13}C_{ap}$ for these individuals, obscuring the C_3 plant signature.

Dietary differentiation may have instead correlated with community membership. The 28 individuals from graves containing ceramics display a relatively low $\delta^{13}C_{ap}$ (t=3.21, df=36.22, p=.003, equality of variances not assumed). Coins were also placed in the graves of eight of these individuals, and the eleven samples from graves containing coins are also significantly different in dietary carbon from the remainder of the population (t=3.21, df=56.29, p=.002, equality of variances not assumed). As these communities were primarily located on the outskirts of Corinth and used the burial area north of the city, they may have shared diets as a result of shared residential location. However, diets do not appear to have differed among burial locations. Mean $\delta^{13}C_{ap}$ of individuals buried north of the city (N=34, $\delta^{13}C_{ap}$ =-12.06 ± 1.32‰) was not significantly higher than the mean $\delta^{13}C_{ap}$ of individuals buried in the city center (N=26, $\delta^{13}C_{ap}$ =-11.40 ± 1.65‰) given an independent t-test (t=-1.73, df=58, p=.089). On the other hand, since ceramics were also placed in graves in the former forum area, $\delta^{13}C_{ap}$ appears to support mortuary evidence for ties between this community and the population living on the city outskirts.

However, dietary incorporation of ^{13}C does not correlate with use of distinct burial locations within these larger cemeteries. While the $\delta^{13}C_{ap}$ of individuals interred in the recessed bedrock area in the Gymnasium is lower than that of general Corinthian values ($\delta^{13}C_{ap}$ = -12.01 ± 1.22‰), this range is not significantly different from that of the entire population (t=.66, df=58, p=.513) or in comparison with only those graves constructed north of the city (t=-.20, df=32, p=.841). Carbon isotopic ratios of the six samples from the forum area are only slightly enriched in ^{13}C ($\delta^{13}C_{ap}$ = -11.55 ± .79‰), as are the 20 samples from Temple Hill ($\delta^{13}C_{ap}$ = -11.36 ± 1.85‰). Neither the forum samples (t=-.40, df=58, p=.693), nor Temple Hill (t=-1.55, df=58, p=.126) are significantly different from the rest of Late Antique Corinth, and these grave clusters are also not significantly different from each other (t=-.24, df=24, p=.813). This lack of differentiation in dietary inclusion of ^{13}C also extends to the interments within multiple interment tombs. If these burial areas were utilized by different communities, dietary differentiation was present within these segments of the population and does not discriminate among them.

7.3.5 Summary

Oxygen and carbon isotopic ratios identify a number of individuals outside the normal population distribution of $\delta^{18}O_{CO3(VSMOW)}$ or $\delta^{13}C_{ap}$ values. Of these, one clear outlier ($\delta^{18}O_{CO3(VSMOW)}$ = 31.54‰) spent their childhood in a warmer or more arid region than Corinth. Thirteen other individuals were found to lie in the tails of the $\delta^{18}O_{CO3}$ distribution. Both carbon and oxygen isotopic ratios also change over time. The lowest

$\delta^{18}O_{CO3(VSMOW)}$ values are generally present in samples dated Period III, and the lowest $\delta^{13}C_{ap}$ in Period II. These differences may be the result of an influx of migrants in Period III. However, nonlocals are also present in earlier periods, including the outlier, implying that migrants may have been arriving in Corinth from a different geographic origin in Period III than in other time periods. Additionally, these data suggest that the AD 536 dust cloud had little to no measureable effect on $\delta^{18}O_{bw}$ values, as this would have resulted in the lowest values being present in Period II, or on the crops available for consumption.

Possible nonlocals displaying higher $\delta^{18}O_{CO3(VSMOW)}$ are present in all three time periods, and show a range of mortuary behaviors consistent with upper class status throughout late antiquity. Possible nonlocals displaying lower $\delta^{18}O_{CO3(VSMOW)}$ are present primarily in Period III, implying a new geographic source population contributed migrants to Corinth starting at that time. These nonlocals were also buried in high status mortuary contexts, and a few are also associated with mortuary correlates of achieved status, such as political office. Possible migrants or their families also appear to have preferentially chosen more elaborate grave constructs out of those available in each area of the site. Since rock-cut chamber tombs and built vaults are structurally similar, and may be analogous structures with differences in construction due to differences in the burial environment, it is interesting that $\delta^{18}O_{CO3(VSMOW)}$ is enriched in the chamber tombs north of the city, and depleted in the vaults in the city center. Thus, nonlocals from distinct geographic sources were buried in similarly high status mortuary contexts.

Considerable isotopic variability also exists within burial areas. Individuals with comparatively low $\delta^{18}O_{CO3(VSMOW)}$ values are present alongside individuals with comparatively high $\delta^{18}O_{CO3(VSMOW)}$ values in the same graves north of the city. Elaborate graves contained individuals displaying both relative enrichment and relative depletion in ^{18}O, along with other mortuary correlates of high status and objects which mark other social distinctions such as community membership. In other words, migrants are rarely distinguished from the rest of the population by distinct mortuary behaviors or grave location.

On the other hand, the chronological correlation of possible nonlocals displaying lower $\delta^{18}O_{CO3(VSMOW)}$ with later periods only also correlates with the significantly lower $\delta^{18}O_{CO3(VSMOW)}$ in samples from the ancient city center as compared to the graves placed north of the city. The communities utilizing these areas must have had different compositions or relied on distinct water sources. In addition, this chronological shift in geographic origin and spatial shift in burial location also appears to align with the relatively low $\delta^{18}O_{CO3(VSMOW)}$ and increased dietary incorporation of ^{13}C among samples interred in high status graves marked by the presence of buckles. These differences are due in particular to the low $\delta^{18}O_{CO3(VSMOW)}$ displayed by skeletons from Grave 1972.20 on Temple Hill which may document a single migratory event.

The continued use of this grave by individuals displaying $\delta^{18}O_{CO3(VSMOW)}$ consistent with the local range indicates a deliberate connection with earlier generations, as might be expected in a migrant community or a family descended from these original migrants. Other elites during this period, especially those buried with buckles, also display relatively depleted $\delta^{18}O_{CO3(VSMOW)}$. When examined as a group, the relatively restricted range in oxygen isotopic ratios slightly lower than the local range at Corinth, may be evidence for a separate migration process.

The average $\delta^{18}O_{CO3(VSMOW)}$ for all skeletons (other than the outlier) buried with buckles is 27.0 ± .74‰. Though one of these samples dates to the 6th century and was buried near the ancient Gymnasium, the majority date broadly to Period III, and these samples are distributed throughout multiple burial locations including on Temple Hill, and in and around the South Stoa on the Roman forum. In other words, these mortuary contexts are not spatially or chronologically restricted despite belonging to the same status group. If this distinct range of oxygen isotopic ratios corresponds with a foreign geographic origin for a large proportion of these elites, this location likely belongs to a city north of Corinth. However, these values are not as depleted in ^{18}O as those of Greek colonial populations along the Black Sea in modern Bulgaria, reported averaging around $\delta^{18}O_{CO3(VSMOW)} = 24.5‰$ (Keenleyside et al., 2011). Thus, it is unlikely that these individuals originated that far or farther north. Since their $\delta^{18}O_{CO3(VSMOW)}$ values are mostly consistent with the local Corinthian range, they may have been from an area along the northern shores of the Mediterranean. Using the equations from section VII.3.2, these $\delta^{18}O_{CO3(VSMOW)}$ values convert to $\delta^{18}O_{bw(VSMOW)}$ of -4.0 ± 1.8‰. Given the offset of the local $\delta^{18}O_{bw(VSMOW)}$ range from modern rainfall at Corinth, the ratios displayed by these elites may be consistent with a geographic origin around Thessaloniki, Constantinople or Ravenna. Using the OIPC, I calculate rainwater $\delta^{18}O_{VSMOW}$ to be -6.4‰ for Thessaloniki, -6.5‰ for Constantinople, and -6.6‰ for Ravenna (Bowen, 2015; Bowen and Revenaugh, 2003). The next most likely source for comparable data may be the port cities on the southernmost shore of the Black Sea, such as Trapezus (meteoric water $\delta^{18}O_{VSMOW}$ = -7.4‰). Unfortunately, no archaeological data is available for comparison from these locales.

Additional differences in grave assemblages also appear to be correlated with shifts in $\delta^{18}O_{CO3(VSMOW)}$. Lamps are associated with samples relatively more enriched in ^{18}O, while buckles are associated with relative depletion in ^{18}O. To some degree, these correlations are the result of differences in artifact prevalence by burial area, as I could only reliably score lamp presence for graves north of the city, while the majority of graves with buckles were located in the ancient city center. The association of lamps with high $\delta^{18}O_{CO3(VSMOW)}$ is particularly difficult to interpret. However, it does show that commemoration activities were held for locals and nonlocals alike, implying that these foreigners had social connections at the city of Corinth that led to their graves being remembered post-burial.

These results may be interpreted as showing that migration was present throughout late antiquity, and that migrants were incorporated into existing communities including high status groups during this time. However, in Period III, a substantial number of these nonlocals may have been political officials sent to the area. The majority of these individuals display $\delta^{18}O_{CO3(VSMOW)}$ consistent with a geographic location slightly north of Corinth. One other individual buried with a buckle in Period II displays $\delta^{18}O_{CO3(VSMOW)}$ from the upper tail of the normal distribution. Administrators may, therefore, have had a variety of origins, and in Period III, their presence may have resulted in greater dietary variability within the elite. The spatial distribution of nonlocals in Period III may also indicate that these imperial personnel were more likely to settle in the area of the ancient city center than in the suburbs.

7.4 Strontium Isotopic Results

Ambiguities remain in the identification of foreigners at Corinth despite the fact that oxygen and carbon isotopic analysis identified a number of groups with distinct isotopic ratios. For one thing, $\delta^{18}O$ is not sufficiently variable in the Eastern Roman Empire to identify all non-locals, and its use may underestimate mobility in late antiquity. In particular, while the eastern coast of Turkey through to Cyprus were likely connected to Corinth through trade, any merchants or ship-owners from those areas may not display significantly different $\delta^{18}O_{CO3(VSMOW)}$ values. Sample 1 from Grave 1931.24, for example, displays $\delta^{18}O_{CO3(VSMOW)}$ congruent with the local range although the tombstone specified this grave belonged to an Anatolian named Eusebius (Bees, 1941; Kent, 1966; Robert, 1966; Roebuck, 1951). In these cases, strontium isotopic analysis may be helpful in distinguishing sites in the Peloponnese, such as Corinth, and sites in the eastern Aegean, such as Ephesus or Rhodes (Nafplioti, 2011). If the $^{87}Sr/^{86}Sr$ value is congruent with Corinth, differences in $\delta^{18}O_{CO3}$ may have resulted from cultural practices or high mobility between Corinth and nearby sites in the Peloponnese or Athens.

7.4.1 Sample selection

I chose samples for radiogenic strontium analysis to include all skeletons previously identified as potential or likely foreigners to test the utility of this method in discriminating among geographic sources of migrants for this region. These samples, listed in Table VII.7, most likely also include enough locals to characterize $^{87}Sr/^{86}Sr$ for Late Antique Corinth. I include the one clear outlier from the $\delta^{18}O_{CO3}$ distribution (Sample 43, $\delta^{18}O_{CO3(VSMOW)} = 31.54‰$) as well as 13 other individuals from the $\delta^{18}O_{CO3}$

tails. I also chose the seven individuals whose $\delta^{13}C_{ap}$ is relatively enriched in ^{13}C to determine the origin of individuals display dietary differentiation at this site. Three of these samples also display $\delta^{18}O_{CO3(VSMOW)}$ in the tails of the "local" oxygen isotopic distribution. The final six samples selected have been suggested to be foreign based on archaeological inference, and I included one comparative faunal sample.

Of the 14 samples outside the normal $\delta^{18}O_{CO3}$ distribution, eight are relatively enriched in ^{18}O, while six are relatively depleted in ^{18}O. While I subjected all of these individuals to strontium analysis, the outlier and those six depleted in ^{18}O are particularly good candidates for non-locals since this tail of the $\delta^{18}O_{CO3}$ distribution is bending out of the normal plane. The samples displaying low $\delta^{18}O_{CO3(VSMOW)}$ values also correlate with the presence of buckles in grave contexts and the burial location of Samples 65, 66, 68, and 70 among these samples also sets them apart, as they are all from the same layer in Grave 1972.20 on Temple Hill. Whether this correlation between mortuary behavior and low $\delta^{18}O_{CO3(VSMOW)}$ values demonstrates a northern origin for administrators at the site of Corinth can be tested further using strontium isotopes.

As strontium analysis is more costly, I am currently able to analyze seven other samples, plus a comparative faunal sample. On the basis of previous archaeological hypotheses, Sample 1 from Corinth Grave 1931.24 in the Asklepieion, Samples 6 and 7 from Corinth Grave 1937.15-19 in the South Stoa, Sample 10 from Corinth Grave 1938.10 in the South Stoa, Sample 13 from Gymnasium Grave 2, and Sample 27 from Corinth Grave 1967.13/Gymasium Grave 86 are all good candidates for migrants. Angel (quoted in Wiseman, 1969), suggested Sample 13, a female old adult buried north of the city, originated in North Africa on the basis of cranial morphology. The dietary $\delta^{13}C_{ap}$ of this individual also sets them apart.

Sample 1 was selected as this skeleton was buried in a grave with a tombstone. Though epithets often relate identity, profession, or origin of the interred skeletons, none of the seven samples taken from graves with associated inscriptions display a $\delta^{18}O_{CO3(VSMOW)}$ inconsistent with the local range. Sample 1 is tested further because it represents one of four individuals including three adults and a child interred in a grave

Table VII.7. Strontium samples: context and analysis results.

Grave Context			Stable Carbon and Oxygen Analysis					Radiogenic Strontium Analysis			
Location	Grave #	Archaeological or Osteological Indicators of Identity	sample #	$\delta 18O_{SMOW}$ (‰)	Distinct vs locals?	$\delta 13C_{PDB}$ (‰)	C_4 in diet?	sample #	weight (mg)	$^{87}Sr/^{86}Sr$	2s error
Asklepieion	1931.24	"Anatolian" inscription	01	27.58	No	-11.95	No	Sr01	8.9	.708704	.000008
	1931.30	None	04	28.68	Upper Tail	-8.15	Yes	Sr02	11.2	.708909	.000011
South Stoa West	1937.15-9	"Avar" invaders or mercenaries – weapons, buckles	06	27.98	No	-12.63	No	Sr03	19.8	.708452	.000011
			07	26.80	No	-12.09	No	Sr04	17.8	.708543	.000010
	1937.25	None	08	28.58	Upper Tail	-11.80	No	Sr05	16.2	.708396	.000011
	1938.10	"Avar" mercenary – weapons, buckle	10	26.88	No	-10.45	No	Sr06	12.0	.708658	.000011
Gymnasium	Gym.2	"North African" cranial morphology	13	26.90	No	-8.17	Yes	Sr07	13.4	.708417	.000009
	1965.14/Gym.5	None	15	26.27	Lower Tail	-12.50	No	Sr08	8.7	.708534	.000010
			16	28.85	Upper Tail	-13.33	No	Sr09	11.0	.708494	.000009
	1966.07/Gym.29	"Elias" inscription	19	27.17	No	-12.45	No	Sr10	11.4	.708544	.000011
	1966.05/Gym.53	None	23	26.25	Lower Tail	-12.50	No	Sr11	14.4	.708446	.000013
			24	28.52	Upper Tail	-12.16	No	Sr12	20.7	.708680	.000011
	1967.13/Gym.86	Hinged buckle	27	27.56	No	-12.49	No	Sr13	13.8	.708538	.000012
Recessed Bedrock Burial Area	1967.10/Gym.69A	None	30	29.23	Upper Tail	-12.72	No	Sr14	11.5	.708485	.000011
			31	28.52	Upper Tail	-12.47	No	Sr15	14.4	.708527	.000009
	Gym.83	None	35	27.20	No	-8.37	Yes	Sr16	22.6	.708837	.000011
	1969.49-50/Gym.96	None	43	31.54	Outlier	-12.18	No	Sr17	17.7	.708869	.000010
Temple Hill	1971.22	None	54	27.86	No	-7.48	Yes	Sr18	17.8	.709035	.000009
			56	28.35	No	-8.33	Yes	Sr19	19.6	.708413	.000010
	1972.20 (12th c +)	None	62	29.30	Upper Tail	-12.43	No	Sr20	8.2	.708417	.000012
	1972.20 (6th-8th c)	Buckles, weapons	65	26.30	Lower Tail	-8.96	Yes	Sr21	14.9	.708453	.000009
			66	26.33	Lower Tail	-11.39	No	Sr22	11.1	.708363	.000010
			68	25.66	Lower Tail	-13.03	No	Sr23	19.2	.709275	.000010
			70	26.05	Lower Tail	-6.86	Yes	Sr24	12.7	.711096	.000012
Comparative faunal sample (*Sus scrofa* canine enamel), LOT 2001-42 (3^{rd} c or 5^{th}-6^{th} c AD, Well 2000-01, Panayia Field)								Sr25	8.7	.708500	.000011

clearly marked as belonging to a foreigner. Since this sample displays a $\delta^{18}O_{CO3(VSMOW)}$ = 27.58‰ almost identical to the mean $\delta^{18}O_{CO3(VSMOW)}$ of the entire population, it is likely that if this individual, named Eusebius, was a migrant, they were from a region of the Mediterranean with a similar value in $\delta^{18}O$ to Late Antique Corinth. This is consistent with his origin as broadly based in Anatolia, which is roughly equivalent to modern Turkey (as per Kent, 1966, number 522, p. 436), or with alternative translations which locate Eusebius as more precisely originating in Soloi, on Cyprus (Bees, 1941; Robert, 1966). As the $\delta^{18}O_{(VSMOW)}$ of rainwater from this site almost identical to that of Corinth, and is calculated as -5.4‰ as compared to Corinth's -5.5‰ (Bowen, 2015; Bowen and Revenaugh, 2003), I conclude that he could have been born on Cyprus. Osteological analysis of this skeleton (the only one preserved from this grave) indicates that this young adult was a probable male, which would be consistent with this individual being Eusebius, though he also could have been one of the other two adults buried in this tomb. Roebuck (1951) postulates that the grave was a family tomb, in which case the sampled individual may have at least belonged to the same social or ethnic group as Eusebius, so the question of foreign origin remains interesting.

Samples 6, 7, and 10 all are from individuals interred in graves containing weapons, and have all been assumed to be the skeletal remains of northern invaders or mercenaries (Davidson and Horváth, 1937; Weinberg, 1974). Similarly, Sample 27 is associated with a belt buckle of the same generalized type as objects of personal adornment present in these so-called "Avar" graves. I chose the final sample for strontium analysis, Sample 19 from Corinth Grave 1966.07/Gymnasium Grave 29, because of the relatively complete knowledge available regarding this individual. Thanks to the associated tombstone (Wiseman, 1967a), the name of this individual is known ("Elias"), and the circumstances surrounding this burial make a compelling narrative to which any more information regarding the identity of the man interred in this tomb would be a welcome addition.

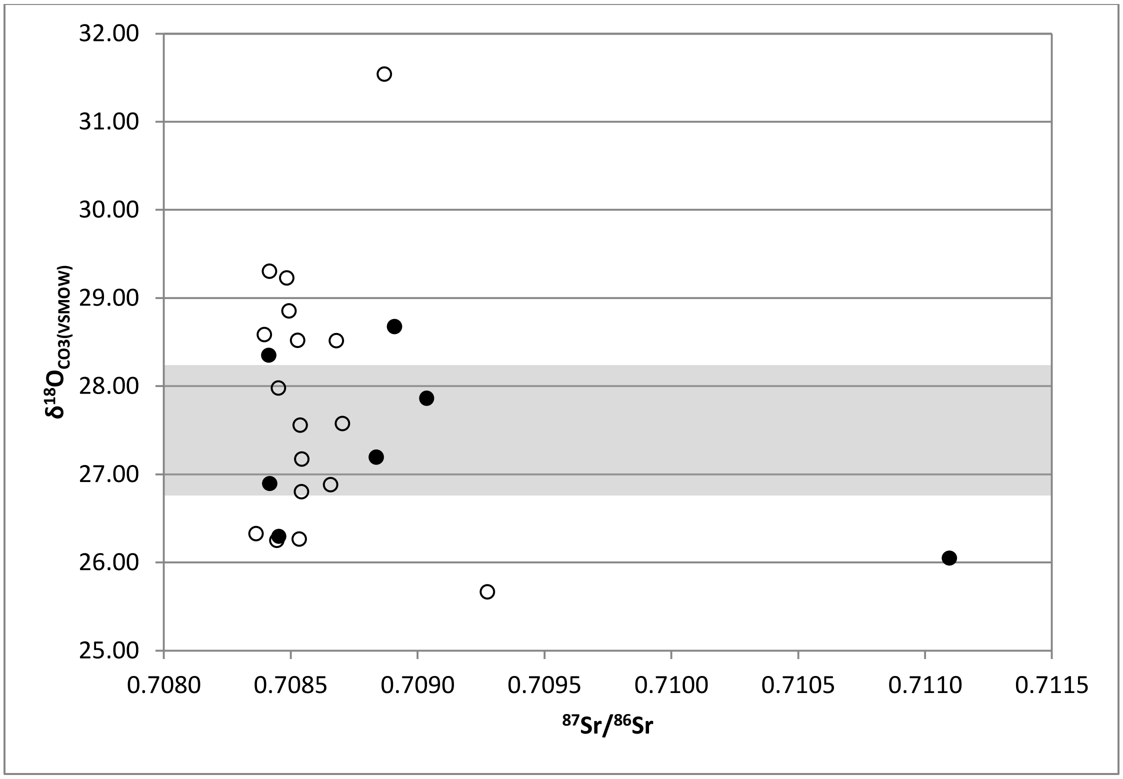

Figure VII.14. Strontium isotopic ratios ($^{87}Sr/^{86}Sr$) plotted against $\delta^{18}O_{CO3(VSMOW)}$ for each sample. The shaded area corresponds with the calculated local range in $\delta^{18}O_{CO3(VSMOW)}$ (26.76 – 28.24‰). Filled circles represent those samples whose $\delta^{13}C_{ap(VPDB)}$ displays evidence of dietary incorporation of C_4 plants or marine resources.

7.4.2 Strontium isotope distribution

Figure VII.14 shows the distribution of $^{87}Sr/^{86}Sr$ in all 25 samples. As can be seen, the 24 human samples display a fairly wide range in $^{87}Sr/^{86}Sr$ values from .7084 to .7111, and this variation does not completely correspond with either $\delta^{18}O_{CO3(VSMOW)}$ or dietary carbon $\delta^{13}C_{ap}$ for these samples. The *S. scrofa* enamel sample has a value towards the lower end of this distribution, at .7085. Since the majority of human samples also cluster around .7085, the faunal value may be a good approximation of a local signature for this population. These data do not display significant differences between sexes (seven males to five females; t=.37, df=10, p=.72) or among age classes (ANOVA

F=.90, df=4, p=.483). Variation in this dataset is present among those individuals displaying relative enrichment in ^{87}Sr, resulting in a positive tail in the distribution, and one sample with an anomalously high value.

7.4.3 *Identifying the local $^{87}Sr/^{86}Sr$ signal at Corinth*

Several methods exist for determining the local $^{87}Sr/^{86}Sr$ signature. In this research, I primarily use a statistical approach assuming a normal distribution of enamel $^{87}Sr/^{86}Sr$ for the majority of archaeological humans within a given population (Wright, 2005, 2012). Thus, while this distribution is similar to previous $^{87}Sr/^{86}Sr$ values obtained from Corinth and nearby sites (Lê, 2006; Leslie, 2012; Nafplioti, 2011), it does not precisely align with previous local determinations. Previous research in the Aegean and mainland Greece has relied heavily on the use of comparative faunal samples to define the range of "bioavailable" strontium available to the human population (Lê, 2006; Leslie, 2012; Nafplioti, 2008; 2011, 2013; Richards et al., 2008). These data are compared to the present dataset, but preference is given to results generated from isotopic analysis of archaeological human samples because animals are also mobile.

As the diets of humans and animals should be the result of similar mixing of ultimate strontium sources in the local ecosystem, faunal values provide a logical proxy for those expected from humans (Bentley et al., 2004; Price et al., 2002). However, the success of this method is dependent on the mobility of the animals in question and the comparability of their diets to that of archaeologically congruent human populations. Dufour and colleagues (2007) identified problems with using radiogenic strontium isotopes to source archaeological fauna that regularly move between catchment areas, such as river fish. Sheep and goats may also have covered a wide geographic range in search of forage. These animals, while undoubtedly part of the meat supply, were primarily relied upon for dairy, and milk products have low strontium concentrations and thus are unlikely to affect the isotopic ratios in human tissue (Price et al., 1994). As a result, the local range for small ruminants may not be useful for the characterization of human mobility. Additional concerns include the introduction of strontium through food processing and the prevalence of imported foodstuffs not shared with archaeological fauna (Wright, 2005).

These issues are compounded when the fauna analyzed are from a different archaeological period than the humans to whom they are being compared. This problem is illustrated in a recent analysis of mobility at Stymphalos (Leslie, 2012). While the Hellenistic (2nd century BC) sheep/goat and pig teeth presented $^{87}Sr/^{86}Sr$ values consistent with that of 4th-6th century AD human enamel samples, the 1st century AD faunal values did not. Leslie (2012: 120) suggested this discrepancy might result from a foreign origin for these animals corresponding with historical accounts of Roman army movements and settlers in the area. It would be problematic to assume these reported faunal data would match that of late antiquity, given likely diachronic changes in animal sources, trade and husbandry.

For this research, I only included one comparative faunal sample from a well filled in late antiquity (LOT 2001-42 from Well 2000-01, cf. NB 941: 127). I sampled *Sus scrofa* canine enamel from this context, as domesticated pigs are often kept in close proximity to humans and have similar diets (Bentley, 2006; van der Merwe et al., 2003). Unfortunately, it is possible this sample is representative of wild boar rather than domesticated pig, and the material used to fill this well mainly dates to the 3rd century AD. As a result, this sample may not be contemporary with the human samples and as there is only one, it is impossible to determine if this pig was wild, if local, animal, rather than one fed table refuse. However, the $^{87}Sr/^{86}Sr$ value of this tooth is consistent with the majority of human enamel samples, and it is reasonable to assume this value approximates the baseline for Late Roman to Late Antique Corinth.

In order to determine the "local" $^{87}Sr/^{86}Sr$ for Corinth, I included all 25 samples in a statistical approach. For a single population consuming mostly locally grown foods and given that the local environment is geologically monotonous, strontium isotopes should be normally distributed and 95% of the population should fall within 1 standard deviation of either side of the mean. Figure VII.15 shows the $^{87}Sr/^{86}Sr$ of all samples in a combination histogram and box plot. The box plot, which charts the median and interquartile range for these data, shows a strongly skewed distribution. When all data are included, the dataset does not conform to the expectations of normality (see Table VII.9, Shapiro-Wilk W=0.5372, p<.001), indicating that some nonlocals are present.

Figure VII.16 shows chronological distribution of $^{87}Sr/^{86}Sr$. One individual, Sample 62, dates to at least the 12th century AD. However, there is no difference in $^{87}Sr/^{86}Sr$ among skeletons dated to late antiquity (N=23, F=.57, df=2, p=.575). There is also no significant difference between the Late Antique samples from this dataset and 13th century AD samples from Corinth (N=11, 10 of which are from Lê, 2006, t=-1.17, df=32, p=.252, independent t-test with equal variances not assumed). This is due in part to the tendency of the Frankish data to display the same skew towards heavier values and

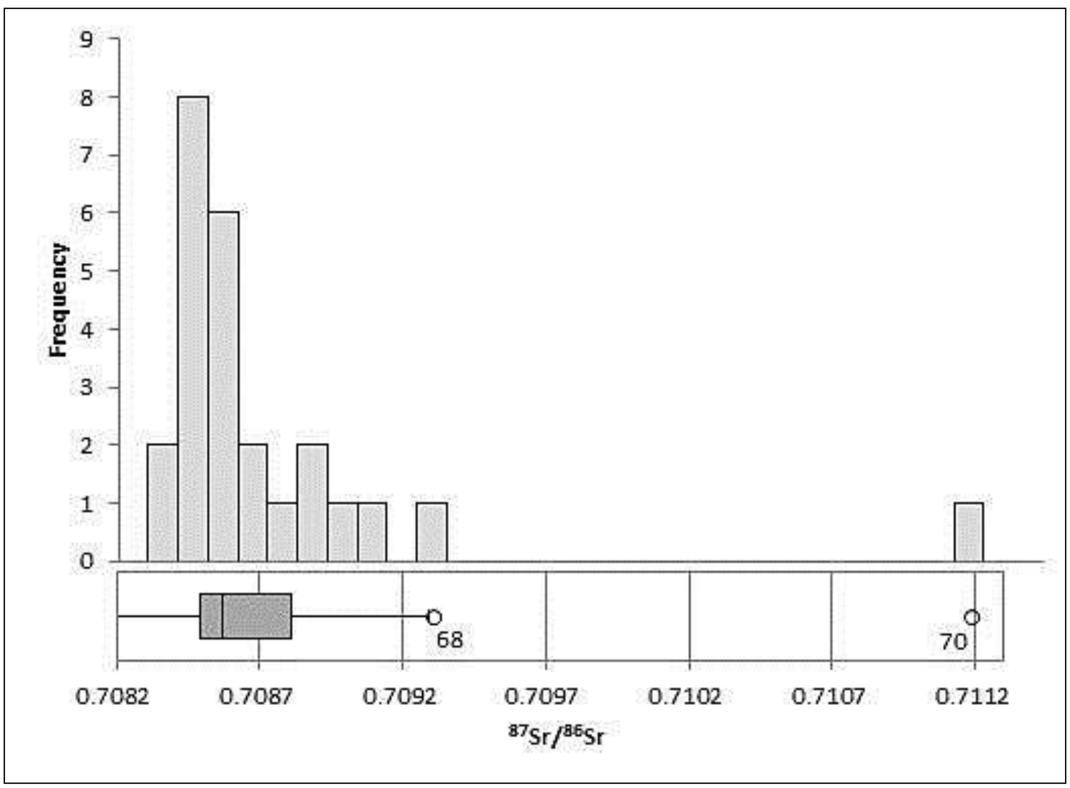

Figure VII.15. Strontium isotope ratios ($^{87}Sr/^{86}Sr$) of all samples. Samples outside 1 standard deviation of the mean are labeled by carbonate sample number.

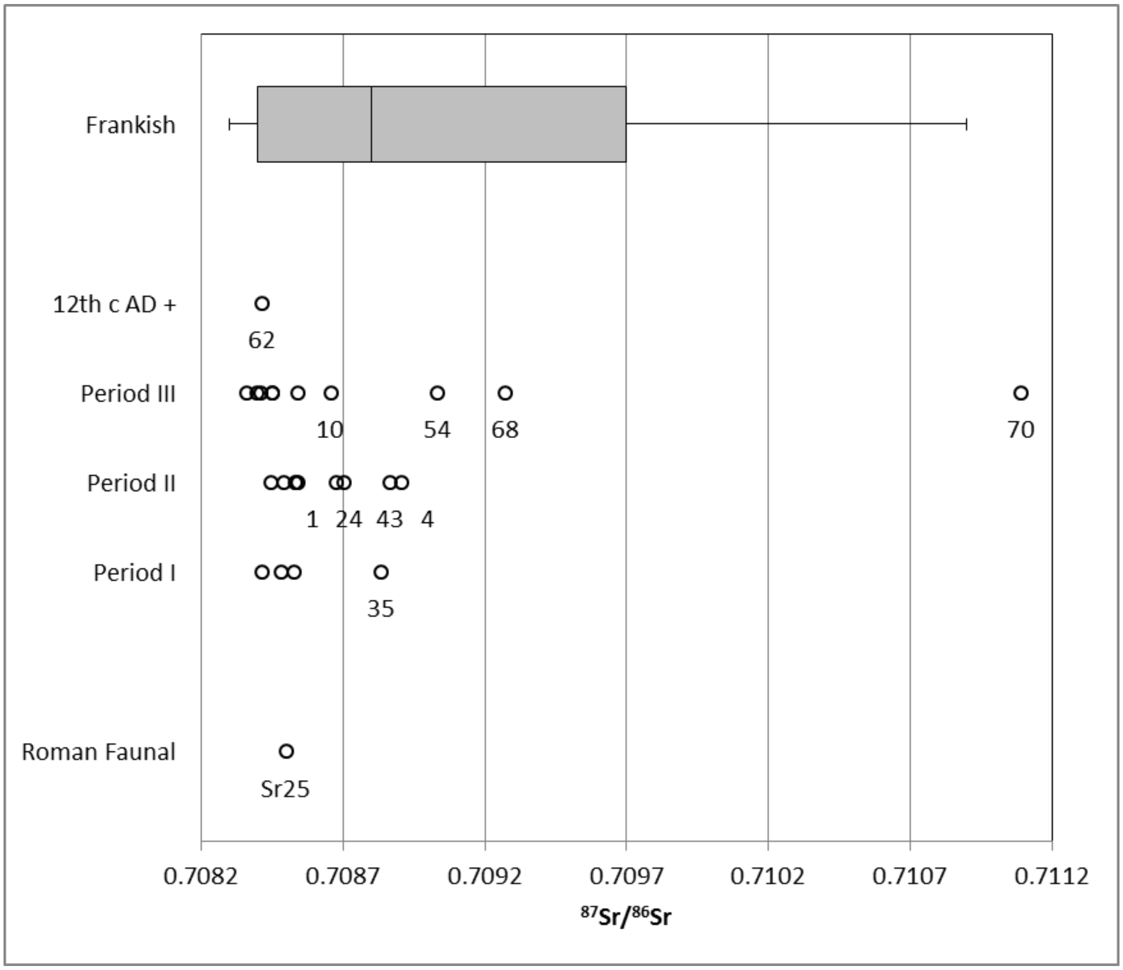

Figure VII.16. Chronological distribution of $^{87}Sr/^{86}Sr$ data from Corinth. Non-local skeletons are labeled with carbonate sample number. Comparative data for Frankish Corinth (13th century AD) from Lê (2006) are displayed in a box plot, all other data are from the current study.

is consistent with Lê's (2006) suggestion that this population contained migrants. It seems logical that for the majority of the population, food sources for both periods were relatively local, and variation within the dataset is the result of the presence of anomalous (migrant) individuals. In order to identify the local signal for Late Antique Corinth, these outliers first need to be excluded.

Using Chauvenet's (Taylor, 1997) and Peirce's (Gould, 1855; Ross, 2003) criteria, one individual is a "ridiculously improbable" member of the population. Sample

70 ($^{87}Sr/^{86}Sr$ = .711096) is .00182 more enriched in ^{87}Sr than the next highest sample value. However, after excluding this individual, the dataset still does not conform to normality (Shapiro-Wilk W=.8318, p=.001). As it is likely that more non-locals are present in this “trimmed” distribution, I employed an iterative approach to outlier exclusion. I first visually identified nine possible outliers, then used the Generalized Extreme Studentized Deviate (ESD) test (Rosner, 1983) to estimate if the observed values conform to a normal distribution after successive elimination of each suspected outlier. Under the ESD test, Sample 70 (G=4.37) in addition to Sample 68 (G=2.92), Sample 54 (G=2.51), Sample 4 (G=2.26), Sample 43 (G=2.39), and Sample 35 (G=2.66; all one-tailed Grubbs’ statistics, p<.05) are all identified as outliers.

Since the normality plot in Figure VII.17 shows considerable variability after excluding these six individuals, more nonlocals may also be present in these data. Table VII.8 contains descriptive statistics for the original dataset, including all samples, as compared to three reduced datasets. In the first, only the outlier is excluded or trimmed, resulting in an immediate lowering in the standard deviation and the difference between the median and the mean, though the data are still skewed. The second trimmed dataset excludes those values which visually appear to break the normal plane, i.e., all samples in the upper tail. In addition to those samples identified as outliers by the ESD test, three others, Samples 1, 10, and 24, also appear to be bending out of the normal plane (see Figure VII.17). The final trimmed dataset excludes only the six samples from the upper tail which are statistically identified as being unlikely to be members of the same, normally-distributed population as the majority of the dataset. Though Samples 1, 10, and 24 appear to visually break the normal plane, however, Table VII.8 shows that the summary statistics after trimming the entire upper tail are not considerably different than those produced from the dataset resulting from the exclusion of just those six samples identified as outliers by the ESD test. Both reduced datasets conform to the expectations of normality (Shapiro-Wilk W=.9281, p=.23 after excluding upper tail, W=.9224, p=.13 under ESD). As Samples 1, 10, and 24 can not be statistically excluded from the normal

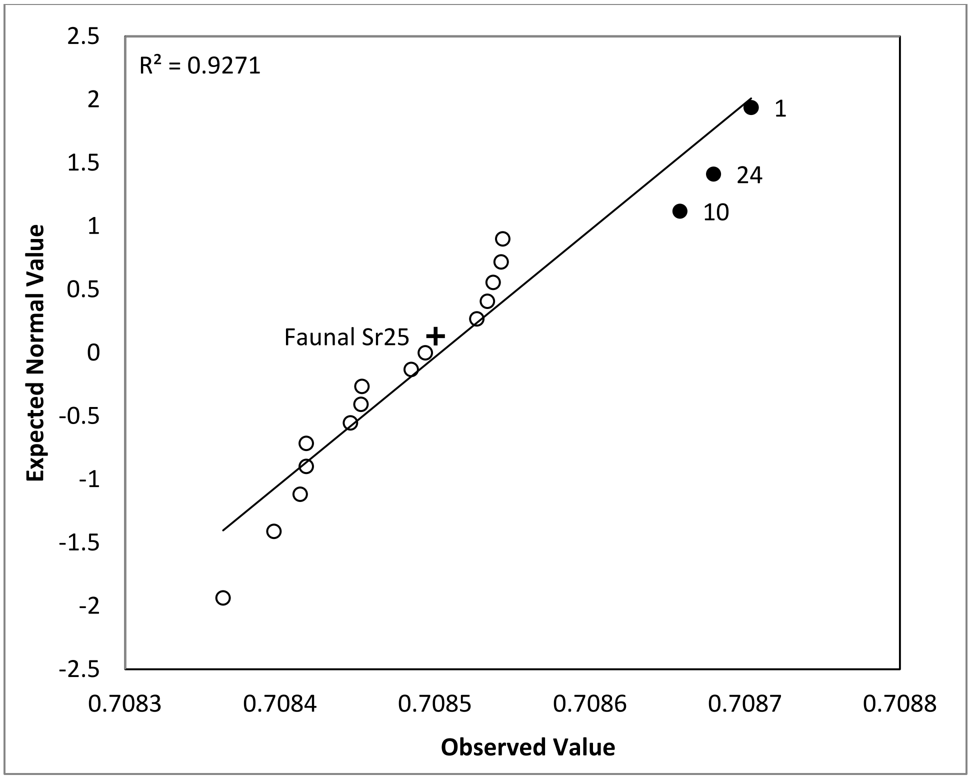

Figure VII.17. Normal Q-Q probability plot for $^{87}Sr/^{86}Sr$ in Corinth tooth enamel after removing six outliers. Filled circles are samples visually identified as possible outliers but which the ESD test did not identify as such. These data are labeled with the carbonate sample number (see Table VII.7). The faunal sample is also labeled and marked with a +.

Table VII.8. Descriptive statistics for $^{87}Sr/^{86}Sr$ of human enamel, for the complete, trimmed, and local datasets.

Statistic	Complete	Outlier Trimmed	Upper Tail Trimmed	Local (Trimmed Using ESD)
Mean $^{87}Sr/^{86}Sr$	.708703	.708604	.708470	.708503
Standard deviation	.000547	.000229	.000058	.000096
Count	25	24	16	19
Minimum	.708363	.708363	.708363	.708363
Maximum	.711096	.709275	.708544	.708704
Variance	2.99 E-07	5.27 E-08	3.41 E-09	9.12 E-09
Coefficient of variation	.077134	.032384	.008250	.013481
Skewness (standard error)	3.79 (.46)	1.51 (.47)	-.209 (.56)	.786 (.52)
Kurtosis (standard error)	16.3 (.90)	1.97 (.92)	-1.20 (1.09)	.0511 (1.01)
Median	.708534	.708531	.708469	.708494

distribution, they may be from individuals with slightly higher local mobility and are included in the normal variation for the site of Corinth.

The local range is thus conservatively estimated to range from .70836 to .70870 after excluding the six individuals which fail the ESD. This estimation is consistent with Lê's (2006) determination of a local range from .70768 to.70968 for Frankish Corinth, though it is slightly more restricted. In contrast to the current study, the Frankish range is more similar to the bulk soil $^{87}Sr/^{86}Sr$ of .70884 (Lê, 2006) and the local signature of .7087 reported by Nafplioti (2011). Since Lê (2006) calculated this range using sheep/goatbone $^{87}Sr/^{86}Sr$, and Nafplioti (2011) used faunal data from the site of Perachora on the bay by Corinth, these animals may have eaten a different diet from that of the majority of humans due to foraging practices or differences in diet. In contrast, the single faunal specimen I analyzed displays a much lower $^{87}Sr/^{86}Sr$ value of .70850. Thus, it is possible that animal foddering varied among communities or time periods, and the values present in the Frankish faunal samples may also reflect dietary strontium for a segment of the Late Antique population, of which Samples 1, 10, and 24 were members.

In other words, variation in the local range may be a result of a number of "hyperlocal" signals (Leslie, 2012). This result may be the result of food procurement, such as what may be present if each community at Corinth primarily consumed food they grew themselves. Leslie (2012) identified an even wider local range of .70831-.70976 for the nearby valley of Stymphalos with two identifiable groups of values within this range. The group closer to the $^{87}Sr/^{86}Sr$ value of modern seawater (.7092) is suggested to have lived closer to the coast. Thus, the local range for Corinth would be made up of a series of hyperlocal signals. Using a statistical approach based on assumptions of normality provides an averaged view of the entire population without necessitating precise identification of the food sources for each community. Therefore, I estimate local $^{87}Sr/^{86}Sr$ for Late Antique Corinth ranged from .70836 to .70870.

7.4.4 Mortuary context of potential migrants

Patterning exists in the distribution of $^{87}Sr/^{86}Sr$ outliers based on their mortuary contexts. Two strontium-identified non-locals (Samples 70 and 68) were both interred in the lowest burial layer in Grave 1972.20 on Temple Hill. Sample 54 is also from a grave on Temple Hill (Grave 1971.22), while the rest are from graves placed north of the city. Sample 4 is from a tomb cut into the foundations of the Asklepieion (Grave 1931.30), Samples 35 and 43 are from graves placed in the recessed bedrock burial area in the Gymnasium (Gym. Grave 83 and Grave 1969.45-50/Gym. Grave 96). As $^{87}Sr/^{86}Sr$ outliers are predominantly from graves placed in one of two burial locations, spatial proximity may have played a part in the decision of where non-locals were buried. It is reasonable to expect that geochemical patterning may also extend to other mortuary variables.

First, I examined whether there was statistical support to the observed differences in $^{87}Sr/^{86}Sr$ by burial location. As shown in Figure VII.18, although the variances are not equal among these locations (Levene's statistic F=3.31, p=.03), the majority of values fall close to the overall local mean of .708503, and are not statistically different (ANOVA F=1.08, df=4, p=.395). The 13 samples taken from graves placed north of the city when grouped together are also not significantly different from the ten from the city center (t=.94, df=9.56, p=.368, equal variances not assumed, Levene's F=6.32, p=.02). In other words, despite the presence of the samples with the three highest $^{87}Sr/^{86}Sr$ values among the Temple Hill skeletons, non-locals are not more likely to be found in any one particular burial location (chi-square 7.44, df=4, p=.114).

In fact, $^{87}Sr/^{86}Sr$ values within geographically isolated graves and burials grouped together in multiple interment tombs are also not significantly different from the rest of the cemetery population. The Late Antique skeletons from Grave 1972.20 (N=4) are not distinct from contemporary samples across Corinth (t=-1.09, df=3.03, p=.355, equal variances not assumed, Levene's F=21.82, p<.001). These individuals are even more similar when compared to the other six samples from the ancient city center, both when the sample dating after the 12th century AD is included (t=-1.01, df=4.29, p=.365, equal variances not assumed, Levene's F=5.83, p=.039) and excluded (t=-.21, df=8, p=.84). The four samples from the recessed bedrock burial area in the Gymnasium are also not significantly different from the other Late Antique samples (t=.17, df=21, p=.865) or

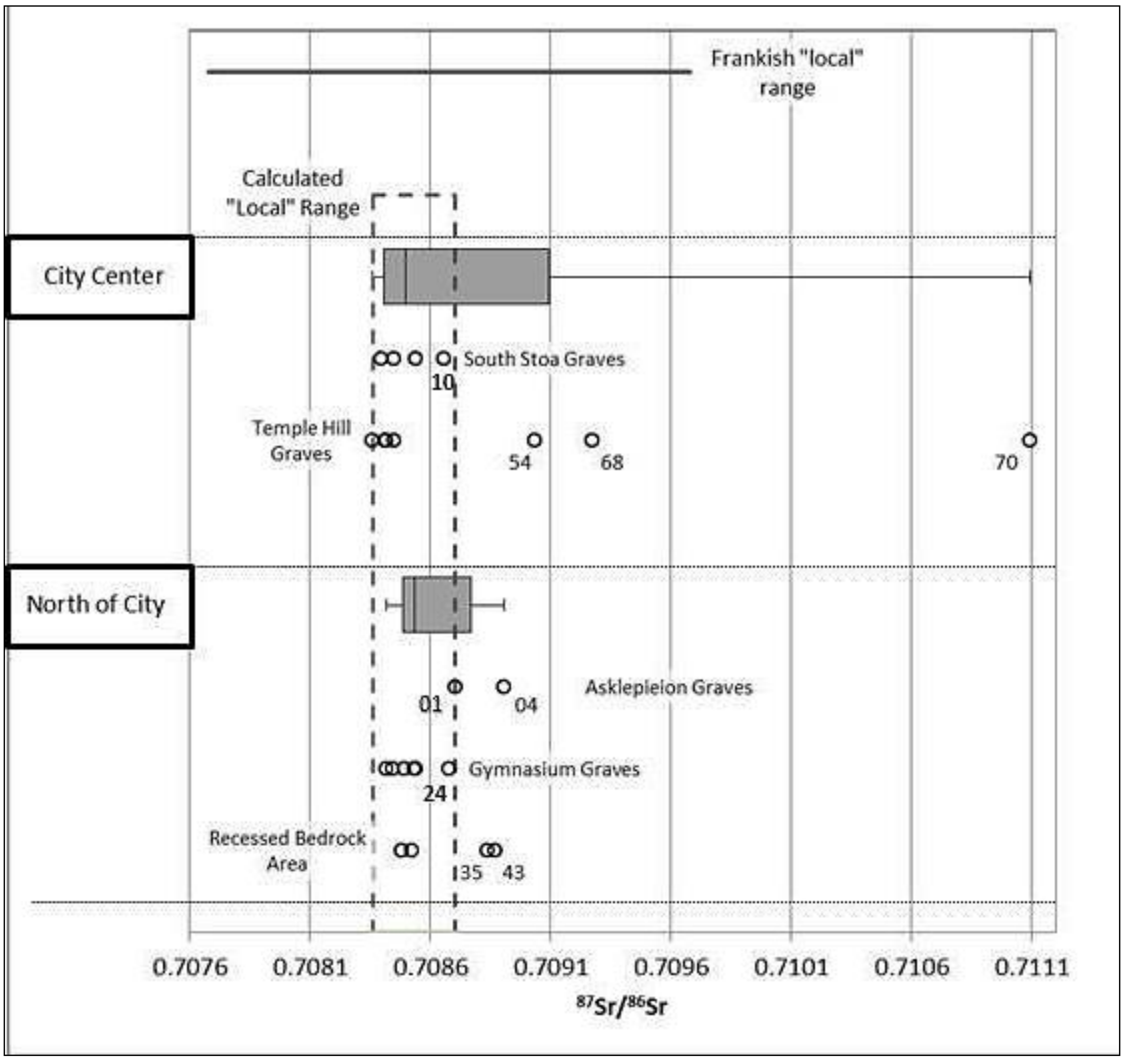

Figure VII.18. Distribution of $^{87}Sr/^{86}Sr$ by burial location. Box plots show the distribution of values for all graves located in the ancient city center and north of the city. Comparative data for Frankish Corinth (13th century AD) are from Lê (2006). The dashed box encloses the local range for Corinth (.70836 to .70870). Circles show individual data points, and samples discussed individually in the text are identified to carbonate sample number.

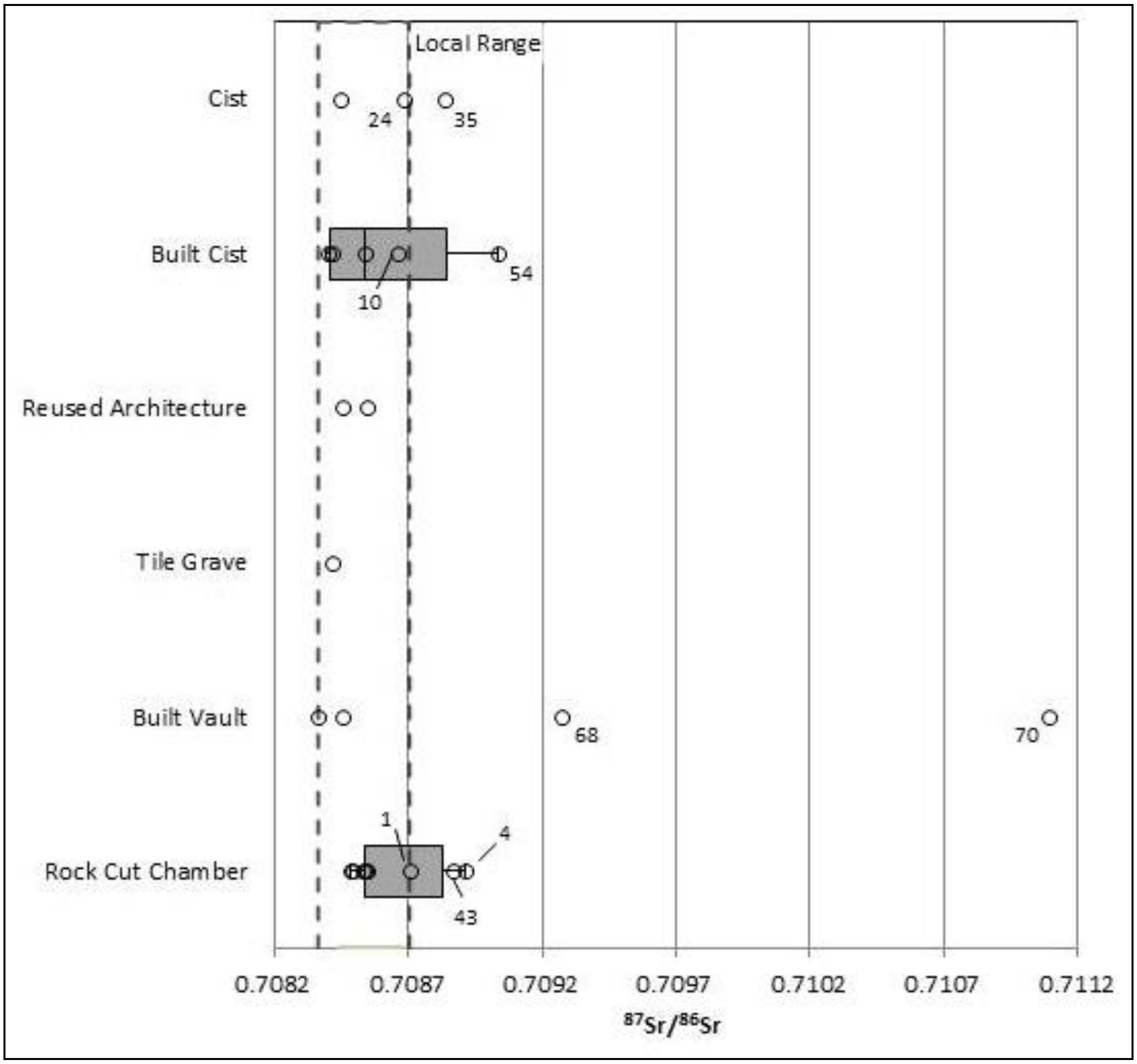

Figure VII.19. Distribution of Late Antique $^{87}Sr/^{86}Sr$ by grave morphology. Box plots show the interquartile ranges and median values for N>4. The dashed box encloses the local range for Corinth (.70836 to .70870). Circles show individual data points, and non-locals and possible non-locals are identified to carbonate sample number.

when compared with only the other nine samples from graves placed north of the city (t=-.93, df=11, p=.371). Thus, non-locals appear to be distributed throughout the city's cemeteries. However, many of these data groupings do not display equal variances, implying that the underlying distribution of these data among locations is not as similar as the independent t-tests and chi-squares suggest. As I limited the number of samples from each of these areas, this may be a result of small sample sizes and it would be worth testing in future research.

This small sample size may be the reason that no meaningful differences are found among $^{87}Sr/^{86}Sr$ values associated with other mortuary distinctions. Figure VII.19 shows the distribution of strontium isotope ratios by grave morphology. Strontium-identified nonlocals are only present in rock-cut chamber tombs, built vaults, built cists and cists, but this is not statistically significant (chi-square=2.43, df=5, p=.787). Using an ANOVA, there are also no differences among $^{87}Sr/^{86}Sr$ when grouped according to grave form (F=1.05, df=5, p=.423). However, the graves constructed in reused architectural units (N=2) and tile graves (N=1) are underrepresented in this dataset, and I did not sample any amphora burials.

Table VII.9. Distribution of Late Antique $^{87}Sr/^{86}Sr$ by mortuary variables. The last column presents results from independent t-tests for each variable.

Grouping		N	Mean $^{87}Sr/^{86}Sr$ ± sd	Min	Max	Median	Statistical difference
Grave Marker	Present	3	.70886 ± .00016	.70854	.70887	.70870	t=-.82 df=9 p=.435
	Absent	8	.70861 ± .00018	.70842	.70891	.70854	
Lamps	Present	2	n/a	.70870	.70887		t=-1.43 df=9 p=.187
	Absent	9	.70860 ± .00017	.70842	.70891	.70854	
Ceramics	Present	12	.70855 ± .00013	.70840	.70887	.70853	t=1.51 df=10.50 p=.16 [a]
	Absent	11	.70891 ± .00078	.70836	.71110	.70870	
Jewelry	Present	17	.70874 ± .00065	.70836	.71110	.70854	t=-.25 df=21 p=.806
	Absent	6	.70867 ± .00022	.70842	.70891	.70868	
Coins	Present	5	.70851 ± .00004	.70845	.70854	.70853	t=.96 df=21 p=.347
	Absent	18	.70879 ± .00063	.70836	.71110	.70860	
Buckles	Present	9	.70886 ± .00088	.70836	.71110	.70854	t=-76 df=8.56 p=.465 [b]
	Absent	14	.70864 ± .00021	.70841	.70904	.70854	
Weapons	Present	7	.70898 ± .00098	.70836	.71110	.70854	t=-.97 df=6.22 p=.369 [c]
	Absent	16	.70861 ± .00020	.70840	.70904	.70854	
Local			.70850 ± .00010	.70836	.70870	.70844	

[a] Failed Levene's test for equality of variances, F=5.18, p=.034; t-test run with equal variances not assumed.
[b] Failed Levene's test, F=6.08, p=.022
[c] Failed Levene's test, F=10.68, p=.004

Table VII.9 contains descriptive statistics and the results of the independent t-tests run on the rest of the mortuary variables. Samples from graves with grave markers, lamps, jewelry, buckles, and weapons all display a mean value slightly higher than the expected local $^{87}Sr/^{86}Sr$ range, but are not significantly different from the rest of the population. Similarly, none of the possible non-locals in the strontium distribution are present in graves with mortuary correlates of the high status group from Period II (Fisher's Exact 1.71, df=1, p=.269 in a one-tailed comparison), and only two of the eight samples associated with mortuary correlates of high status in Period III are non-local (Fisher's Exact .01, df=1, p=.666 in a one-tailed comparison). These results imply that some of the elite in Period III were of foreign origin, but that these individuals were not buried in a distinct way from the rest of the population.

On the other hand, samples from graves with ceramics, buckles, and weapons all fail Levene's test for equality of variances, so there may be differences in the underlying $^{87}Sr/^{86}Sr$ distribution for individuals associated with these mortuary variables. For example, strontium-identified nonlocals are nearly significantly less likely than locals to be present in graves containing ceramics (Fisher's exact 4.10, df=1, p=.059 in a one-tailed comparison). As a result, only one probable non-local belongs to mortuary Group 4. However, given the small sample sizes, it is difficult to attribute these differences to any status groups or communities on the basis of their mortuary correlates.

7.4.5 Summary

Using a statistical approach, I identify the $^{87}Sr/^{86}Sr$ signature for Late Antique Corinth to range from .70836 to .70870. This range is similar to previous estimates of a local range for Corinth which were mainly based on the use of comparative faunal specimens, often faunal bone. The method employed here is reliant primarily on the distribution of values among samples of human tooth enamel, and is affected less by differences in diagenesis between enamel and bone. It also affords a local range based directly on the diet of the local human population, which may be different than that of any faunal domesticates, and may combine a series of "hyperlocal" signals.

Based on this local range, six individuals are non-local in origin, and all display $^{87}Sr/^{86}Sr$ values higher than the expected range for Corinth. These samples are present in all three Late Antique periods and in a range of mortuary contexts. Three samples (4, 35, and 43) were from individuals buried north of the city, while 3 (54, 68, and 70) were interred on Temple Hill near the ancient city center. Of these, Sample 43 from Grave 1969.49-50/Gymnasium Grave 96 also displays the highest $\delta^{18}O_{CO3(VSMOW)}$ value, and their skeletal geochemistry clearly marks them as an individual whose childhood residence was far from Corinth. Interestingly, no non-locals were present in the South Stoa burial cluster or in the cemetery surrounding the recessed bedrock burial area in the Gymnasium. While these differences are not statistically significant, it may be that individuals of foreign origin were preferentially buried in specific locations, near to other migrants, and that the sample sizes present here were not sufficient to catch this patterning.

It is also noteworthy that only two of these non-locals were buried in mortuary contexts previously suggested to be the graves of foreigners. Though I sampled seven individuals from three hypothetical "Avar" graves, only those two buried among the original interments in Grave 1972.20 on Temple Hill display anomalous $^{87}Sr/^{86}Sr$ values. Sample 27, which was also taken from an individual buried with a hinged buckle similar to those found by suggested foreigners, and Sample 13, which was taken from a female of suggested North African ancestry (Angel, quoted in Wiseman, 1969), also display $^{87}Sr/^{86}Sr$ values consistent with a local origin. Samples 1, 10, and 24, on the other hand, while not possible to statistically exclude from the normal distribution of local $^{87}Sr/^{86}Sr$ values, display very high values. As Sample 1 in particular was specifically identified as a foreigner on their tombstone (an "Anatolian" and possibly from Soloi on Cyprus), however, it is possible that the strontium isotopic ratios alone are not sufficient to identify all nonlocals. In the following section, I attempt to combine the strontium and oxygen isotopic results in order to determine if these data can be used together to better characterize mobility in Late Antique Corinth.

7.5 Multi-Isotopic Characterization of Mobility

In order to better identify nonlocals in this population, I performed multivariate statistical analysis on the paired $^{87}Sr/^{86}Sr$ and $\delta^{18}O_{CO3(VSMOW)}$ values available from 24 human enamel samples. I did not include carbon isotopic ratios in this analysis as both locals and nonlocals in both strontium and oxygen isotopic distributions consumed C_4 plants, and dietary $\delta^{13}C_{ap}$ does not correlate with other geographic factors. As fairly wide isotopic variation are present for both $^{87}Sr/^{86}Sr$ and $\delta^{18}O_{CO3(VSMOW)}$ "local" signatures, it is possible that examining these distributions singly will not catch all of the foreigners present in Corinth cemeteries. On the other hand, if migrants traveled to Corinth from a few, select geographic locations, it would be likely that these individuals would display a clustered pattern in isotopic parameters. Through multivariate statistical analysis, it may be possible to produce an independent synthesis of these data that would enable statistical identification of these groupings. Hierarchical cluster analysis has been suggested as one appropriate method for finding groups among isotopic data which conform to geographical origin (Killgrove and Montgomery, 2016; Turner et al., 2009). As isotopic ratios vary greatly in scale, prior to analysis I transformed these values into z-scores.

K-means clusters were generated based on models imposing two through twelve clusters using Paleontological Statistics statistical package (PAST version 3.06). I then performed a one-way ANOVA using PSPP on each model to test for significant differences in mean isotopic values among the clusters and to delineate the number of clusters that were most significantly different by all isotopic parameters. Figure VII.20 shows the relationship among samples given a model with nine clusters. This model has the greatest significance according to the one-way ANOVA run for each isotopic parameter (oxygen: $F=144.22$, $p<.000$; strontium: $F=43.43$, $p<.000$). Specific ranges of

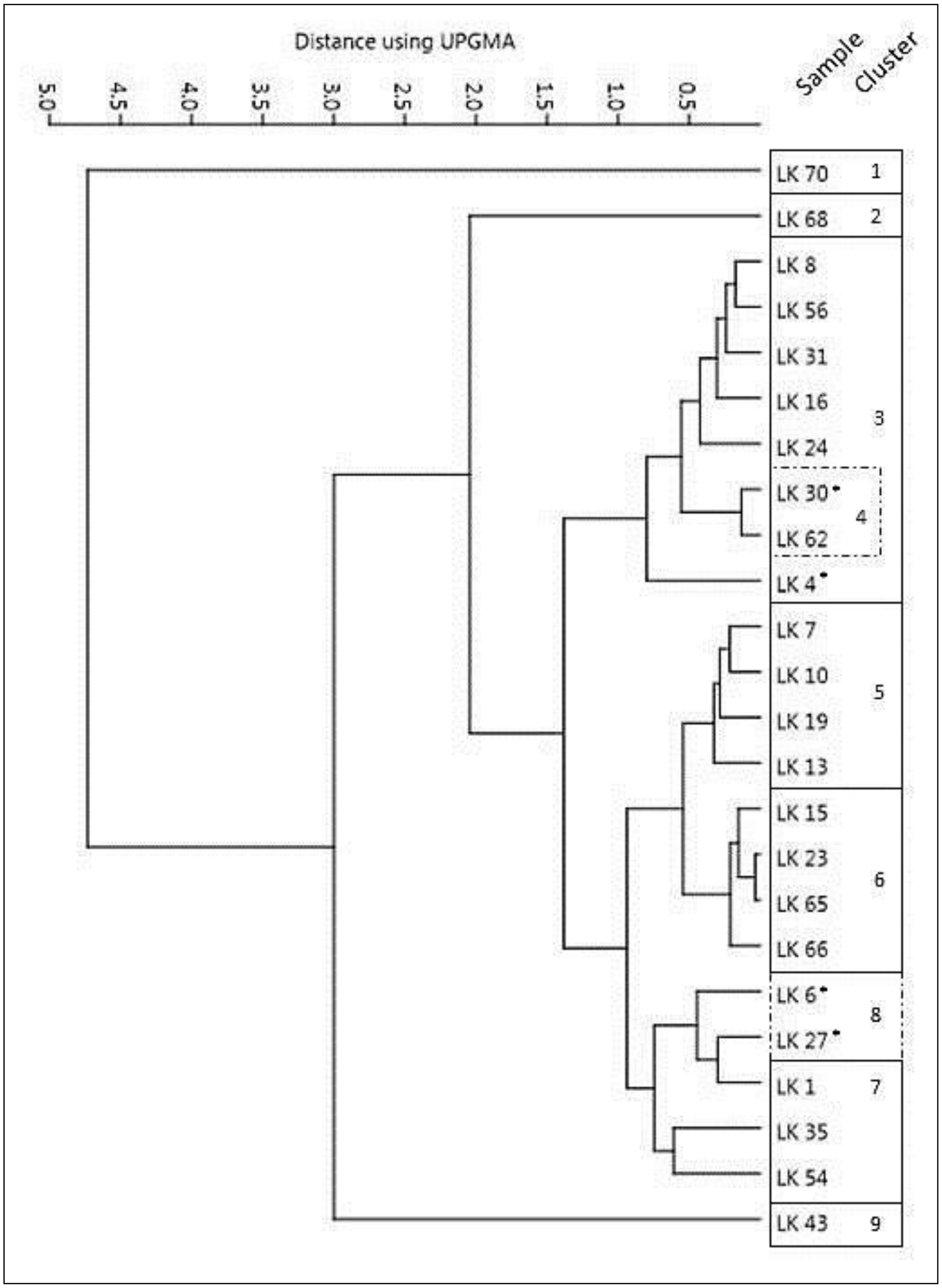

Figure VII.20. Hierarchical cluster analysis results. Dendrogram shows linkage based on the unweighted pair group method with arithmetic mean (UPGMA) for strontium and oxygen isotopic parameters. Boxes represent the 9 clusters that display the highest statistical significance using one-way ANOVA. Samples are labeled by carbonate sample number (see Table VII.7). Clusters and samples with problematic allocations are marked with an dotted border or an asterisk, respectively.

oxygen isotopic data are encompassed within each cluster, which result is consistent with the characterization of geographically defined groups. Strontium isotopic ranges are less well-refined. These nine isotopic groupings include three outliers (Samples 43, 68, and 70) who are distinct from the rest of the dataset (as Clusters 1, 2, and 9). Clusters 5 through 8, as shown on the dendrogram, may be representative of the majority of local Corinthians during this time period. Cluster 6 displays an abnormally low $\delta^{18}O_{CO3(VSMOW)}$ as compared to the conservative estimate for local $\delta^{18}O_{CO3}$ and this sets them apart. Cluster 7 is distinguished through slightly higher $^{87}Sr/^{86}Sr$. Clusters 3 and 4 are then consistent with a separate source population from which a number of migrants to Corinth may have been drawn.

To assess whether these clusters were measurably influenced by the outliers, I then reran the cluster analyses excluding Samples 43, 68, and 70. As Cluster 4 contains one sample dating to the 12th century AD or later, I also excluded this individual (Sample 62). I imposed two through five clusters and tested each model for significant differences between clusters, resulting in a model with three clusters. This analysis only reclassifies three of 20 individuals between the local and non-local groups. With Sample 62 excluded, Sample 30 is not distinct from the rest of Cluster 3 on the dendrogram in Figure VII.20. Samples 6 and 27 (Cluster 8 on the dendrogram) also then associate with Clusters 3 and 4. This analysis also reallocates Sample 4 to within Cluster 7 (Samples 1, 35, and 54) among the suggested locals. Clusters 5 and 6 from Figure VII.20 are not distinguished from each other in this cluster analysis, though as a whole these eight individuals group separately from Samples 1, 4, 35, and 54 (Cluster 7 and Sample 4). These results indicate that there are meaningful differences among these three groups and little skewing effect from the three outliers.

This cluster analysis also implies that samples in Clusters 5 and 6 are all likely locals, as they are grouped together. Thus, the local $\delta^{18}O_{CO3(VSMOW)}$ for Late Antique Corinth may more properly equate $26.7 \pm .46‰$, substantially more restricted and depleted in ^{18}O than the conservative estimate of $27.5 \pm .74‰$ calculated previously. If this restricted range is taken as a true reflection of $\delta^{18}O_{bw}$, using the equations from

Section 7.3.2 (Daux et al., 2008; France and Owsley, 2015) the estimated local $\delta^{18}O_{bw}$ for Corinth shifts from -2.99 ± 1.82‰$_{VSMOW}$ (using the average y-intercept from Daux et al., 2008) to -4.83 ± 1.82‰$_{VSMOW}$. This value is much closer to the expected $\delta^{18}O_{VSMOW}$ of meteoric water at the site of Corinth, which I calculated to be -5.5 ± 0.4‰$_{VSMOW}$ using the OIPC (Bowen, 2015; Bowen and Revenaugh, 2003). However, it remains possible that this range in local $\delta^{18}O_{bw}$ is a result of differences in food processing, water sources, or heightened local or regional mobility for a portion of the Late Antique population as samples do group into two distinct clusters.

Since the exclusion of the non-contemporary Sample 62 resulted in significant reallocations of individuals between proposed local and nonlocal groups, diachronic change in $\delta^{18}O_{CO3(VSMOW)}$ may also have occurred, providing additional evidence that cultural factors may be behind the distinctions between Clusters 5 and 6. I tested the possibility that Byzantine and later populations may be geochemically distinct from the Late Antique sample using previously published isotopic research from Corinth which included 13th century human skeletal remains. I reran the cluster analysis including Sample 62 and the nine Frankish individuals with $^{87}Sr/^{86}Sr$ and $\delta^{18}O_{CO3(VSMOW)}$ values available (Garvie-Lok, 2009; Lê, 2006). I examined differences in ANOVA scores for models imposing three through 13 clusters. The model imposing ten clusters provides the best consensus for these data (oxygen: $F=79.97$, $p<.000$; strontium: $F=24.22$, $p<.000$), though the eight cluster model provides a better fit for the strontium data and both parameters show equal variance among clusters for this model (oxygen: $F=18.17$, $p<.000$; strontium $F=95.87$, $p<.000$). For the ten-cluster model, including these data reallocates Sample 4 within Cluster 3 and Sample 35 within Cluster 5 from Figure VII.20, and makes Sample 66 into its own cluster with SCO-44 from the Frankish samples, but otherwise does not change the distribution of Late Antique samples among clusters. Sample 43 remains an outlier, as does Sample 70, though Sample 70 clusters together with SCO-54 and -55. Sample 68 is also shares outlier group membership with two Frankish samples, SCO-46 and -60.

When I ran cluster analyses for both time periods with the outliers removed, these results are even more similar to the dendrogram in Figure VII.20. Figure VII.21 shows the distribution of $^{87}Sr/^{86}Sr$ and $\delta^{18}O_{CO3(VSMOW)}$ values according to these clusters. Clusters 5 and 6 from Figure VII.20 are not distinguished from each other, again implying that the local range for Late Antique Corinth should be adjusted. Samples 27 and 6 no longer group together (Cluster 8 on Figure VII.20); instead, Sample 27 allocates with Clusters 5 and 6 and Sample 6 groups within Cluster 3. Samples 30 and 62 (Cluster 4 in Figure VII.20) are both also incorporated into Cluster 3. Sample 4 was once more reallocated to Cluster 7, and Sample 66, while still grouping together with Frankish sample SCO-44, also allocates back within Cluster 6. These results are consistent with Samples 70, 68, and 43 from the Late Antique dataset being from individuals of disparate foreign origins, and may imply that the samples in Clusters 3 and 7 were also non-local. Samples displaying values where the ranges of these source populations overlap may not allocate well within a single cluster, and as a result, allocation of Samples 4, 6, and 27 is problematic.

Figure VII.21 also shows how these clusters correspond with dietary differentiation. Of particular interest is the fact that the majority of samples from Cluster 7 and the outlier Sample 70 all display substantial enrichment in ^{13}C. Samples 4, 54, and 35 from Cluster 7 in particular may thus be hypothesized to show higher $^{87}Sr/^{86}Sr$ as a result of marine resource consumption, as opposed to sharing an origin from a single source population with homogeneous underlying geological substrate. Since eating fish can result in both elevated $\delta^{13}C_{ap(VPDB)}$ and a shift in $^{87}Sr/^{86}Sr$ reflecting the contemporary ocean value (around .7092) in human tissue, marine resource consumption may account for both of these values in these samples. Sample 35 may more appropriately belong within Cluster 5, and Sample 4 within Cluster 3. Sample 54 displays $\delta^{18}O_{CO3(VSMOW)}$ in the range where Clusters 3 and 5 overlap. Samples from Cluster 7 are also not distinguished by mortuary behavior; none are from graves with mortuary correlates of high status in either period and they are also not members of mortuary Group 4. Additionally, since the samples in Cluster 7 were buried in three

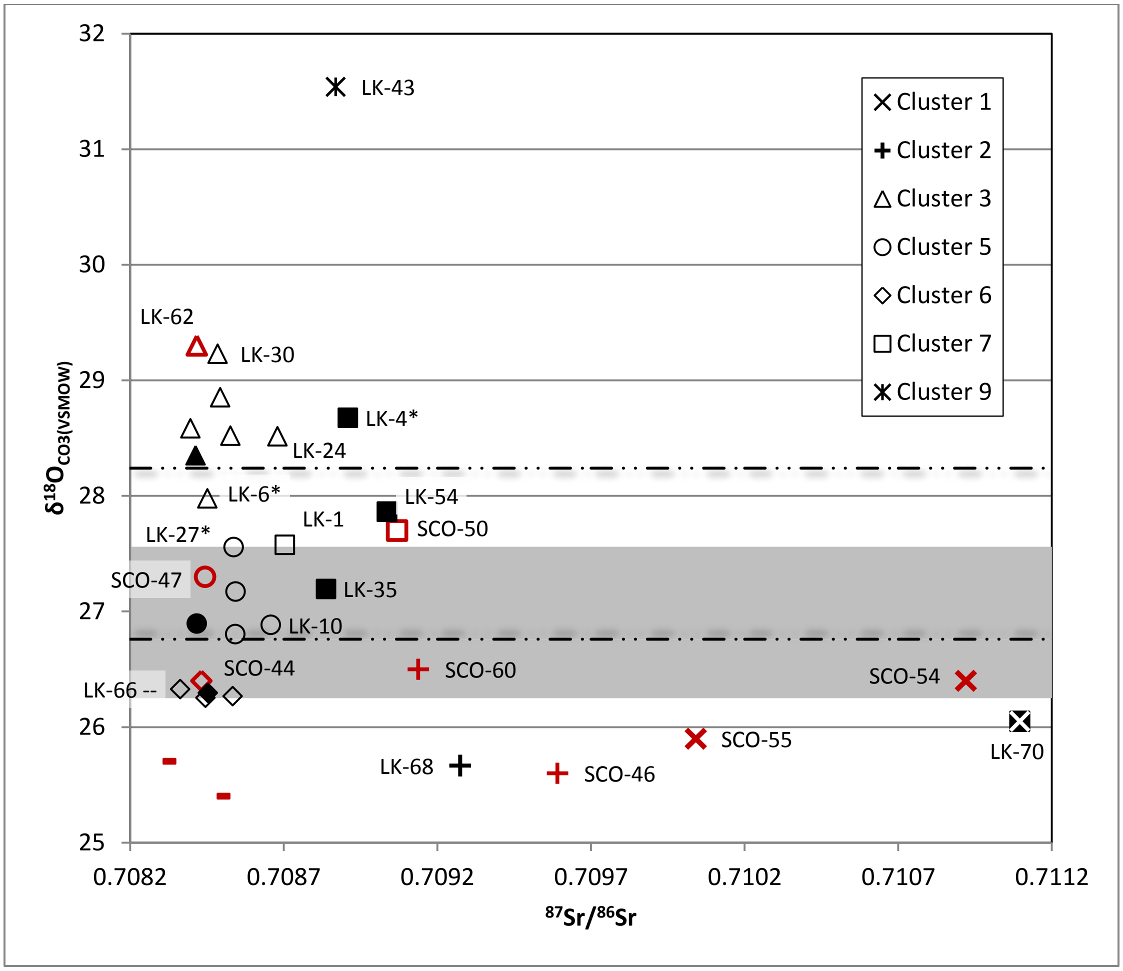

Figure VII.21. Strontium isotopic ratios ($^{87}Sr/^{86}Sr$) plotted against $\delta^{18}O_{CO3(VSMOW)}$ for Late Antique and Frankish samples identified to isotopic cluster. Filled symbols represent samples which display elevated $\delta^{13}C_{ap(VPDB)}$. The shaded area corresponds with the restricted local range in $\delta^{18}O_{CO3(VSMOW)}$ supported by the cluster analysis, and the dashed line represents the conservative $\delta^{18}O_{CO3(VSMOW)}$ range calculated for this study (26.76 – 28.24‰). Symbols are color-coded by archaeological period (black=Late Antique, red=12th century AD or later). Asterisks mark samples with problematic allocations. Samples discussed individually in the text are identified to carbonate sample number (See Table VII.7). Geochemical data for Frankish skeletons is from Garvie-Lok (2009) and Lê (2006).

separate burial areas and in all three time periods, their chronological and spatial distribution precludes archaeological inference regarding a shared identity. The likelihood that these samples are clustered together as a result of shared diet rather than migration implies substantial culinary variation existed at the site of Corinth.

This impression is heightened by the fact that elevated $\delta^{13}C_{ap(VPDB)}$ in other samples is unlikely to be a response to marine resource consumption. As shown in Figure VII.21, Samples 13, 56, and 65 are all within the local range in $^{87}Sr/^{86}Sr$ identified for Late Antique Corinth. Sample 70, though displaying $\delta^{18}O_{CO3(VSMOW)}$ similar to that of Sample 68, also shows substantially higher $^{87}Sr/^{86}Sr$. If these differing strontium isotopic ratios were the result of fish eating, the elevated $\delta^{13}C_{ap(VPDB)}$ of Sample 70 indicates that their $^{87}Sr/^{86}Sr$ would be lower than that of Sample 68, rather than the way it appears here. These two individuals may still have originated in one geographic location, however, if the underlying geology of the area was heterogeneous. Dietary differentiation does not explain clustering among these or the remaining samples, implying that the majority of clustering is the result of population movement.

Cluster 3 (see Figure VII.21) in particular may represent one geographically sourced population distinct from Corinth. All cluster analyses separate out these eight samples from Clusters 5, 6, and 7 due to relatively elevated oxygen isotopic ratios. Members of this cluster are significantly more likely to be buried with grave assemblages which include ceramic vessels and, thus, to be part of mortuary Group 4 (Fisher's Exact 5.04, df=1, p=.034 in a one-tailed comparison). Six other samples, including five probable locals (Samples 10, 15, 19, and 23) and one of the outliers (Sample 43) are also part of this mortuary group, implying this community was open to both locals and nonlocals. Members of this cluster are present in all three archaeological periods and all burial locations except Temple Hill.

The isotopic signature of Cluster 3 can be hypothesized to lie around $\delta^{18}O_{CO3(VSMOW)}$ = 27.98 to 29.30‰ and $^{87}Sr/^{86}Sr$ = .70840 to .70868. This location is geographically similar to Corinth but slightly warmer or more arid. The strontium isotopic range is within that reported for the Levantine coast in archaeological samples of Frankish date (.7078 to .7090) (Mitchell and Millard, 2009), and the oxygen isotopic ratios are consistent with average $\delta^{18}O_{CO3(VSMOW)}$ from Upper Egypt during the Roman period (28.2‰) (Dupras and Schwarcz, 2001). These values are bracketed on the high end by those from Late Roman inland Jordan ($\delta^{18}O_{CO3(VSMOW)}$ = 28.0 to 31.1‰) (Perry et al., 2009, 2011) and northern Egyptian values from the Roman period around 30.0 to 31.5‰ (Prowse et al., 2007). The conservative local range for Late Antique Corinth (26.76-28.24‰) is slightly lower, as are Frankish coastal Levantine samples local to Caesarea display a range of 24.26 to 27.07‰ (Mitchell and Millard, 2009). The local range identified through the cluster analysis (26.25-27.56‰) is even lower and does not overlap with that of Cluster 3. Thus, these isotopic ranges may be the geochemical signature of a population in the Eastern Mediterranean, possibly along the Levantine coast or the southern coast of Turkey. Unfortunately, few archaeological samples are currently available from these areas, and this range is not directly comparable to any available archaeological population, so a precise geographic origin for this cluster is not possible at this time.

Though mortuary behavior is similar for Cluster 3 and one outlier (Sample 43), their mortuary treatment is markedly different than that of the outliers Samples 68 and 70. These individuals are from the same grave on Temple Hill, and are associated with the high status mortuary group in Period III because weapons, buckles, and jewelry were placed in their grave. These outliers were buried similarly to the samples grouped together in Cluster 6, all four of which are from high status mortuary contexts. The two samples from Period II (Sample 15 from Grave 1965.14 and Sample 23 from Grave 1966.05) were buried north of the city near the ancient Gymnasium. Ceramic vessels and jewelry were placed in both graves. The two samples from Period III (Samples 65 and 66) were interred together in the earliest burial event in Grave 1972.20 on Temple Hill along with two outliers (Samples 68 and 70), and buckles, weapons, and jewelry were placed in their grave. The relative depletion in ^{18}O of these samples, and the shared burial location of two of these individuals with other clear non-locals appears to be consistent with a shared, northern geographic origin. However, all cluster analyses group samples from Cluster 6 together with Cluster 5 to the exclusion of Clusters 3 or 7, and mortuary behavior also does not discriminate between Clusters 5 and 6. Thus, it may be possible that cultural factors may account for the lower $\delta^{18}O_{CO3(VSMOW)}$ values present among members of the elite represented by Cluster 6.

The geographic origin of nonlocals also appears to change over time. Only three of the Frankish samples cluster with the locals from Clusters 5-7 from Figure VII.21 in either model. Two additional Frankish samples, though relatively depleted in ^{18}O, may also be drawn from the local population. Under the ten cluster model, two Frankish samples (those identified as non-locals by Lê, 2006) grouped with Sample 70, while two other samples originally identified as locals group with Sample 68 as outliers. Since none of the Frankish samples with paired $^{87}Sr/^{86}Sr$ and $\delta^{18}O_{CO3(VSMOW)}$ ratios display elevated $\delta^{13}C_{ap(VPDB)}$ (Garvie-Lok, 2009), these two individuals are also likely nonlocals. Under the eight cluster model in the hierarchical cluster analysis presented here, one of the Frankish outliers groups with Sample 70, the other forms its own outlier cluster, and the final two local Frankish samples group with Sample 68. Thus, the incorporation of these two datasets implies one of two results: 1) nonlocals are present in the Frankish population who were not identified using the original local signature; or 2) a considerable shift in diet or the cultural or environmental factors effecting $^{87}Sr/^{86}Sr$ and $\delta^{18}O_{CO3(VSMOW)}$ values occurred between the 8th and 13th centuries AD.

7.6 Summary and Discussion

This research establishes a local signature for $\delta^{18}O_{CO3(VSMOW)}$ and $^{87}Sr/^{86}Sr$ in Late Antique Corinth, Greece based on isotopic distributions among human samples. These ranges are consistent with previous estimates of local isotopic signatures for this site. When used in tandem with geochemical evidence for dietary differentiation ($\delta^{13}C_{ap(VPDB)}$), these isotopic systems show that both cultural factors, as highlighted by the likely incorporation of marine resources into diet, and population movement distinguish isotopic clusters at Corinth. In addition, this multi-isotopic approach may have the ability to refine estimates for the local isotopic range for archaeological sites. Though a conservative local signature for $\delta^{18}O_{CO3(VSMOW)}$ ranges from 26.76 to 28.24‰, the multi-isotopic approach allows this range to be refined and edited. The local range for Late Antique Corinth $\delta^{18}O_{CO3(VSMOW)}$ is more likely to be 26.25 – 27.56‰ and the signature for $^{87}Sr/^{86}Sr$ is .70836 to .70870. These estimates match the underlying geologic substrate for the region and more closely correspond with the expected $\delta^{18}O$ of local meteoric water.

My cluster analyses group together two distinct clusters and members of a third as representative of "locals." A likely group of migrants (Cluster 3) overlaps the local $\delta^{18}O_{CO3(VSMOW)}$ range for Corinth, and Cluster 6, which the oxygen isotopic analysis identified as being in the tails of the normal distribution, groups together with Cluster 5 against the outliers and other likely migrants in the cluster analysis. Elevated $\delta^{13}C_{ap(VPDB)}$ in a third cluster (Cluster 7) makes it likely that at least two samples from this grouping should also be reallocated within the local group. The resulting $\delta^{18}O_{CO3(VSMOW)}$ signature for Corinth is substantially different from that identified through the $\delta^{18}O$ distribution alone. Further research is needed to determine if this distinction within the local $\delta^{18}O_{CO3(VSMOW)}$ distribution for Corinth is a result of community-level differences in mobility (local or regional), or if groups within the population relied on different water sources or levels of imported beverages.

The majority of drinking water for the ancient city of Corinth was derived from a network of subterranean tunnels and cisterns designed to share ground water access through the city (Biers, 1985, 2003; Hill, 1964; Landon, 2003; Sanders, 1999). Thus, a distinct water source for segments of this population would be unlikely unless cultural treatment of water differed between communities, one imbibed considerable amounts of imported liquid, each incorporated migrants from different areas, or they experienced different levels of mobility through the course of their lives. Since the sources of dietary carbon vary more within these communities than between them, any dietary distinctions such as food preparation practices which may enrich water in ^{18}O appear to be shared within these communities. On the other hand, the presence of dietary variability and probable culinary diversity implies that other resource procurement strategies may be similarly diverse.

Variation in ^{13}C for some samples, particularly three of the five samples grouped together in Cluster 7, is likely the result of consumption of marine resources, though other samples displaying enrichment in ^{13}C likely do so as a result of the incorporation of C_4 plants either directly or through the consumption of meat or milk from animals that foraged on these plants. In addition, $\delta^{13}C_{ap(VPDB)}$ does not reflect distinctions in the mortuary realm such as mortuary correlates of ethnic or achieved identity. However, increased dietary variability is present in samples from high status mortuary contexts dating to Period III as compared to Period II. Though this trend correlates with the presence of the lowest $\delta^{18}O_{CO3(VSMOW)}$ values during Period III, samples displaying elevated ^{13}C are present in two local and at least two nonlocal isotopic clusters identified in Section VII.5. Thus, the distribution of $\delta^{13}C_{ap(VPDB)}$ implies that individuals displaying elevated ^{13}C were from a variety of geographic origins and a range of social classes within Corinth. These values also do not explain the majority of isotopic variability. Dietary differentiation may have correlated with community membership instead of foreign origin, as relatively lower $\delta^{13}C_{ap(VPDB)}$ values are present in samples associated with ceramic vessels, and thus, with mortuary Group 4. Finally, since these isotopic shifts occurs after the 7th century, there is no evidence that the AD 536 climatic event resulting from a volcanic dust cloud had a measurable effect on $\delta^{18}O_{bw}$ values or the crops available for consumption in late antiquity.

Isotopic analyses also identify a number of migrants in this dataset. At least three individuals are outliers whose childhood residence was far from Corinth, and as these samples are separated in the cluster analysis, they are likely from three distinct geographic origins. A separate cluster of eight individuals relatively enriched in ^{18}O may have traveled to Corinth from yet another single source population (Cluster 3). These combined data show that geographic origins of migrants appear to have shifted over time. Though elevated $\delta^{18}O_{CO3(VSMOW)}$ (Cluster 3) is present in all time periods, samples showing depleted $\delta^{18}O_{CO3(VSMOW)}$ are mainly only from graves dated to Period III. The two outliers in the cluster analysis with depleted $\delta^{18}O_{CO3(VSMOW)}$ are also from Period III, and their $^{87}Sr/^{86}Sr$ values confirm that they were born far from Corinth. The final outlier, Sample 43 from Period II, is also consistent with this shift in origins, as this individual displays the highest $\delta^{18}O_{CO3(VSMOW)}$ found in this dataset.

Sample 43 is further distinguished from the rest of the dataset by elevated $^{87}Sr/^{86}Sr$ (.708869) as well as $\delta^{18}O_{CO3(VSMOW)}$ (31.54‰). These values are consistent with an origin in northern Africa, possibly in Egypt as $\delta^{18}O_{CO3(VSMOW)}$ for Roman Egypt averages at 28.2‰ in the south (Dupras and Schwarcz, 2001) and ranges from 30.0 to 31.5‰ for one provincial capital in the north (Prowse et al., 2007). However, the only $^{87}Sr/^{86}Sr$ estimates from archaeological populations in Egypt is provided by New Kingdom samples and is set at .7075 (Buzon et al., 2007), which value is distinct from Sample 43.

Samples 68 and 70 are mainly distinguished by their heavy $^{87}Sr/^{86}Sr$ values (.709275 and .711096, respectively), though they are also in the lower tails of the $\delta^{18}O_{CO3}$ distribution (25.66 and 26.05‰, respectively). These two individuals cluster separately from each other when using both strontium and oxygen isotopic parameters, which suggests that they traveled to Corinth from separate geographic locations. Sample 70 displays a $^{87}Sr/^{86}Sr$ value among the highest reported in the Aegean, and is consistent with an origin in a region with significantly older geology. The islands of Naxos and Chios - and possibly sites such as Pergamon along the Turkish coast near Chios - display similar ratios of .7095 and .7112, respectively (Nafplioti, 2011). Though no archaeological data for $\delta^{18}O_{CO3}$ are present from this area, the value of 26.05‰ for this sample is only slightly below that of Corinth, and may be consistent with $\delta^{18}O$ of precipitation for Aegean sites of similar latitude. While the difference in strontium isotopic ratios is fairly high, it is possible that these two individuals originated from the same site if the local geology was heterogeneous. Since possible sources for this population(s) can not be identified at this time, it is impossible to determine whether these samples originated from one site or two. It is interesting, however, that these two individuals were buried together in the same grave, and this shared mortuary context may also point to a shared origin.

7.6.1 Integration of mortuary and isotopic data

Possible foreigners are distributed throughout the cemeteries of Corinth and most were buried in close proximity with locals. Samples from Cluster 3 in particular were buried in multiple interment tombs alongside interments of locals and in a few cases, shared graves and burial locations with non-locals from other isotopic clusters. Burial treatment was also similar for both migrants and native Corinthians, as both were buried with ceramics and are members of mortuary Group 4.

Thus, burial treatment of the deceased was not distinct from locals for the majority of migrants. Though it is unclear if ceramic vessels used in the burial liturgy were deposited with the deceased throughout the Eastern Roman Empire, this shared behavior is consistent with the integration of any foreign-born individuals and their families into Corinthian society, rather than their separation. As segregation would be expected if large numbers of migrants had traveled to Corinth due to mandated population movement, there is no evidence supporting Hypothesis 2B. If these individuals did come from the Levant, however, some may have been refugees from the Arab conquest of the region during the 7th century AD (McCormick, 1998). Although Sample 16 from Cluster 3 is generally dated to the 6th century AD, the majority of individuals in this isotopic group are from graves dated to the 7th century, or to the late-6th century at least. If they were fleeing the conflict with the Sassanid Empire, however, they did not do so as a result of government intervention and mass relocation as samples from this cluster date to all three archaeological periods.

If multiple interment graves were used by these families, the presence of foreigners alongside natives in these tombs would also indicate that these individuals set up households in Corinth, and that their children who grew up locally were buried by their side. Grave 1967.10A (Samples 30 and 31) may provide evidence that families traveled together to settle in Corinth, as Sample 30 is the only clearly nonlocal child in the dataset and this individual is grouped together in the same isotopic cluster as Sample 31. The lowest level of interments in Grave 1972.20 also included local children

(Samples 65 and 66) in addition to two nonlocal adults: a male (Sample 70) and probable female (Sample 68). As this grave was prominently placed at the entrance of a later church, the initial interments in this grave were evidently important to later generations, making the foreign origins of these individuals even more interesting.

Other evidence that foreigners were integrated into Late Antique Corinthian society is the fact that isotopic ratios are not significantly correlated with hierarchical status as it is reflected in the mortuary realm. Additionally, buckles and weapons are present in the graves of both locals and nonlocals. These objects may have been placed by the side of the deceased to commemorate political achievements or standing in the community. Foreign origin was evidently not discriminated against by natives, if these individuals were able to achieve high social standing and political office.

In fact, political officials of foreign origin may have been increasingly stationed in Corinth in Period III since samples from graves with buckles as a group are relatively depleted in ^{18}O. If buckles were placed in the graves of some of the individuals who had achieved high political positions, than the city's governors as a group display significantly lower $\delta^{18}O_{CO3(VSMOW)}$ than the rest of the population. If these individuals all traveled to Corinth from Constantinople, this demonstrates a high degree of control on the part of the Eastern Roman Empire on provincial administration. Other possible geographic sources for this population include Thessaloniki, Ravenna, and possibly a few ports on the southern coast of the Black Sea, such as Trapezus. However, although the presence of buckles also correlates with slightly higher $^{87}Sr/^{86}Sr$ values, this difference is not statistically significant. Moreover, a similarly low $\delta^{18}O_{CO3(VSMOW)}$ value also distinguishes Cluster 6, which are grouped as locals along with Cluster 5. Since the members of Cluster 6 are all associated with mortuary correlates of high status, it is also possible that the difference in $\delta^{18}O_{CO3}$ is a result of cultural behaviors practiced by some members of the elite in both Period II and Period III.

On the other hand, despite their integration into the social hierarchy and governance of Corinth, foreign origin may still have been reflected in mortuary indicators of identity through burial location. The samples from the recessed bedrock cutting in the Gymnasium area display distinct $\delta^{18}O_{CO3(VSMOW)}$ values from the rest of the Late Antique population. They also include individuals from more than one geographic origin distinct from Corinth (Sample 43 and Samples 30 and 31). These results are consistent with the use of discrete burial areas by members of social groups within Corinth. They also may indicate that foreigners banded together in this community under a single social identity. This result would be expected if migrants had come to the city as merchants or were otherwise assisted in their integration into society by membership in occupation-based voluntary associations.

Additional migrants may also be present in the population that this research does not identify. Sample 1 is not distinct from the local $\delta^{18}O_{CO3(VSMOW)}$ or $^{87}Sr/^{86}Sr$ signature (27.58‰ and .708704), though the tombstone placed over their grave specifies a foreign origin for at least one of the individuals interred in the tomb. “Eusebius” may instead have been the name of one of the other two adults buried in Grave 1931.24. Sample 10 also does not display nonlocal $\delta^{18}O_{CO3(VSMOW)}$ or $^{87}Sr/^{86}Sr$ (26.88‰ and .708658), though the mortuary context of this individual is anomalous for Late Antique Corinth. While it is possible that these two samples were both Corinthian natives, it is also possible that they originated in a region with similar $\delta^{18}O$ in precipitation and of similar geologic age to that of Corinth. If Sample 10 was taken from a “wandering soldier” (Weinberg, 1974), this mercenary was most likely from the Aegean, however, and not even from as far north as Bulgaria, as Greek colonial populations along the Black sea display mean $\delta^{18}O_{CO3(VSMOW)}$ = 24.5‰ (Keenleyside et al., 2011).

CHAPTER VIII

SUMMARY AND DISCUSSION

For archaeology, the question of population mobility is rarely as simple as the identification of skeletons of foreign origin. Doing so would equate military invaders with merchants, refugees, governmental administrators, and possibly even pastoralists. Instead, I include geographic origin as one of the factors, along with ancestry, class membership, citizenship, and religion, which are built into identity formulations throughout a person's life history to better understand relocation as a cultural process. Thus, while this research contributes a better understanding of the "local" range in isotopic ratios for strontium and oxygen for Corinth, Greece, my primary purpose was to discuss what it meant to be a local in Corinth during late antiquity.

In this case, for example, the skeletal geochemical data shows that population movement occurred, but this is not the same as explaining who these people were and why they traveled to Corinth in the first place. The mortuary context of these skeletons can fill in these blanks to some degree, since burial behavior reflects the social distinctions which exist in living societies. At Corinth, funerary behavior followed a steady progression during this time period, within which framework migrants were incorporated as opposed to having acted as agents of change. However, there is still room for interpretation of these results as many types of migrants remain indistinguishable from one another without: a) characterizing separate geographic origins of migrants, and b) contextualizing their presence within the mortuary correlates for societal distinctions. This research uses a multi-isotopic approach for a) and integrates the isotopic and geochemical data for b). In this chapter, I will summarize all results presented in this dissertation, and then with reference to the hypotheses posed in Chapter 2, attempt to describe the nature of population movement at this city and what this means as far as who could be a Corinthian. Finally, I discuss the limitations of these inferences and the identities this research is unable to explore as well as future work.

8.1 Summary of Results

8.1.1 Mortuary results

At Corinth, the mortuary results are consistent with hypotheses of continuity and regional involvement during this period. Mortuary variability, as demonstrated by univariate and multivariate analyses, displays strong similarities to regional trends (Poulou-Papadimitriou et al., 2012; Rife, 2012; Rife et al., 2007; Ubelaker and Rife, 2011), and little sign of the breaks in tradition observed farther afield, such as in contemporary Olympia or north of Greece along the Danubian frontier (Barford, 2001; Curta, 2001; Vida and Volling, 2000; Volling, 2001). Changes, when they occur, are best contextualized within the framework of Christianization and the imperial policies of the Eastern Roman Empire.

This continuity is apparent in the slow transition from established grave types to constructs present in the later Byzantine period throughout the Eastern Roman Empire (Ivison, 1993) and the fact that the simplest grave constructs of amphorae and tile graves were used for burial throughout late antiquity. Coins also appear to have been placed in graves later than expected; in their regional survey of mortuary practices Poulou-Papadimitriou and colleagues (2012: 380) consider it likely that by the 6th century AD, all coins in graves were the result of accidental deposition, and re-opening of tombs for multiple burial events would have provided ample opportunity for their loss. However, tomb reuse only accounts for the presence of coins in Period III graves. In Period II, coins are associated with jewelry and implements in grave assemblages north of the city possibly into the 7th century AD, associating coins with high status graves in Corinth after this practice is generally thought to have been abandoned. These results imply that this pre-Christian tradition may have been followed later at Corinth than previously supposed.

However, mortuary variability is also strongly correlated with diachronic change, which factored into shifts in corpse treatment, burial location, and the correlations of objects placed in grave assemblages with biological identity and their likely status associations. Within time periods, spatial variability, both within and between site areas, shows that not all funeral rituals were practiced by all segments of Corinthian society and that funerary patterning is a result of the underlying social parameters which differentiated geographically separated burial areas and the populations that used them.

Corpse treatment changed gradually, as did burial location. Over this period, corpse disposal shifted from a preponderance of single interments to the majority of burials placed in multiple interment tombs. An increasing number of tombs also show evidence of secondary burial. The tombs chosen for these sequential burial events were among the relatively elaborate grave types present throughout the site. Children and infant burial treatment differed throughout late antiquity; only subadults were buried in simple amphorae. Though a few amphorae burials continued to be used for their disposal, as time progressed children and infants were increasingly buried in the same tomb constructs as adults, and often in multiple interment tombs where subadult and adult skeletons were placed side by side. In earlier mortuary contexts, the osteological data shows that this demographic was also underrepresented, implying that only some of the youngest segment of the population were buried in these cemeteries at all. However, for later interments, the burial liturgy still differed for children (Fedwick, 1976), and this appears to be reflected in the fact that almost no graves containing only children also contain ceramic libation vessels. Secondary burial practices may also have differed for subadults versus adults, with an emphasis placed on retrieval of the bones of the upper body, particularly the head, for these younger individuals, while the skeletons of adults were almost completely removed from initial, temporary grave receptacles.

Tombs were initially placed in established suburban cemeteries, but as former commercial and administrative areas of ancient Corinth became converted to residential use, burials started to be placed within the ancient city walls, and some of these originally isolated graves formed a locus for later burial activity. In this development, as in other mortuary behaviors, funerary archaeology at Corinth corresponds with trends observed throughout the Mediterranean (Cantino Wataghin, 1999). On the other hand, burial areas remained in contemporary use, and specific tombs were focus of particularly extended reuse and commemoration activities. In the same area of the site, for example, one grave may have contained around 100 skeletons, in another the MNI is 22, some contain one to two individuals, a number of graves were reused for 4-10 burial events, and one tomb structure was left completely empty. The implied selectivity in burial placement suggests that the Late Antique tombs which were reused were prioritized as a result of the identities of the decedents originally placed in these grave receptacles. Thus, this practice is consistent with the desire for *ad sanctos* burial (Cantino Wataghin, 1999) rather than simply resulting from cemetery crowding (Ivison, 1993; Poulou-Papadimitriou et al., 2012). In future research, I intend to use metric and nonmetric traits to examine whether these tombs were used by kin groups and extended families, or by a broader community.

Mortuary variability also differs among site areas, implying corresponding diachronic shifts in the importance of various aspects of material culture in daily life and community-distinct burial practices for the population using each cemetery. Mortuary correlates for status differences, for example, change over the course of late antiquity in Corinth. While the majority of graves from Period I in this sample do not contain artifacts other than an occasional piece of jewelry, a coin, or an implement (which presence subdivides burials in the Asklepieion/Gymnasium cemetery into mortuary Group 1), in Period II graves, relatively elaborate grave constructs such as rock-cut chamber tombs, built cists, and reused architectural units with multiple interments are associated with grave markers, ceramic vessels, and jewelry (Status 1). In Period III, on the other hand, built cists and reused architectural units were used for burials at the high end of the status spectrum along with built vaults instead of rock-cut chamber tombs (Status 2). These high status grave assemblages also differ from those of Period II graves in the inclusion of buckles, weapons, and implements as well as jewelry. The spatial distribution of these items in graves and their association with graves of different types coincides with chronological shifts in burial location.

Furthermore, the presence of many of these high-status items with subadults is evidence that status was inherited, at least as far as it was symbolically expressed through mortuary behavior. On the other hand, specific objects appear to have been placed in graves to reflect political office or a leadership position in the community, as these items are found distributed almost equally in geographically separated grave clusters. In Period II (Status 3) this item is buckles, and in Period III (Status III), weapons and implements. Additionally, though the single interments in Period III containing weapons and implements are all males, and those containing buckles are either of subadults or males, the sample size of graves for which sex can be determined using osteological criteria is very low. If any objects were used to symbolically represent women's roles in the community, this was not apparent using the available data. It is also possible that the sexual division of roles reflected in the mortuary realm is the result of poor preservation and not reality, especially as there are no statistically significant differences in object associations by sex.

Some of these changes also appear to be the result of the adoption or observance of different behaviors in geographically separated communities within the city. The association between jewelry, coins, and implements is not present for graves in the city center as it is for burials north of the city. The presence of faunal remains, on the other hand, distinguishes a subset of graves in the ancient city center. Glass and ceramic vessels are only associated with subadult burials in Panayia Field (Group 6), and this burial area is further distinguished by being the only one that may have been within the reduced circuit of the Late Antique city walls. One anomalous grave (Grave 1938.10) is present in the city center as this tomb contains objects otherwise rare in grave assemblages at Corinth (Group 7). No graves north of the city contain weapons.

In addition, the correlation of objects placed in grave assemblages with particular social identities also differs depending on site area. Though few graves placed in either the burial area north of the city or in the city center contain implements, in the city center they are only found in graves also containing both buckles and weapons and are not associated with jewelry. On the other hand, in graves placed north of the city implements are associated with jewelry, rather than buckles. These differences in grave assemblages may imply that the suburban community near the Asklepieion and Gymnasium did not share in the prestige or wealth associated with living near the administrative center, and the buckles awarded to those individuals north of the city to commemorate political positions in life were not kept as heirlooms. Alternatively, they may coincide with changing perception in the meaning of these objects coinciding with the relocation of political power from families residing in the suburbs of Corinth to those near the ancient city center.

Finally, within these site areas, spatial variability is also present. In some cases, geographically isolated grave clusters share mortuary behaviors with graves placed in other burial areas, rather than with nearby tombs. Some of the graves placed along the ancient western city wall, near the Acrocorinth fortification, contain both weapons and buckles, implying that the community burying their dead in this area was similar to the community in the ancient city center (Group 3). Similarities also exist between tombs constructed in the former forum area and those placed north of the city, as this group of graves contains ceramics (Group 4). Of the tombs on Temple Hill, on the other hand, only the graves which display mortuary correlates of the highest status group display the full range of objects placed in grave assemblages (Status 2). A few grave groups were geographically isolated, either through the construction of a recessed burial area in the bedrock in the Gymnasium area (Group 2), or by being the loci of later burial activity. By the Bema in the ancient Forum, at the west end of the South Stoa, on Temple Hill, and in Lerna Square, burial activity was particularly involved. The Bema graves and the tombs on Temple Hill (Group 5) were even later memorialized through the construction of churches at their location.

Thus, though spatial variability supports the presence of a pan-Corinthian burial culture, differing grave site behavior and the commemoration of specific burial loci is consistent with community-specific elaborations of mortuary ritual. As the data used in these analyses is primarily composed of cemeteries to the west of the Late Antique city of Corinth, they are also unlikely to fully represent the entirety of mortuary behavior which existed at this site in this period. Future research is likely to expand this view of diversity within Corinthian cemeteries. Within this window on the cemetery population, however, community composition, specifically the presence of nonlocals, has clear implications regarding the integration or segregation of foreigners in Late Antique Corinthian society. These analyses form the framework for future bioarchaeological and mortuary analyses.

8.1.2 Isotopic results

Isotopic analyses of samples from these mortuary groups also contribute to the perception of diversity in this city. Nonlocals are clearly present in these cemeteries, and the source and volume of these migrants varied over time. Diversity in isotopic signatures among these migrants and their presence in mortuary contexts identical to that of natives implies that Corinthian society was particularly open to their incorporation. Diets also changed during late antiquity, including more diverse sources of carbon, especially among the upper class, during later periods. I used the distribution of isotopic ratios within this dataset of human tooth enamel samples to define a conservative local signature for $\delta^{18}O_{CO3(VSMOW)}$ of 26.76 – 28.24‰, and .70836 – .70870 for $^{87}Sr/^{86}Sr$ in Late Antique Corinth. I selected the subset of samples for radiogenic strontium analysis in order to fully characterize the isotopic signatures of samples at the tails of the $\delta^{18}O$ distribution, and used hierarchical cluster analysis to distinguish among geographically sourced populations for possible nonlocals. This multi-isotopic approach successfully identified four separate geographic source populations for migration to Corinth, as well as considerable isotopic diversity within the local population. In addition, the cluster analysis identified that some of the variability in $\delta^{18}O_{CO3(VSMOW)}$ is likely due to the presence of a large group of migrants from a site with a slightly overlapping local range in $\delta^{18}O_{CO3(VSMOW)}$ (Cluster 3). Thus, the multi-isotopic approach allows a more refined estimate for probable local $\delta^{18}O_{CO3(VSMOW)}$ = 26.25 – 27.56‰. This restricted range is also more consistent with the expected local $\delta^{18}O_{VSMOW}$ in precipitation.

Using both $\delta^{18}O$ and $^{87}Sr/^{86}Sr$, three clear outliers are present whose paired values are not consistent with the isotopic parameters of the site of Corinth for this time period. The cluster analysis of the paired strontium and oxygen isotopic ratios also provide evidence that migrants journeyed to Corinth from a variety of geographic origins. The three outliers cluster separately, implying that they originated in three distinct geographic locations; one may have been from northern Africa (hereafter, the southern outlier), and the other two (the northern outliers) were likely from a site slightly north of Corinth, possibly along the northern Aegean, the northern Adriatic, or possibly the southeastern coast of the Black Sea, but not as far north as Bulgaria. Elevated $^{87}Sr/^{86}Sr$ groups four of the Late Antique skeletons together (Cluster 7), and elevated $\delta^{18}O_{CO3(VSMOW)}$ defines membership in a separate cluster of eight (Cluster 3).

The three outliers and Cluster 3 likely represent four geographically separated source populations which contributed migrants to Late Antique Corinth. Samples from Cluster 7, on the other hand, may reflect migration from a fifth location, or their distinction from other clusters may be a result of dietary differentiation. Members of Cluster 3 are particularly interesting in that these samples date to all three time periods and imply an extended connection between Corinth and one specific geographic area – i.e., a migration stream. The isotopic parameters of this cluster are consistent with a southern geographic origin, possibly along the Levantine coast, southern Turkey, or Cyprus.

As no northern migrants are present in Late Antique Corinth prior to Period III, the migration process appears to have shifted over time. Though southern migrants are present in all three periods, this shift may be a result of changing or additional motivations for migration. Differences between migrants from separate source populations are highlighted by their incorporation into distinct mortuary groups. Samples from Cluster 3 and the southern outlier are found in high status mortuary contexts from Periods II and III and are significantly associated with ceramic objects, placing them alongside locals among high status members of Group 4. This finding implies that these southern migrants were fully acculturated within a subset of the existing Corinthian population.

The northern outliers, on the other hand, were buried in a separate burial location from the southern migrants. They were also buried in the same tomb which displays the greatest range of artifacts placed in mortuary contexts and thus sets this grave firmly among the highest on the status spectrum in Period III. In addition, the majority of burials from Period III which contain mortuary correlates of high status are also depleted in $\delta^{18}O_{CO3(VSMOW)}$. Only one of the samples from Cluster 3 was also buried with a weapon. The variety of objects placed in graves on Temple Hill is furthermore echoed by the elaboration of mortuary ritual at this site and monumentalization of these tombs with the construction of a church. It is possible that these later migrants were present in Corinth as the result of a different motivation from earlier migrants, as well as originating in a different location. Since most were not buried in the same burial area, at least, they do not seem to have been integrated into the same community or communities.

On the other hand, however, the cluster analyses also identify substantial variability within the local Corinthian population. Two clusters are consistent with Corinthian origin, one of which (Cluster 6) is comparatively depleted in $\delta^{18}O_{CO3(VSMOW)}$. At least two of the samples allocated within Cluster 7 may also be locals. Though it is possible that the distinctions among these clusters are the result of population movement, results from the cluster analysis make it more likely that they reflect isotopic variability resulting from cultural factors or dietary differentiation within the site of Corinth. The cluster analysis groups Clusters 5 and 6 together in comparison to all other samples, and the adjusted $\delta^{18}O_{CO3(VSMOW)}$ range after the cluster analysis culled Cluster 3 as likely migrants is consistent with the likely $\delta^{18}O_{CO3(VSMOW)}$ of meteoric water for the site of Corinth.

For locals, lower $\delta^{18}O_{CO3(VSMOW)}$ are primarily displayed by samples from high status mortuary contexts, and may indicate that some of the elites show depleted oxygen isotopic ratios as the result of cultural practices or distinctions in water source among communities. As I selected the majority of samples for strontium analysis based on their presence in the tails of the oxygen isotopic distribution, it would be worthwhile to more thoroughly examine the distribution of radiogenic strontium among samples from the local oxygen range in the future. A better characterization of local $^{87}Sr/^{86}Sr$ in addition to the local $\delta^{18}O_{CO3(VSMOW)}$ would make it possible to comment on whether these elites display distinct oxygen isotopic values as a result of cultural practices, heightened local mobility, or if the majority of the governors and aristocratic class in Corinth originated slightly north of the city.

The $\delta^{13}C_{ap(VPDB)}$ may also support the possibility that later elites are culturally distinct from earlier elites. Though the majority of samples from all periods show evidence that diet is predominated by a C_3 plant signature, a significant proportion display enrichment in ^{13}C which is consistent with the consumption of C_4 grasses or marine resources. In earlier periods, the samples displaying dietary variability are not from high status mortuary contexts, however, by Period III and coinciding with the shift in $\delta^{18}O_{CO3(VSMOW)}$, some portion of the elite also show enrichment in ^{13}C. In addition, the carbon isotopic ratios show that dietary differentiation may account for some proposed geographic clustering, though samples displaying elevated ^{13}C are present in two local and two nonlocal isotopic clusters. If locals are eating fish, this may result in higher $^{87}Sr/^{86}Sr$, making them appear nonlocal since the strontium value of fish reflects the contemporary ocean value and the modern ocean strontium budget places this value at around .7092. Cluster 7 thus may be a result of these dietary differences. These carbon isotopic results show that individuals displaying elevated ^{13}C were from a variety of geographic origins and a range of social classes within Corinth and imply that the local population was culinarily heterogeneous. A complete characterization of the isotopic diversity of locals in Corinth is possible in the future using the remainder of the tooth enamel samples, and any dietary complications are testable with paired data from collagen.

8.2 Hypothesis Testing

These results can be interpreted using the hypotheses defined in Chapter II. Identity, status, religious traditions, and achievements can all change over a person's life in response to their actions and the social atmosphere of the city in which they live. By using anthropological mortuary analysis to describe existing social distinctions reflected in the mortuary realm, I juxtapose the geochemical identification of possible foreigners within a contemporary social context. The resulting association of non-locals with specific funerary behaviors has significant implications regarding the incorporation or acculturation of migrants at Corinth. Specifically, when discriminating among hypotheses, I examined status, location, and the grave assemblages associated with skeletons displaying isotopic ratios distinct from expected local distributions as compared to contemporary mortuary contexts.

8.2.1 Hypothesis 1A: Isolation with no influx of foreigners

Hypothesis 1A states that, if the city was isolated from state-controlled trade routes and semi-autonomous from the imperial administration, few foreigners would have traveled to Corinth and no nonlocals are likely to be identified geochemically. In terms of mortuary behavior, local and regional trends would predominate rather than changes as a result of imperial legislation or decrees by the Christian church. Neither the mortuary nor the isotopic data support this scenario.

Though continuity was apparent in mortuary behavior, especially in terms of the importance of commemoration, the use of particular grave types, and the location of burial areas, new behaviors were introduced as well. These diachronic shifts were consistent with mortuary treatment documented throughout the rest of the Eastern Roman Empire, especially Greece. A number of innovations dating to Period II, especially the use of tombstones as a form of legal documentation of ownership (Walbank and Walbank, 2006), appear to be a direct result of legislative reform and other empire-wide controls on social behavior and coincide with the compilation of the Justinian Codex (*Cod. Iust*. 1.11.7). The decline in the deliberate placement of coins in grave assemblages also coincides with the increasing influence of the Christian church and Christianization of religious rituals such as burial (Sweetman, 2015). Similarly, the selective reuse of tombs is consistent with the Mediterranean-wide preoccupation with the cult of the saints and the desire to place the deceased near the burial place of previously deceased, particularly holy or important individuals (Cantino Wataghin, 1999).

While behavioral norms would not likely be controlled if Corinth operated autonomously from the imperial or religious administration, mortuary archaeology alone does not disprove this hypothesis. However, skeletal geochemistry is also inconsistent with the premise of little to no population movement as a great deal of isotopic variability is present in these data. At least 16 samples display paired strontium and oxygen isotopic ratios which are distinct from local isotopic distributions, and their combined values imply that at least four geographically separated source populations contributed migrants to Late Antique Corinth. In addition, the fact that the graves of these foreigners are indistinguishable from those of Corinthian natives can not simply be attributed to the presence of socially regulated behavioral norms. In other words, these skeletons are unlikely to be the remains of foreign travelers and temporary visitors who just happened to die in Corinth, and whose burial was provided for by law but would not have been welcome within the local community. Under law (*Cod. Iust.* 1.11.7, 4.48.24) burial could only be withheld from criminals who suffered capital punishment, otherwise burial commensurate with the status of the deceased was provided for from their effects. This means that the graves of visitors as opposed to migrants would be outwardly identical to those of locals, but would likely be fairly simple and would not include items of adornment or those aspects of mortuary behavior that varied between communities. Thus, these findings are inconsistent with an “isolated” city where visitors were unwelcome and did not stay long. As a result, the available evidence appears to disprove Hypothesis 1A.

8.2.2 *Hypothesis 1B: Isolation and transfer of political power to foreign-born elites*

Hypothesis 1B, while similar to 1A in that the city of Corinth is assumed to be relatively isolated from the administration of the Eastern Roman Empire, hypothesizes that migration may have occurred under the guise of a chronologically circumscribed political coup. This hypothesis conjectures that the so-called "Slavic invasion" of AD 580 was a rhetorical device utilized by later Byzantine historians to refer to a relatively peaceful transition of power to a group of northern-born elites. Rather than taking over the area through military force, this independent governing body attempted to legitimize their rule as the political heirs of Constaninople, and thus, would be unlikely to identify as foreigners or to remain in contact with their emigration area.

The fact that burial treatment can be explained by Empire-wide trends and local traditions is consistent with this hypothesis. In other words, a group of foreign-born elites may have acculturated with the native population, resulting in perceived continuity in burial practices. On the other hand, it is probable that some behaviors would still have been introduced as a result of this culture contact, especially among private actions and elaborations of existing mortuary traditions. The greatest number of these innovations occurred during the 6th century AD, and thus are chronologically consistent with the AD 580 date for this "invasion." However, these changes are either shared throughout Greece and Crete (such as the use and placement of libation vessels in graves) or can be best explained via reference to mid-6th century tax code reforms by Justinian. An independent governing body within the Eastern Roman Empire would be unlikely to remit taxes to Constantinople. Other innovations, such as the placement of weapons within graves, are not present in graves dating earlier than the mid-7th century AD. Though timing in these changes is inconsistent with suggested invasion events, however, the mortuary data does not disprove this hypothesis as these historical sources were composed long after the events they relate.

The isotopic results, on the other hand, do not support this hypothesis. The three clear outliers may represent three separate geographic origins, rather than only one.

Though a greater number of individuals may have traveled to Corinth from a separate geographic origin as Cluster 3, the isotopic signature of this group is unlikely to reflect the geographic origin of a single group of ruling elites. These individuals are distributed throughout the cemeteries of Corinth, and in all three archaeological time periods, rather than arriving as a group in one restricted event and all being buried close to one another. The one mortuary aspect, that of ceramics, which is significantly associated with membership in this cluster is also a traditional artifact found in grave assemblages throughout southern Greece and Crete (Poulou-Papadimitriou et al., 2012; Poulou-Papadimitriou, 2011; Tzavella, 2010). No other artifacts associated with high status are present to a greater degree in mortuary contexts of these skeletons than in the graves of locals.

Finally, if the attribution of this coup to the Slavs is accurate in only the geographic source for the incoming population, any migrants should be northern in origin (i.e., depleted in ^{18}O). Though samples from Period III graves with buckles tend to display relatively low $\delta^{18}O_{CO3(VSMOW)}$, some members of this mortuary group are also relatively enriched in ^{18}O. The low average appears to be influenced by samples from one high status mortuary context (Grave 1972.20) on Temple Hill. Two of the skeletons interred in the earliest layer of burials in this grave are outliers according to their paired oxygen and strontium isotopic ratios, and of the remaining six skeletons interred alongside these migrants, two others also display depleted $\delta^{18}O_{CO3(VSMOW)}$. Isotopic ratios of skeletons from neighboring graves on Temple Hill, on the other hand, are consistent with the local range and were the focus of variants of commemoration and secondary burial behaviors though they shared mortuary group membership with Grave 1972.20. Thus, a single family with an elevated status in their community may be responsible for the trend in this data. In addition, the cluster analysis groups high-status burials with low $\delta^{18}O_{CO3(VSMOW)}$, except for the outliers, together with locals by excluding samples relatively enriched in ^{18}O. This seems to imply that only two of the clearly nonlocal skeletons were of a northern origin. Therefore, taken together the isotopic results and the mortuary treatment of foreigners identified through skeletal geochemistry are not compatible with Hypothesis 1B.

8.2.3 Hypothesis 1C: Military invasion followed by population turnover in AD 580

Hypothesis 1C states that an invasion in AD 580 may have been a direct result of neglect or disinterest by the Eastern Roman Empire in Greece. This invasion, as described in the "Chronicle of Monemvasia," involved a group of northerners who swept through the Balkans to the Peloponnese, drove the native Corinthians out of Corinth, and settled throughout the area. Neither the mortuary nor the isotopic data are consistent with this hypothesis. There is no abrupt change in mortuary behavior which would accompany a significant influx of foreigners with no wish to conform to local burial traditions, and the timing of those shifts which do occur do not line up with this historic date. Though strontium and oxygen isotopic ratios display evidence of foreigners buried in the cemeteries of Corinth, the mortuary context of these skeletons is not consistent with an invasion narrative. Non-locals are distributed among geographically separated burial locations and buried in graves of typical morphology with artifacts traditionally placed in grave assemblages in Corinth before and after AD 580. Additionally, only two non-local $\delta^{18}O_{CO3(VSMOW)}$ values are depleted in ^{18}O, and these oxygen isotopic ratios are slightly more enriched than would be expected in a migrant from Bulgaria (Keenleyside et al., 2011). It is even more unlikely that these two individuals originated even further north along the Danubian frontier, i.e., the assumed geographic origin of the Slavic invaders.

On the other hand, identification of these invaders would be complicated if their entrance into Greece was an incremental process, and they gained territory slowly, over the course of years or generations. Though possible, this type of mobility more closely matches the behavior of other semi-nomadic, semi-autonomous groups existing within the Eastern Roman Empire (Ahrweiler, 1998). Either type of mobility does not fit within the invasion event narrative, wherein the barbarian horde swept through the Balkans in the course of a decade. I identified only two nonlocals of a possible northern origin, and these individuals were esteemed by subsequent generations to the extent that a church was later built to memorialize their gravesite.

Mortuary data and skeletal geochemistry from Corinth may thus be added to the archaeological and literary evidence in Greece which downplays the impact of the barbarian aggressor. Even more specifically, it provides additional support for the suggestion that the "Chronicle of Monemvasia" was a 10^{th} century AD fable written in rhetorical support of the Emperor Nikephoros I, rather than a historical account of population movement in the Peloponnese (Anagnostakis and Kaldellis, 2014; Avramea, 2001; Curta, 2010b). It is also worth noting that, despite the effort in propaganda represented by this document, the 13^{th} century church on Temple Hill monumentalized the grave of foreigners, not the nearby tombs of Corinthian natives.

8.2.4 Hypothesis 2A vs 2B: Acculturation

Though the hypotheses under Model 1 are relatively simple to distinguish and test, the hypotheses under Model 2 may best represent two ends of a continuum in acculturation. The more open the society, the more likely it is that foreigners will be assimilated into the existing community. In Hypothesis 2A, I suggest this incorporation may be aided by existing migrant networks and organizations built around free-market trade to aid merchants and ship-owners. As a result, a number of migrants from a variety of geographic origins may have ended up in Corinth and would have been incorporated into relatively high-status groups already present in the city. Alternatively, in a closed society with a great deal of administrative oversight, very little population movement would occur unless it was government-assisted or mandated. This would be particularly expected in states such as the Eastern Roman Empire, where the elite used terms such as "barbarian" rhetorically, and the government feared and attempted to control the more mobile populations within its borders. Under this extreme, the government may have moved groups of refugees in response to war. The Eastern Roman Empire may also have required low-status laborers from one region to relocate in order to repopulate regions decimated by famine or sickness. On the other hand, refugees or government-assisted relocations may also be present in a relatively open society, though the diaspora-like nature of their migration event may result in these refugees remaining an insular community within their immigration area. High status migrants may also be present in a relatively closed society, if they were originally administrators sent to the city.

Thus, though each migrant type may be found in either hypothesis regarding the amount of acculturation, I use the presence of migrants from either extreme to test whether Corinthian society was more likely to have integrated or segregated foreigners. These migrant types are distinguished by the mortuary groups in which they were buried. A segregated group of migrants, who are only present for a restricted time period and in a distinct mortuary group, would be consistent with a refugee community. A number of migrants scattered among geographically separated cemeteries and associated with mortuary correlates of high status, on the other hand, would be consistent with voluntary migration. Qualitatively, a large number of high-status foreigners from a variety of geographic origins are more likely when migration decisions are the result of personal choice, possibly resulting from entrepreneurship. A smaller number of high-status foreigners, all from similar origins, may have instead been government officials appointed to Corinth from the larger or more influential cities in the Eastern Roman Empire.

A refugee community may be evident in the observation of new mortuary innovations in Periods II and III. Moreover, burial behavior corresponds with geographic location in distinguishing one mortuary group, that of the Panayia Field graves. The use of glass objects in graves may be a potential signifier of ethnic identity, though this object is rarely present. Their use mainly in the 7th-8th centuries AD also aligns with the Arab conquest of the Levant in the early 7th century and the movement of Armenian refugees from eastern Turkey. Of the two samples from one grave north of the city which also contains glass vessels, one is a member of Cluster 3, which may support this supposition. Unfortunately, the isotopic ratios of the other sample from this grave are consistent with the local population, and one sample is not a sufficient basis for generalizations. I also did not sample any skeletal remains from Panayia Field for isotopic analysis, though this area may have been used by a migrant or refugee community. This community was also likely small, as only seven graves are present in this group, most of which contained children or infants, resulting in a sample that would limit archaeological inference regarding their geographical origins.

On the other hand, isotopic ratios do reveal that a number of nonlocals are present among the other burial locations at Corinth. Of the three clear outliers, one was buried near the ancient Gymnasium, in the bedrock cutting separated from the main cemetery (Group 2). The other two skeletons that were born far from Corinth are buried in the same grave on Temple Hill. One of the skeletons from Cluster 7 was interred in a tomb on Temple Hill near to that of two outliers (Group 5). The other two possible non-locals from this cluster were buried north of the city, one on the hill by the foundations of the ancient Temple of Asklepius, and the final skeleton was placed in a grave connected to the recessed bedrock burial area in which the southern outlier was buried. The fact that these migrants appear to be from a variety of origins, yet were only buried in a few burial locations, may imply that these individuals were merchants.

These migrants may also have been organized within foreigner associations or guilds with associated burial privileges. Not only were non-locals from these three clusters found in only three burial areas, all were also buried in multiple interment tombs. Though I only sampled one skeleton from each of the graves containing non-locals placed north of the city as a result of poor preservation, the two graves from Temple Hill were each used to bury locals as well as nonlocals. The recessed bedrock burial area by the Gymnasium and other graves placed on Asklepieion hill also contained skeletons with $\delta^{18}O_{CO3(VSMOW)}$ and $^{87}Sr/^{86}Sr$ consistent with local origin. The finding that locals were buried next to foreigners suggests that these tombs were shared by either families or communities. Though the isotopic diversity within graves may be generational in nature, rather than ethnic, the recessed bedrock burial area in particular appears to have been used by a community which incorporated migrants from a variety of geographic origins under one shared identity. Membership in an occupation-based association is an example of one such identity with this likely result. Institutions such as these (i.e., a *collegium peregrinorum* as in Noy, 2010) also have a long history in the Roman Empire and scholars have suggested that similar guilds, specifically involved in trade and/or shipping, existed into at least the 6th century AD (Laiou and Morrisson, 2007; McCormick, 2001; McLean, 1996). In keeping with the suggestion that use of a geographically restricted burial area forms evidence of the "legacy" of voluntary associations in Late Antique France (Granier et al., 2011), the presence nonlocals from a variety of origins in the recessed bedrock burial location can be considered the first indirect evidence for one of these organizations in Late Antique Corinth.

Cluster 3 may also represent the result of a distinct migration process. Isotopically, this cluster appears to be consistent with a single geographic source population, and as such, provides evidence for extended interaction between this location and Corinth as migrants from this area are present in all three archaeological periods. These migrants may have originated along the Levantine coast or the southern coast of Turkey. The implied migration network is supported by the fact that these samples are buried in the same burial locations in the same mortuary group as earlier migrants. Within these burial areas and mortuary groups are also nonlocals from other geographic origins. Thus, it is likely that immigrants from this area joined an existing community within which previous migrants had also integrated. Within this community, foreigners were able to achieve high social standing as they were later buried with mortuary correlates of rank and status. Merchants and other sojourners may have led to the development of this migration network which persisted throughout late antiquity.

The final two northern outliers, on the other hand, exemplify the generally low $\delta^{18}O_{CO3(VSMOW)}$ values present in samples from graves containing mortuary correlates of high status in Period III. At this time, the presence of weapons and buckles together in grave assemblages appears to be correlated with both rank and achieved status differences such as what would result from political office. The fact that the skeletons associated with buckles display significantly lower $\delta^{18}O_{CO3(VSMOW)}$ may indicate that regulators and administrators at the site of Corinth were from a site slightly north of Corinth. The implication that foreigners were able to achieve particularly high stations in later periods is supported by the fact that the grave of the two northern outliers was constructed on Temple Hill where it was prominently incorporated into the entrance of the later church, and was reopened for burials. The fact that at least two of these important people were foreign born is consistent with the assertion that the Eastern Roman Empire or the Christian church sent administrators and regulatory officials to provincial capitals to oversee governance and remit taxes (*Cod. Theod.* 8.8.4, 8.8.9; Galatariotou, 1993; McCormick, 1998). Church officials may also have been involved in provisioning the army through the *annona militaris* (van Alfen, 1996; Van Doorninck, 2015). While these individuals do not share geographic origins and are not from the same location as the remaining elite (if their low oxygen isotope values are the result of foreign origin and not cultural practices), the fact that these important members of the community were nonlocal makes it more likely that other administrative officials may also have been born away from the city.

Foreign administrators from the church or the state have been documented originating in Constantinople (McCormick, 1998). Though Corinth held its own bishopric in late antiquity, it is also possible that the larger city of Thessaloniki may also have sent ecclesial officials. As both the church and the state were involved in trade and may have regulated the *annona* (Monks, 1953; Sams, 1982; Van Doorninck, 2015), either place is a likely origin for these nonlocals, and their oxygen isotopic signatures are consistent with the isotopic composition of rainfall in Thessaloniki or Constantinople. In addition, it is possible that sojourners from Armenia or northern Italy may also have contributed to this group. After Justinian’s conquest of the Western Mediterranean, he established an imperial outpost in Ravenna (Laiou and Morrisson, 2007; Procop. *Goth.*). Thus, this important site is also likely to have had contact with Corinth thanks to Corinth’s position on the isthmus. Armenians also often used military service as a stepping stone into careers in imperial administration (Charanis, 1959; Garsoïan, 1998). Though inland sites in Turkey, such as Melitene, are similar to Bulgaria in the oxygen isotopic composition of precipitation, and thus too depleted in ^{18}O to be the source population for the northern outliers, sites along the Black Sea coast, especially Trapezus, are possible candidates for their geographic origin. Wherever they originated, however, these governors apparently stayed in Corinth and were highly-regarded by the subsequent generations instead of leaving as required in legislative regulations (*Cod. Theod.* 8.8.4).

On the whole, however, the isotopic data appears to support the assumption that the consolidation of power by Constantinople over the Eastern Mediterranean was accompanied by a focus on this area for trade connections and population interactions. On the other hand, any migrants from Rome would be difficult to discriminate geochemically from Corinthian locals as the population around Rome displays overlapping strontium and oxygen isotopic ranges with this site. Therefore, it is possible that negotiations between the Christian bishops in Greece and the Pope during the early 6th century AD may have resulted in some isotopically invisible migrants to Corinth.

Finally, the presence of migrants in these cemeteries also speaks to the urban ethos and function of cities in late antiquity. The ability of these migrants to achieve high status positions in society would not have been possible if society was closed, and this openness is considered a common result of the entrepreneurial trade opportunities available in a port city such as Corinth. In addition, the fact that the mortuary contexts of nonlocal skeletons contain objects given by the Eastern Roman Empire to holders of political office implies that the state continued to be involved in provincial capitals. The fact that these foreign officials were particularly identified in the chronologically latest graves analyzed for this study furthermore implies that these cities retained a central role in imperial administration and were connected to the main governing body in Constantinople. This finding is directly opposed to the traditionally identified decline in the relevance of the city to the "state machinery" (Haldon, 1995: 78) and semi-autonomy of the provinces which is thought to have arisen as a result of the *theme* system. One possible response to this reorganization of the Eastern Roman Empire's army in the 7th century AD and the increasing militarization of the provincial population (Haldon, 1990, 1993), however, may have been a shift in the objects symbolically associated with achieved status as the local population was responsible for the military defense of its own territory. This may explain why the weapons found in graves after the mid-7th century appear to have been used as a mark of political office, equivalent to the earlier use of buckles in mortuary contexts.

Thus, there is evidence to support the contention that communities in Late Antique Corinth consisted of merchants from a variety of origins as well as regulatory officials sent by the Imperial administration, and that connections between these initial migrants and their places of origin may have given rise to at least one migration network. These processes changed over time; connections persisted between Corinth and an unspecified geographic location, possibly along the Levantine coast or the southern coast of Turkey, throughout this time period. Contemporarily, other foreigners relocated to Corinth from separate geographic areas, and these individuals were buried together in distinct burial locations despite their disparate origins, suggesting a shared corporate identity such as what had historically been available to merchants in the Roman Empire. However, political officers only appear to have been sent to Corinth from more northerly locations during Period III. Each of these types of migrants appears to have been incorporated into the existing social fabric of the city based on mortuary behaviors shared among community-specific burial locations. This result, while allowing for oversight by the government in Constantinople, also implies that the social atmosphere at this provincial city was open to migrants and that foreigners were acculturated.

8.3 Migrant Types in Antiquity

Reflecting back on modern ethnographic work on migrants in urban settings, the situation described in ancient Corinth does not appear much different than that present today. Sojourners, recurrent migrants, and temporary visitors were all likely features of this Late Antique port city, and if these travelers did not remain in Corinth long enough to be incorporated into its society and be buried in its cemeteries, then the information they brought back to their place of origin likely did lead to permanent relocations. This process included at least one particularly long-lived migration system or stream which may have begun as a result of these initial interactions. Local and regional mobility may also both have been an important part of daily life. Thus, the case of Late Antique Corinth provides evidence against the so-called mobility transition (Ravenstein, 1885, 1889; Zelinsky, 1971). The amount of mobility present in modern times appears to be well-matched by that of this ancient city, and population movement is not merely the result of ease of transportation and increased population density within the emigration area.

On the whole, these migration decisions were made by individuals and families, and not dictated by the state. There is no sign of forced relocations of entire groups of people; likewise, the evidence for any diaspora community within ancient Corinth is scanty, and it does not appear that a refugee population or some other group of migrants cut off from their place of origin settled in the city. This may be a result of the fact that Corinth was only one possible regional migration target. State-sponsored or other migrants taking advantage of untenanted agricultural land may have had few incentives to live in the city rather than by their crops. Thus, the countryside may have been just as diverse as the city, and more exotic behaviors may be present in rural cemeteries as these populations would have had little reason to acculturate (Trombley, 2001b). In other words, migrants may have settled in the untenanted land between towns, rather than besieging existing fortified centers, leaving little to no archaeological evidence of their presence in cities such as Corinth. When Slavic-speaking peoples came to Greece, as they undoubtedly must have done, the lack of evidence for their presence at this urban site suggests that they did not do so by targeting existing population centers. The slow "process of infiltration" (Barford, 2001: 46; Burmeister, 2000: 540) of the countryside (Paparrigopoulos, 1843; Setton, 1950; Soltysiak, 2006), on the other hand, is more consistent with the "wave of advance" model for population movement (Ammerman and Cavalli-Sforza, 1973, 1984) than with modern depictions of mass migration movements as concentrating on urban settings (Brettell, 2000).

Though the city does not appear to have been involved in any mass migrations during this time period, Corinth was obviously the target of migration events and processes. If the countryside was similarly diverse, then it is possible that port cities like Corinth, instead of forming a cultural "bottleneck" (Trombley, 2001b: 230) on normative behaviors, were a kind of middle-ground where the increasingly diverse rural population could interact with the Eastern Roman Empire's administrative representatives. After all, those migrants who were present in Corinth appear to have been readily incorporated into already existing communities. Their graves share mortuary behaviors relating to burial liturgy, symbolic expressions of rank and political office, and even burial placement with that of locals. These shared behaviors are unlikely to be only the result of pan-Byzantine mortuary practices, and the implied pan-Byzantine culture, as mortuary contexts containing migrants are also consistent with local and regional elaborations on mortuary traditions.

One possible example of the resulting variability in mortuary practices which may have resulted from these interactions is the so-called "wandering soldier" from Grave 1938.10, who was buried with weapons, a buckle, an amulet, a fire-striker, and a blackened, handmade pot (Weinberg, 1974). While these items have typically been used to identify this individual as an ethnic outsider, those few that are not common products of the Eastern Roman Empire may be the result of the interactions and negotiations between the residents of the surrounding rural areas and the urban population of Corinth. Instead of being buried in an isolated location, this individual was placed in a grave by the dense group of graves at the southwestern end of the forum. This skeleton and all but one of the skeletons from nearby graves also display isotopic values consistent with a local origin. In other words, there is no reason to assume any of these objects can be used to signify ethnic identity in a mortuary context.

In addition to outliers who are best conceptualized as sojourners (Brettell, 2008; Gmelch, 1980; Gonzalez, 1961), the presence of a migration stream implies that at least one migration network (Brettell, 2008; Fawcett, 1989; Kritz et al., 1992; Massey, 1988; Massey et al., 1993; Sanjek, 2003) must also have been present in the Late Antique

Eastern Mediterranean, creating connections between geographically separated sites that endured regardless of shifts in trade routes or political influence. It would be interesting to see if this connection continued after the Arabs consolidated their power in the Levant and severed trade ties between the Eastern Roman Empire and destinations such as Cyprus, as this would provide clear evidence of population interaction in the absence of economic incentives in the ancient world. If such ties persisted in the face of a hostile political environment, either the Arab takeover was not as complete as contemporary histories would make it seem, or that they merely affected upper level politics and state-controlled trade while everyday interactions continued unabated.

8.4 Conclusions and Questions for Further Work

In light of these data, all from disparate sources, comes the clear indication that mortuary behavior, human skeletal osteology, and geochemistry support recent archaeological evidence that Corinth was fully integrated into the trade networks and administration of the Eastern Roman Empire. Constantinople consolidated power over its provinces during this period, and this city may form an example of how provincial capitals had an essential role in this state, as well as a site for population interactions in late antiquity. Connections between Corinth and a number of other cities led to significant population mobility, and migrants are present even in the relatively small sample of skeletons subjected to isotopic analysis. Furthermore, population movement is likely underestimated by these data due to the likely similarities in local $\delta^{18}O$ for sites around the Aegean and in comparison to sites at a similar latitude and distance from the sea, such as Rome. As this research forms only a small window into Late Antique life even at this one site, as well, it does not claim to fully describe all possible variability which existed during this time period. This dissertation does, however, provide a framework within which subsequent research can be compared.

Other limitations for these data are also present. For one, the mortuary realm is a reflection of living society, and does not precisely reproduce living identities. This research does not, therefore, examine all of the identities present in Late Antique Corinth. I am unable to comment on the roles exclusively available to women based only on mortuary data, for example. I have also chosen to focus the mortuary analysis on identifying the high versus the low end of the mortuary spectrum pertaining to status distinctions. Doubtless, finer divisions in status are present than I have described. Slaves are one low-status group who were likely present in Late Antique Corinth but whom I did not identify using either mortuary correlates or isotopic analysis. With identification and excavation of residential neighborhoods from this period, these under-represented social groups may be better defined. At that time, it would be worthwhile to re-examine the mortuary correlates for status and other social distinctions at this site.

Some of these divisions may also be identified through future mortuary analysis, particularly if the artifact classes are broken down. Buckles are one such category for which a number of distinct types are present, each of which may be correlated with a different status, occupation, or identity. Ceramics may also be overly inclusive. Not only do forms differ among grave assemblages, the presence of imports and objects of local manufacture are subsumed within this artifact class. It may be possible in future work to compare isotopic ratios with variations in ceramic vessel form and fabric, as choice in which particular object was placed in a grave may pertain to price considerations, community membership, or geographic origin.

Similarly, it would be interesting to test for familial use of multiple interment tombs and burial locations. Though I collected dental metrics and nonmetrics for this population, commingling and preservation makes their analysis challenging. At the moment, these data are also only available consistently for the interments from graves constructed near the Gymnasium area. In the future, dental metrics and trait information may be collected from other cemeteries excavated around the ancient city of Corinth, and these data will form an important comparative sample for the existing dataset and enable biodistance analyses to incorporate a wider range of the population.

Since much of the existing mortuary variability at this site is related to geographic separation of burial locations, and many of these tombs are grouped around or make use of older, abandoned architectural structures, this aspect of reuse should also be addressed in future studies. Restructuring these areas into a place of burial may imply simply that these facilities were abandoned and available for use in the inevitable search for a place to put the bodies of the dead. This argument has been used to oppose the suggestion that the use of the sites of ancient temples for burial and as the site of churches is a result of syncretism (Caraher, 2010; Gregory, 1986b). However, it is possible that certain structures, and certain places, did retain cultic meaning which was deliberately invoked by the placement of later religious structures (Sweetman, 2010). These topographical issues need to be addressed more fully.

Finally, though migrants are present in these cemeteries, the exact source populations of these foreigners can not currently be determined. As more sites are subjected to oxygen and strontium analyses, these identifications may become possible. Other isotope systems may also be employed as independent indicators of origin, such as lead (Carlson, 1996; Montgomery et al., 1999) or sulfur (Oelze et al., 2012; Vika, 2009). Expanding the sample size may also help answer questions regarding the migration process at Corinth, since multigenerational connections among emigration and immigration areas may be missed through use of any sampling strategy.

The movement of people is not novel to the modern era, and may instead have been an integral part of daily life in antiquity. This research identifies migrant families at one ancient urban site and describes how their presence contributed to the characterization of Late Antique Corinth. In future research, I plan to further examine the causes of isotopic variability within the local population of Corinth and extend these analyses to include cemetery populations from elsewhere in the city. I will also focus on the association of the mortuary groups identified here with kinship, as determined by metric and nonmetric skeletal traits, diet, through isotopic analysis of collagen from tooth dentin, and other health indicators, especially the differential diagnoses of pathologies and the osteological identification of childhood stress.

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APPENDIX A

Key for Appendix

Abbreviations used throughout

Grave ID	Grave Identification	Number identifying grave in the Corinth excavation database
BL	Bone Lot	Number identifying human skeletal remains in the Corinth excavation database
P	Period	Date of grave
Comm	Commemoration	Objects which enabled mourners to find a grave, or were left by mourners at the gravesite
CT	Corpse Treatment	Whether primary or secondary burials are present
NB	Corinth Notebook	Number identifying excavation notes for this grave
np	not preserved	Skeletal remains were noted during excavation but not preserved for osteological analysis
nr	not recorded	The grave is mainly not described in the excavation notes
ne	not excavated	Grave was noted but not completely excavated
dist	disturbed	Grave was disturbed in antiquity and this activity has limited the information available from this grave
?	Uncertainty	Available data is not sufficient for classification of this case
deW	de Waele	Number identifying grave in de Waele's original system
Wi	Wiseman	Number identifying Gymnasium grave in Wiseman's original publications in 1967a, b, 1969, and 1972
I	Period I	Late 5^{th} through 6^{th} centuries AD
II	Period II	Mid- to late 6^{th} through 7^{th} centuries AD
III	Period III	Mid-7^{th} through 8^{th} centuries AD
NPD	No Precise Date	Grave dates to late antiquity, but more precise dating is not available
Byz	Byzantine	Mortuary activity dates after the 12^{th} century AD

Mortuary Data

P	Pit Grave	M	Marker
A	Amphora	L	Lamps
T	Tile Grave	Cer	Ceramics
Ci	Cist	J	Jewelry
BCi	Built Cist	Co	Coins
RCh	Rock-Cut Chamber	B	Buckles
BV	Built Vault	W	Weapons
RA	Reused Architecture	I	Implements
		OV	Other Vessels

Osteological Data

MNI	Minimum Number of Individuals
M	Male
M?	Probable Male
F	Female
F?	Probable Female
? Sex	Sex indeterminate
I	Infant (0-3)
C	Child (4-11)
AO	Adolescent (12-19)
YA	Young Adult (20-34)
MA	Middle Adult (35-49)
OA	Old Adult (50+)
Suba	Skeletally immature, no precise age determination possible
Ai	Skeletally mature, no precise age determination possible

Graves North of the City

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Asklepieion 1	1931.24 / deW 1/n	A 101, 102	II	RCh	M, L	J	P	4	:	1 M, Y-MA; 1 C; 1 ? Sex, Ai [a] rest np [b]	A 101, Adult (Sample 1)
Asklepieion 2	1931.25 / deW 2/m	dist	II	RCh	L, but dist	dist		?	:		
Asklepieion 3	1931.26 / deW 3/i	A 103	III	RCh	L	Cer, Co	P	5	:	1 M?, MA [b]; + 2 ? Sex, Ai [a] rest np	JLA 103, Adult (Sample 2)
Asklepieion 4	1931.27 / deW 4/a	nr	III	RCh	n/a	Cer		?	:		
Asklepieion 5	1931.28 / deW IV	A 104	III	RCh	None	Cer	P	2	:	1 F, YA [b]; 1 suba [a]	
Asklepieion 6	1931.29 / deW V/k	A 105	III	RCh	M, L	Cer	P	2	:	1 M?, MA [b]; 1 suba [a]	A 105, Adult (Sample 3)
Asklepieion 7	1931.30 / deW VI	A 106	II	RCh	None	None	P	2	:	1 M, Ai [b]; 1 ? Sex, Ai [a]	A 106, Adult (Sample 4)
Asklepieion 8	1931.31 / deW VII	A 107	II	RCh	M	None	P	1	:	1 M?, MA [b]	A 107, Adult (Sample 5)
Asklepieion 9	1931.32 / deW VIII	nr	II	RCh	M	None		?	:	np	
Asklepieion 10	1931.33 / deW K1	nr	I	T	L	None		?	:	np	

[a] The excavation notes provided enough information to determine whether these skeletons are adults or children (Ai or suba).

[b] Sex and age determination for A 104 taken from Angel (1942); Angel also identifies: A 101 as M, YA; A 102 as M?, C; A 103 as M, MA; A 105 as M, MA; A 106 as M, YA; and A 107 as M, OA.

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Asklepieion 11	1931.34 / deW H-J 5-6	nr	III	RCh					:		
Asklepieion 12	1931.40 / deW D4	nr	II	RCh	M, L			?	:	np	
Asklepieion 13	1932.119 / deW D3	np	III	RCh	None	Cer		3	:	np	
Asklepieion 14	1931.41 / deW F3	nr	III	RCh	M	Cer		?	:	np	
Asklepieion 15	1931.42 / deW B5	nr	III			Cer		?	:		
Asklepieion 16	1931.44 / deW B6-7 or A-B:6-5, A6-7	nr	II	BCi	None	None		?	:	np	
Asklepieion 17	1931.45 / deW AB5-6	nr	II	BCi	L	None		?	:	np	
Asklepieion 18	1931.46 / deW A11	nr	II	RCh	None	None		?	:	np	
Asklepieion 19	1931.47 / deW A11	nr	II	RCh	None	None		?	:	np	
Asklepieion 20	1931.48 / deW QQ11	np	III	RCh	None	Cer	P	6	:	np	
Asklepieion 21	1931.49 / deW RR12	np	III	RCh	None	Cer	P	1	:	np	
Asklepieion 22	1931.50 / deW SS12	nr	III	RCh	n/a	Cer		?	:	np	
Asklepieion 23	1931.51a / deW BC9-10	nr	II	RCh	n/a	None		?	:	np	

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Asklepieion 24	1931.51b / deW BC9-10	nr	II	RCh	None	None		?	:	np	
Asklepieion 25	1931.51c / deW BC9-10	nr	II	RCh	None	None		?	:	np	
Asklepieion 26	1931.52 / deW TT41	nr	II	RCh	M	None		?	:	np	
Asklepieion 27	1931.53 / deW UU41	nr	II	RCh	M	None		?	:	np	
Asklepieion 28	1931.54 / deW VV41	nr	II	RCh	None	None		?	:	np	
Asklepieion 29	deW WW41	dist	II	RCh	dist	dist		?	:	dist	
Asklepieion 30	1932.12 / deW 11/71	nr	II	RCh	None	None		?	:	np	
Lerna Square 1	1931.35 / deW B2	np	I	T	None	None	P	1	:	np	
Lerna Square 2	1931.36 / deW C2	np	I	T	None	None	P	1	:	np	
Lerna Square 3	1931.37 / deW E1	np	I	T	None	None	P	1	:	np	
Lerna Square 4	1931.38 / deW H1	np	I	T	None	None	P	1	:	np	
Lerna Square 5	1931.39 / deW L1	np	I	T	None	None	P	1	:	np	
Lerna Square 6	1931.43 / deW B4	nr	I	T	L	None		?	:	np	
Lerna Square 7	deW 43	nr	I	T	None	None		?	:	np	
Lerna Square 8	deW 44	nr	II	P	None	None		?	:	np	
Lerna Square 9	deW 45	nr	II	P	None	None		?	:	np	

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Lerna Square 10	1931.60 / deW 46	nr	I	T	None	Co		?	:	np	
Lerna Square 11	deW 47	nr	I	T	None	None		?	:	np	
Lerna Square 12	deW 48	nr	I	T	None	None		?	:	np	
Lerna Square 13	deW 49	nr	II	T	L	None		?	:	np	
Lerna Square 14	deW 50	nr	I	?	M	None		?	:	np	
Lerna Square 15	deW 51	nr	I	T	None	None		?	:	np	
Lerna Square 16	deW 52	nr	I	T	None	None		?	:	np	
Lerna Square 17	deW 53	nr	II	RCh	None	None		?	:	np	
Lerna Square 18	deW 54	nr	II	RCh	None	None		?	:	np	
Lerna Square 19	deW 55	nr	I	T	None	None		?	:	np	
Lerna Square 20	deW 56	nr	I	T	None	None		?	:	np	
Lerna Square 21	deW 57	nr	III	BCi	None	None		?	:	np	
Lerna Square 22	1931.59 / deW 58	nr	II	?	None	Co		?	:	np	
Lerna Square 23	deW 59	np	III	BCi	None	None	P	2	:	np	
Lerna Square 24	deW 60	nr	I	T	None	None		?	:	np	
Lerna Square 25	1932.2 / deW 1/61	np	I	T	None	None	P	1	:	suba [a]	
Lerna Square 26	1932.3 / deW 2/62	nr	I	T	None	None		?	:	np	
Lerna Square 27	1932.4 / deW 3/63	nr	I	T	None	None		?	:	np	
Lerna Square 28	1932.5 / deW 4/64	np	I	T	None	None	P	1	:	np	

[a] The excavation notes provided enough information to determine whether this skeleton is an adult or a child (Ai or suba).

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Lerna Square 29	1932.6 / deW 5/65	np	I	T	L	None	P	1	:	np	
Lerna Square 30	1932.7 / deW 6/66	np	I	T	L	None	P	1	:	np	
Lerna Square 31	1932.8 / deW 7/67	np	I	T	L	None	P	1	:	np	
Lerna Square 32	1932.9 / deW 8/68	np	I	T	None	None	P	1	:	np	
Lerna Square 33	1932.10 / deW 9/69	nr	II	T	M, L	None		?	:	np	
Lerna Square 34	1932.11 / deW 10/70	nr	I	T	M, L	None		?	:	np	
Lerna Square 35	1932.13 / deW 12/72	nr	I	T	None	None		?	:	np	
Lerna Square 36	1932.14 / deW 13/73	nr	I	T	None	None		?	:	np	
Lerna Square 37	1932.15 / deW 14/74	nr	I	T	L	None		?	:	np	
Lerna Square 38	1932.16 / deW 15/75	nr	I	T	None	None		?	:	np	
Lerna Square 39	1932.17 / deW 16/76	np	I	P	None	None	P	1	:	np	
Lerna Square 40	1932.18 / deW 17/77	nr	I	T	None	None		?	:	np	

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Lerna Square 41	1932.19 / deW 18/78	np	I	T	None	None	P	1	:	? Sex, Ai [a]	
Lerna Square 42	1932.20 / deW 19/79	np	I	T	L	None	P	1	:	suba [a]	
Lerna Square 43	1932.21 / deW 20/80	np	I	P	L	None	P	1	:	np	
Lerna Square 44	1932.22 / deW 21/81	np	II	T	M	None	P	1	:	np	
Lerna Square 45	1932.23 / deW 22/82	nr	I	T	None	None		?	:	np	
Lerna Square 46	1932.24 / deW 23/83	nr	I	T	L	Co		?	:	np	
Lerna Square 47	1932.25 / deW 24/84	np	I	T	None	J	P	1	:	np	
Lerna Square 48	1932.26 / deW 25/85	nr	II	T	M	None		?	:	np	
Lerna Square 49	deW R34-35	nr	II	BCi	None	None		?	:	np	
Lerna Square 50	1932.29 / deW 26/86	nr	II	T	M	None		?	:	np	
Lerna Square 51	1932.30 / deW 27/87	nr	I	T	None	None		?	:	np	
Lerna Square 52	1932.31 / deW 28/88	np	II	T	None	None	P	1	:	? Sex, Ai [a]	
Lerna Square 53	1932.32 / deW 29/89	np	III	BCi	None	None	S	3	:	np	

[a] The excavation notes provided enough information to determine whether these skeletons are adults or children (Ai or suba).

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Lerna Square 54	1932.34 / deW 30/90	np	I	T	None	J, Co	P	1	:	? Sex, Ai [a]	
Lerna Square 55	1932.35 / deW 31/91	np	I	T	None	None	P	1	:	np	
Lerna Square 56	1932.36 / deW 32/92	np	III	T	None	Cer	P	1	:	np	
Lerna Square 57	1932.37 / deW S-T38	np	II	RA	M	None	P	1	:	np	
Lerna Square 58	1932.38 / deW 33/93	nr	I	T	None	None		?	:	np	
Lerna Square 59	1932.39 / deW 34/94	nr	I	T	None	None		?	:	np	
Lerna Square 60	1932.40 / deW 35/95	nr	I	T	None	None		?	:	np	
Lerna Square 61	1932.41 / deW 36/96	nr	I	T	None	None		?	:	np	
Lerna Square 62	1932.42 / deW 37/97	np	I	?	None	None	P	1	:	np	
Lerna Square 63	1932.43 / deW 38/98	nr	I	T	None	None		?	:	np	
Lerna Square 64	1932.44 / deW 39/99	nr	I	T	None	None		?	:	np	
Lerna Square 65	1932.45 / deW 40/100	nr	I	T	None	None		?	:	np	
Lerna Square 66	deW at XX:29	nr	II	A	None	None		?	:	np	

[a] The excavation notes provided enough information to determine whether this skeleton is an adult or a child (Ai or suba).

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Lerna Square 67	1932.46 / deW 41/101	nr	II	T	M	None		?	:	np	
Lerna Square 68	1932.47 / deW 42/102	nr	I	T	None	None		?	:	np	
Lerna Square 69	1932.48 / deW 43/103	nr	I	T	None	None		?	:	np	
Lerna Square 70	1932.49 / deW 44/104	nr	I	T	None	None		?	:	np	
Lerna Square 71	1932.50 / deW 45/105	nr	I	T	None	None		?	:	np	
Lerna Square 72	1932.51 / deW 46/106	nr	I	T	L	None		?	:	np	
Lerna Square 73	1932.52 / deW 47/107	nr	I	T	None	None		?	:	np	
Lerna Square 74	1932.53 / deW 48/108	nr	I	T	None	None		?	:	np	
Lerna Square 75	1932.54 / deW 49/109	nr	II	BCi	None	None		?	:	np	
Lerna Square 76	1932.57 / deW 50/110	nr	I	T	None	None		?	:	np	
Lerna Square 77	1932.58 / deW 51/111	nr	II	T	None	J		?	:	np	
Lerna Square 78	1932.74 / deW 52/112	nr	I	T	None	None		?	:	np	
Lerna Square 79	deW 113	nr	II	A	None	None		?	:	np	
Lerna Square 80	1932.75 / deW 114	nr	I	T	None				:		

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Lerna Square 81	1932.76a / deW 53/115	nr	I	T	None	None		?	:	np	
Lerna Square 82	1932.76b / deW 54/116	nr	I	T	L	None		?	:	np	
Lerna Square 83	1932.78 / deW 55/117	nr	II	BCi	None	Cer		?	:	np	
Lerna Square 84	deW Y-Q:38-40	nr	II	T	None	None		?	:	np	
Lerna Square 85	1933.3 / deW 123	np	I	T	None	Co	P	1	:	np	
Lerna Square 86	1933.4 / deW 124	nr	I	T	None	None		?	:	np	
Lerna Square 87	1933.5 / deW 125	nr	I	T	None	Co		?	:	np	
Lerna Square 88	1933.7 / deW 126	np	I	T	None	None	P	1	:	np	
Lerna Square 89	1933.8 / deW 127	np	I	T	None	None	P	1	:	np	
Lerna Square 90	1933.9 / deW 128	nr	I	T	L	None		?	:	np	
Lerna Square 91	1933.10 / deW 129	nr	I	T	None	None		?	:	np	
Lerna Square 92	1933.11 / deW 130	nr	I	T	None	None		?	:	np	
Lerna Square 93	1933.12 / deW 131	nr	I	T	None	None		?	:	np	
Lerna Square 94	1933.13 / deW 132	nr	I	T	None	None		?	:	np	

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Lerna Square 95	1933.14 / deW 133	nr	I	T	None	None		?	:	np	
Lerna Square 96	1933.16 / deW 134	nr	I	T	None	None		?	:	np	
Lerna Square 97	1933.17 / deW 135	nr	I	T	None	None		?	:	np	
Lerna Square 98	1933.18 / deW 136	nr	I	?	None	None		?	:	np	
Lerna Square 99	1933.19 / deW 137	nr	I	T	None	None		?	:	np	
Lerna Square 100	1933.21 / deW 138	np	II	A	None	None	P	1	:	suba [a]	
Lerna Square 101	1933.22 / deW 139	np	I	T	None	None	P	1	:	np	
Lerna Square 102	1933.23 / deW 140	np	I	T	None	None	P	1	:	np	
Lerna Square 103	1933.24 / deW 141	np	I	T	None	None	P	1	:	np	
Lerna Square 104	1933.25 / deW 142	nr	I	T	None	None		?	:	np	
Lerna Square 105	1933.26 / deW 143	np	I	T	None	None	P	1	:	np	
Lerna Square 106	1933.27 / deW 144	nr	I	T	None	None		?	:	np	
Lerna Square 107	1933.28 / deW 145	nr	I	T	None	None		?	:	np	

[a] The excavation notes provided enough information to determine whether this skeleton is an adult or a child (Ai or suba).

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Lerna Square 108	1933.29 / deW 146	np	II	A	None	None		1	:	suba [a]	
Lerna Square 109	1933.30 / deW 147	np	I	T	None	J	P	1	:	np	
Lerna Square 110	1933.31 / deW 148	np	II	A	None	None		1	:	suba [a]	
Lerna Square 111	1933.32 / deW 149	np	II	A	None	None		1	:	suba [a]	
Lerna Square 112	1933.34 / deW 150	np	II	A	None	None	P	1	:	np	
Lerna Square 113	1933.35 / deW 151	np	II	A	L	None	P	1	:	np	
Lerna Square 114	1933.36 / deW 152	np	I	A	None	None	P	1	:	np	
Lerna Square 115	1933.37 / deW 153	np	I	A	None	None	P	1	:	np	
Lerna Square 116	1933.40 / deW 156	nr	I	T	None	None		?	:	np	
Lerna Square 117	1933.41 / deW 157	nr	I	T	None	None		?	:	np	
Lerna Square 118	1933.42 / deW 158	nr	I	T	None	None		?	:	np	
Lerna Square 119	1933.43 / deW 159	np	I	T	None	None	P	2	:	np	
Lerna Square 120	1933.44 / deW 160	nr	I	T	None	None		?	:	np	

[a] The excavation notes provided enough information to determine whether these skeletons are adults or children (Ai or suba).

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Lerna Square 121	1933.46 / deW 162	np	I	T	None	None	P	?	:	np	
Lerna Square 122	1933.47 / deW 163	np	I	T	None	None	P	1	:	np	
Lerna Square 123	1933.48 / deW 164	np	II	P	None	None	P	1	:	np	
Lerna Square 124	1933.52 / deW168	np	I	A	None	None		1	:	suba [a]	
Lerna Square 125	1933.53 / deW 169	nr	NPD		None	None		?	:	np	
Lerna Square 126	1933.54 / deW 170	nr	NPD		None	None		?	:	np	
Lerna Square 127	1933.55 / deW 171	nr	I	A	None	None		?	:	np	
Lerna Square 128	1933.56 / deW 172	nr	I	T	None	None		?	:	np	
Lerna Square 129	1933.57 / deW 173	nr	NPD		None	None		?	:	np	
Lerna Square 130	1933.59 / deW 174	nr	II	T	None	None		?	:	np	
Lerna Square 131	1933.60 / deW 175	np	II	T	None	Cer		1	:	np	
Lerna Square 132	1933.61 / deW 176	nr	II	A	None	None		?	:	np	
Lerna Square 133	1933.62a / deW 177	np	II	A	None	None	P	1	:	np	

[a] The excavation notes provided enough information to determine whether this skeleton is an adult or a child (Ai or suba).

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Lerna Square 134	1933.62b / deW 178	np	II	A	None	None	P	1	:	suba [a]	
Lerna Square 135	1933.63 / deW 179	ne	II		None[1]				:		
Lerna Square 136	1933.65 / deW 181	np	II	T	None	None	P	1	:	np	
Lerna Square 137	1933.67 / deW 183a	np	II	T	None	None	P	1	:	suba [a]	
Lerna Square 138	1933.68 / deW 183b	np	II	T	None	None	P	1	:	np	
Lerna Square 139	1933.69 / deW 184	np	II	T	None	None	P	1	:	np	
Lerna Square 140	1933.70 / deW 185	nr	II	T	None	None		?	:	np	
Lerna Square 141	1933.71 / deW 186	nr	II	P	None	None		?	:	np	
Lerna Square 142	1933.72 / deW 187	nr	II	P	None	None		?	:	np	
Lerna Square 143	1933.73 / deW 188	np	II	T	None	None	P	1	:	np	
Lerna Square 144	1933.74 / deW 189	np	II	T	None	None	P	1	:	np	
Lerna Square 145	1933.75 / deW 190	nr	II	T	L	None		?	:	np	
Lerna Square 146	1933.76 / deW 191	nr	II	T	None	None		?	:	np	

[1] Presence of lamps could not be scored.

[a] The excavation notes provided enough information to determine whether these skeletons are adults or children (Ai or suba).

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Lerna Square 147	1933.78 / deW 193	nr	II	T	None	None		?	:	np	
Lerna Square 148	1933.79 / deW 194	nr	II	T	None	None		?	:	np	
Lerna Square 149	1933.80 / deW 195	nr	II	T	None	None		?	:	np	
Lerna Square 150	1933.81 / deW 196	np	I	T	None	None	P	1	:	np	
Lerna Square 151	1933.88 / deW 204	np	I	T	None	None	P	1	:	np	
Lerna Square 152	1933.89 / deW 205	nr	II	P	None	None		?	:	np	
Lerna Square 153	1933.102 / deW 220	nr	II	T	None	None		?	:	np	
Lerna Square 154	1933.115 / deW 227	nr	I	T	None	None		?	:	np	
Lerna Square 155	1933.116 / deW 228	nr	I	T	None	None		?	:	np	
Lerna Square 156	1933.117 / deW 229	nr	I		None	None		?	:	np	
Lerna Square 157	1933.121 / deW 233	nr	I	T	None	None		?	:	np	
Lerna Square 158	1933.122 / deW 234	nr	I	T	None	None		?	:	np	
Lerna Square 159	1933.123 / deW 235	nr	I	T	None	None		?	:	np	
Lerna Square 160	1933.126 / deW 238	nr	I	T	None	None		?	:	np	

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Lerna Square 161	1933.127 / deW 239	nr	I	T	None	None		?	:	np	
Lerna Square 162	1933.128 / deW 240	nr	I	T	None	None		?	:	np	
Lerna Square 163	1933.129 / deW 312	nr	II	T	L	None		?	:	np	
Lerna Square 164	1933.130 / deW 313	nr	I	T	None	None		?	:	np	
Cavern B/III 1	1933.110 / deW 223	A 108	III	RA	L	Cer, Co	?	15	:	1 F?, YA [b]; rest np	
Cavern C/IV 1	1933.64 / deW 180	np	II	T	None	None	P	1	:	np	
Cavern C/IV 2	1933.77 / deW 192	np	II	T	None	None	P	1	:	C [c]	
Cavern C/IV 3	1933.101 / deW 217	nr	II	T	M	None		?	:	np	
Cavern C/IV 4	1933.106 / deW 218	nr	II	T	None	None		?	:	np	
Cavern C/IV 5	1933.107 / deW 219	nr	II	T	None	None		?	:	np	
Cavern C/IV 6	1933.108 / deW 221	nr	III	RCh	None	Cer		?	:	np	
Cavern C/IV 7	1933.109 / deW 222	nr	III	RCh	None	None		?	:	np	

[b] Angel (1942) identifies: A 108 as F, YA.

[c] More precise age class estimate than suba possible from the excavation notes due to the presence of skeletal measurements in NB.

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Cavern C/IV 8	1933.112 / deW 225	np	II	A	None	None	P	1	:	suba [a]	
Cavern C/IV 9	1933.113 / deW 226	np	II	A	M, L	None	P	1	:	np	
Cavern C/IV 10	1933.124 / deW 236	np	II	T	None	Co	P	1	:	np	
Cavern C/IV 11	1933.125 / deW 237	nr	II	T	L	Co		?	:	np	
Cavern D/VI 1	1933.45 / deW 161	nr	II	RA	M, L	Cer		?	:	np	
Cavern D/VI 2	1933.49 / deW 165	np	II	A	None	None	P	1	:	np	
Cavern D/VI 3	1933.82 / deW 197	nr	II		L	None		?	:	np	
Cavern D/VI 4	1933.83 / deW 198	nr	II	T	None	None		?	:	np	
Cavern D/VI 5	1933.84 / deW 199	nr	II	T	None	None		?	:	np	
Cavern D/VI 6	1933.84a / deW 200	np	III	P	M	Cer	?	3	:	np	
Cavern D/VI 7	1933.85 / deW 201	nr	II	T	None	None		?	:	np	
Cavern D/VI 8	1933.86 / deW 202	nr	II	T	None	None		?	:	np	
Cavern D/VI 9	1933.87 / deW 203	np	II	A	None	None	P	1	:	np	

[a] The excavation notes provided enough information to determine whether this skeleton is an adult or a child (Ai or suba).

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Cavern D/VI 10	1933.90 / deW 206	nr	II	T	M, L	None		?	:	np	
Cavern D/VI 11	1933.91 / deW 207	nr	II	T	None	None		?	:	np	
Cavern D/VI 12	1933.92 / deW 208	np	II	T	None	None	P	1	:	suba [a]	
Cavern D/VI 13	1933.93 / deW 209	np	II	T	None	None		1	:	np	
Cavern D/VI 14	1933.94 / deW 210	nr	II	T	None	None		?	:	np	
Cavern D/VI 15	1933.96 / deW 212	nr	II	T	None	None		?	:	np	
Cavern D/VI 16	1933.118 / deW 230	nr	II	T	None	None		?	:	np	
Cavern D/VI 17	1933.119 / deW 231	nr	II	T	None	None		?	:	np	
Cavern D/VI 18	1933.120 / deW 232	nr	II	T	None	None		?	:	np	
Cavern E/V 1	1933.50 / deW 166	np	II	A	L	None	P	1	:	np	
Cavern E/V 2	1933.95 / deW 211	np	II	T	L	None	P	1	:	np	
Cavern E/V 3	1933.97 / deW 213	np	II	T	L	None		1	:	np	
Cavern E/V 4	1933.98 / deW 214	np	II	T	L	None		1	:	np	

[a] The excavation notes provided enough information to determine whether this skeleton is an adult or a child (Ai or suba).

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Cavern E/V 5	1933.99 / deW 215	nr	II	T	M	None		?	:	np	
Cavern E/V 6	1933.100 / deW 216	np	II	T	None	None	P	1	:	np	
Cavern E/V 7	1933.111 / deW 224	np	III	RA	L	Cer, J, Co	?	100	:	np	
Hill of Zeus 1	1896.01a	nr	II	RCh		Cer? [2]		?	:	np	
Hill of Zeus 2	1896.01b	nr	II	RCh		Cer? [2]		?	:	np	
Hill of Zeus 3	1896.01c	nr	II	RCh		Cer? [2]		?	:	np	
Hill of Zeus 4	1896.01d	nr	II	RCh		Cer? [2]		?	:	np	
Hill of Zeus 5	1896.01e	nr	II	RCh		Cer? [2]		?	:	np	
Hill of Zeus 6	1896.01f	nr	II	RCh		Cer? [2]		?	:	np	
Hill of Zeus 7	1896.01g	nr	II	RCh				?	:	np	
Hill of Zeus 8	1896.01h	nr	II	RCh				?	:	np	
Hill of Zeus 9	1896.01i	nr	II	RCh				?	:	np	
Hill of Zeus 10	1896.01j	nr	II	RCh				?	:	np	
Hill of Zeus 11	1896.01k	nr	II	RCh				?	:	np	
Hill of Zeus 12	1896.01l	nr	II	RCh				?	:	np	
Hill of Zeus 13	1896.01m	nr	II	RCh				?	:	np	
Hill of Zeus 14	1933.134 / deW 241/1	nr	III	T	None	Cer		?	:	np	
Hill of Zeus 15	1933.135 / deW 242/2	nr	I	T	None	None		?	:	np	

[2] Hill of Zeus tombs 1-13 were recorded together in the excavation notes with little information regarding their interior; in reference to these grave assemblages, the publication claims "about half of these contained pottery" (Richardson 1897: 459; see also NB 1: 62).

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Hill of Zeus 16	1933.136 / deW 243/3	nr	II	P	None	None		?	:	np	
Hill of Zeus 17	1933.137 / deW 244/4	nr	II	P	None	None		?	:	np	
Hill of Zeus 18	1933.137a / deW 245/5	nr	III	RCh	None	Cer		?	:	np	
Hill of Zeus 19	1933.137b / deW 246/6	nr	II	RCh	None	None		?	:	np	
Hill of Zeus 20	1933.138 / deW 247/7	nr	II	RCh	None	None		?	:	np	
Hill of Zeus 21	1933.139 / deW 248/8	nr	III	RCh	None	Cer		?	:	np	
Hill of Zeus 22	1933.140 / deW 249/9	nr	I		None	None		?	:	np	
Hill of Zeus 23	1933.141 / deW 250/10	nr	I	T	None	None		?	:	np	
Hill of Zeus 24	1933.142 / deW 251/11	np	II	Ci	L	None	P	1	:	np	
Hill of Zeus 25	1933.143 / deW 252/12	nr	III	RCh	None	Cer		?	:	np	
Hill of Zeus 26	1933.144 / deW 253/13	nr	I	T	None	None		?	:	np	
Hill of Zeus 27	1933.145 / deW 254/14	nr	II	RCh	None	None		?	:	np	
Hill of Zeus 28	1933.146 / deW 255/15	nr	III	RCh	None	None		?	:	np	
Hill of Zeus 29	1933.147 / deW 257/17	nr	II	Ci	None	None		?	:	np	

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Hill of Zeus 30	1933.148 / deW 258/18	nr	II	RCh	None	None		?	:	np	
Hill of Zeus 31	1933.149 / deW 259/19	nr	II	Ci	None	None		?	:	np	
Hill of Zeus 32	1933.150 / deW 260/20	nr	III	RCh	None	Cer		?	:	np	
Hill of Zeus 33	1933.151 / deW 261/21	nr	III	RCh	None	Cer		?	:	np	
Hill of Zeus 34	1933.152 / deW 262/22	ne	I		None				:		
Hill of Zeus 35	1933.153a / deW 263/23	nr	III	RCh	None	Cer		?	:	np	
Hill of Zeus 36	1933.153b / deW 264/24	nr	III	RCh	None	None		?	:	np	
Hill of Zeus 37	1933.154 / deW 265/25	nr	III	Ci	None	Cer		?	:	np	
Hill of Zeus 38	1933.155 / deW 266/26	ne	I		None	None		?	:	np	
Hill of Zeus 39	1933.156 / deW 267/27	nr	II	RCh	None	None		?	:	np	
Hill of Zeus 40	1933.157 / deW 268/28	np	III	Ci	None	Cer	P	1	:	np	
Hill of Zeus 41	1933.158 / deW 269/29	nr	III	RCh	None	None		?	:	np	
Hill of Zeus 42	1933.159 / deW 270/30	nr	II	RCh	None				:		
Hill of Zeus 43	1933.160 / deW 271/31	nr	III	Ci	None	Cer, J		?	:	np	

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Hill of Zeus 44	1933.161 / deW 272/32	nr	II	Ci	None	None		?	:	np	
Hill of Zeus 45	1933.162 / deW 273/33	np	III	RCh	None	Cer, J		8	:	np	
Hill of Zeus 46	1933.163 / deW 274/34	nr	III	RCh	None	Cer		?	:	np	
Hill of Zeus 47	1933.164 / deW 275/35	nr	III	RCh	None	Cer		?	:	np	
Hill of Zeus 48	1933.165 / deW 276/36	ne	I		None	None		?	:	np	
Hill of Zeus 49	1933.166 / deW 277/1	nr	II	T	None	None		?	:	np	
Hill of Zeus 50	1933.167 / deW 278/2	nr	III	Ci	None	Cer		?	:	np	
Hill of Zeus 51	1933.168 / deW 279/3	nr	II	RCh	None	None		?	:	np	
Hill of Zeus 52	1933.169 / deW 280/4	nr	II	Ci	M	None		?	:	np	
Hill of Zeus 53	1933.170 / deW 281/5	nr	II	Ci	None	None		?	:	np	
Hill of Zeus 54	1933.171 / deW 282/6	nr	I	T	None	None		?	:	np	
Hill of Zeus 55	1933.172 / deW 283/7	nr	I	T	None	None		?	:	np	
Hill of Zeus 56	1933.173 / deW 284/8	nr	I	T	None	None		?	:	np	
Hill of Zeus 57	1933.174 / deW 285/9	nr	I	T	None	None		?	:	np	

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Hill of Zeus 58	1933.175 / deW 286/10	nr	I	T	None	None		?	:	np	
Hill of Zeus 59	1933.176a	nr	II	Ci	None	None		?	:	np	
Hill of Zeus 60	1933.176b	nr	II	Ci	None	None		?	:	np	
Hill of Zeus 61	1933.177 / deW 287/1	nr	II	RCh	None	None		?	:	np	
Hill of Zeus 62	1933.178 / deW 288/2	nr	II	Ci	None	None		?	:	np	
Hill of Zeus 63	1933.179 / deW 289/3	nr	II	RCh	None	None		?	:	np	
Hill of Zeus 64	1933.180 / deW 290/4	nr	III	RCh	None	Cer, OV		?	:	np	
Hill of Zeus 65	1933.181 / deW 291/5	nr	II	Ci	None	None		?	:	np	
Hill of Zeus 66	1933.182 / deW 292/6	nr	II	RCh	None	None		?	:	np	
Hill of Zeus 67	1933.183 / deW 293/7	nr	II	RCh	None	None		?	:	np	
Hill of Zeus 68	1933.184 / deW 294/8	nr	II	RCh	None	None		?	:	np	
Hill of Zeus 69	1933.185 / deW 295/9	nr	II	RCh	None	None		?	:	np	
Hill of Zeus 70	1933.186 / deW 296/10	ne	II	RCh	None				:		
Hill of Zeus 71	1933.187 / deW 297/11	ne	II	RCh	None				:		
Hill of Zeus 72	1933.188 / deW 298/12	nr	II	RCh	M	None		?	:	np	

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Hill of Zeus 73	1933.189 / deW 299/13	ne	II	RCh	None	None		?	:	np	
Hill of Zeus 74	1933.190 / deW 300/14	ne	II	RCh	None	None		?	:	np	
Hill of Zeus 75	1933.191 / deW 301/16	nr	I	T	None	None		?	:	np	
Hill of Zeus 76	1933.192 / deW 302/16	np	II	A	None	None		1	:	suba [a]	
Hill of Zeus 77	1933.193 / deW 303/17	nr	I	T	None	None		?	:	np	
Hill of Zeus 78	1933.194 / deW 304/18	nr	I		None	None		?	:	np	
Hill of Zeus 79	1933.196 / deW 305/1	nr	II	RCh	None	None		?	:	np	
Hill of Zeus 80	1933.197 / deW 306/2	nr	III	RCh	M	Cer		?	:	np	
Hill of Zeus 81	1933.198 / deW 307/3	nr	II	RCh	None	None		?	:	np	
Hill of Zeus 82	1933.199 / deW 308/4	nr	II	RCh	None	None		?	:	np	
Hill of Zeus 83	1933.200 / deW 309/5	nr	II	RCh	None	None		?	:	np	
Hill of Zeus 84	1933.201 / deW 310/6	nr	II	RCh	None	None		?	:	np	
Hill of Zeus 85	1933.202 / deW 311/7	nr	II	RCh	None	None		?	:	np	

[a] The excavation notes provided enough information to determine whether this skeleton is an adult or a child (Ai or suba).

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Gymnasium 1	Gym.gr.1 (Wi 67)	1965-08	I	T	M	None	P	1	:	F?, Ai [d]	
Gymnasium 2	Gym.gr.2 (Wi 67)	1965-05	I	T	None	None	P	1	:	F, OA [e]	65-5, Adult (Sample 13)
Gymnasium 3	1965.13 / Gym.gr.3 (Wi 67)	1965-13	II	RCh	M	Cer	P	5	:	1 M, Ai; 1+ F, Ai; 2 ? Sex, Ai; 1 AO [d]	
Gymnasium 4	1965.12 / Gym.gr.4 (Wi 67)	1965-11	II	RCh	M	Cer, Co		5	:	2 M?, Ai; 1 F?, Ai; 2 ? Sex, Ai [d]	
Gymnasium 5	1965.14 / Gym.gr.5 (Wi 67)	1965-15	II	RCh	M	Cer, J	P	22	:	1+ M, Ai; 1+ F, Ai; 9 ? Sex, Ai; 1 AO; 1 C; 1 I; 8 suba [d]	65-15B (Sample 14), D (Sample 16), E (Sample 17), Adults; C, Adolescent (Sample 15)
Gymnasium 6	Gym.gr.6 (Wi 67)	1965-09	II	T	M	None	P	1	:	C [d]	
Gymnasium 7	Gym.gr.7 (Wi 67)	1965-16	II	Ci	M	None	S	1	:	? Sex, Ai [d]	
Gymnasium 8	1965.15 / Gym.gr.7a (Wi 67)	1965-16	II	A	M	None		1	:	suba (I-C) [d]	

[d] Wesolowsky (1971, 1973) identified in BL 1965-08: F, Ai; in BL 1965-13: 2 M, Ai; 2 F, Ai; 1 AO, 1 I; in BL 1965-11: 2 M, Ai; 1 F, Ai; 2 ? Sex, Ai; in BL 1965-15: 11 ? Sex, Ai; 10 suba; in BL 1965-09: C; and in BL 1965-16: 1 ? Sex, Ai; 1 C.

[e] Sex and age determination for this skeleton taken from Angel (quoted in Wiseman, 1969).

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Gymnasium 9	Gym.gr.8 (Wi 67)	np	I	A	n/a	None		1	:	suba [a]	
Gymnasium 10	Gym.gr.9 (Wi 67)	ne	I	T	None				:		
Gymnasium 11	Gym.gr.10 (Wi 67)	np	I	T	None[1]			?	:	np	
Gymnasium 12	Gym.gr.11 (Wi 67)	1965-03	I	T	None	None	P	1	:	F, OA [e1]	
Gymnasium 13	Gym.gr.12 (Wi 67)	1965-10	II	T	None	Co	P	1	:	M?, YA [d]	
Gymnasium 14	Gym.gr.13 (Wi 67)	ne	I	T	None				:		
Gymnasium 15	1965.10 / Gym.gr.14 (Wi 67)	np	I	T	None	None	P	1	:	np	
Gymnasium 16	Gym.gr.15 (Wi 67)	1965-12	I	T	None	Co	P	1	:	F?, Ai [d, e2]	
Gymnasium 17	1965.09 / Gym.gr.16 (Wi 67)	np	I	T	L	None	P	1	:	np	
Gymnasium 18	Gym.gr.17 (Wi 67)	1965-07	I	T	None	J	P	1	:	M [d], Ai	65-7, Adult (Sample 18)

[1] Presence of lamps could not be scored.

[a] The excavation notes provided enough information to determine whether this skeleton is an adult or a child (Ai or suba).

[d] Sex identification for BL 1965-07 taken from Wesolowsky (1971, 1973); Wesolowsky also identified in BL 1965-10: 1 M, YA; and in BL 1965-12: AO.

[e1] Sex and age determination for this skeleton taken from Angel (quoted in Wiseman, 1969).

[e2] Angel (quoted in Wiseman, 1969) identified this skeleton as AO.

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Gymnasium 19	Gym.gr.18 (Wi 67)	np	I	T	None	None		?	:	np	
Gymnasium 20	Gym.gr.19 (Wi 67)	ne	I	T	M				:		
Gymnasium 21	Gym.gr.20 (Wi 67)	1965-18	I	T	None	None	P	1	:	F? [d], Ai	
Gymnasium 22	Gym.gr.21 (Wi 67)	ne	I	T	None				:		
Gymnasium 23	Gym.gr.22 (Wi 67)	1965-17	I	T	None	None	P	1	:	M?, Ai [d]	
Gymnasium 24	Gym.gr.23 (Wi 67)	ne	I	T	None				:		
Gymnasium 25	Gym.gr.24 (Wi 67)	1965-14	I	T	L	None	P	1	:	C	
Gymnasium 26	Gym.gr.25 (Wi 67)	1965-04	I	T	L	None	P	1	:	F, AO [e]	
Gymnasium 27	Gym.gr.26 (Wi 67)	ne	I	T	None[1]				:		
Gymnasium 28	Gym.gr.27 (Wi 67)	np	I	T	None	Cer	None	0	:		
Gymnasium 29	Gym.gr.28 (Wi 67)	np	I	T	None	None		?	:	np	
Gymnasium 30	1966.07 / Gym.gr.29 (Wi 67)	1966-09	II	RCh	M	Cer, J	P + S	3	:	1 M?, Ai; 1 ? Sex, Ai; 1 I	66-9, Adult (Sample 19)

[1] Presence of lamps could not be scored.

[d] Sex identification for BL 1965-18 taken from Wesolowsky (1971, 1973); Wesolowsky also identified in BL 1965-17: M, Ai.

[e] Sex and age determination for this skeleton taken from Angel (quoted in Wiseman, 1969).

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Gymnasium 31	Gym.gr.30 (Wi 67)	ne	I	T	None[1]				:		
Gymnasium 32	1966.08 / Gym.gr.31	1966-10	II	RCh	M	Cer	?	4	:	3 ? Sex, Ai; 1 C	
Gymnasium 33	Gym.gr.32 (Wi 67)	ne	I	T	None[1]				:		
Gymnasium 34	Gym.gr.33 (Wi 67)	1966-07	I	T	None	I	P	1	:	F?, Ai	
Gymnasium 35	1966.02 / Gym.gr.34 (Wi 67)	1966-02	I	T	None	J, Co, I	P	1	:	? Sex, Ai	
Gymnasium 36	Gym.gr.35 (Wi 67)	np	I	T	None	None		1	:	suba [a]	
Gymnasium 37	Gym.gr.36 (Wi 67)	np	I	A	M	None		1	:	suba [a]	
Gymnasium 38	Gym.gr.37 (Wi 67)	1966-08	I	T	M	None	P	2	:	suba (I-C)	
Gymnasium 39	Gym.gr.38 (Wi 67)	ne	I	T	None[1]				:		
Gymnasium 40	1966.01 / Gym.gr.39 (Wi 67)	1966-02	I	T	None	Co, J	P	1	:	? Sex, Ai	
Gymnasium 41	1967.09 / Gym.gr.78 (Wi 69)	1967-09	II	RCh	M, L	Cer, J, Co	P	2	:	1 ? Sex, Ai; 1 C	

[1] Presence of lamps could not be scored.

[a] The excavation notes provided enough information to determine whether these skeletons are adults or children (Ai or suba).

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Gymnasium 42	Gym.gr.80 (Wi 69)	1967-29	II	RCh	M	Cer	P	1	:	? Sex, Ai	67-29, Adult (Sample 28)
Gymnasium 43	1967.07 / Gym.gr.81 (Wi 69)	1967-28	II	RCh	M	Cer, B	P	4	:	1 M, Ai; 2 ? Sex, Ai; 1 suba	
Gymnasium 44	1967.11 / Gym.gr.82 (Wi 69)	1967-53	II	RCh	M, L	Cer, J	S	7	:	5 ? Sex, Ai; 1 C; 1 suba (I-C)	
Gymnasium 45	1967.13 / Gym.gr.86 (Wi 69)	1967-10, 30, 42	II	Ci	None	J, B, Co	P	6	:	2 F, Ai; 1 F?, Ai; 1 M, Ai; 1 C; 1 I [d, e1]	67-10D, Adult (Sample 27)
Gymnasium 46	Gym.gr.90 (Wi 69)	nr	I						:		
Gymnasium 47	Gym.gr.91 (Wi 69)	nr	I	T					:		
Gymnasium 48	Gym.gr.92 (Wi 69)	nr	I	T					:		
Gymnasium 49	1970.11 / Gym.gr.102	1970-18, 25	I	Ci		None	P	1	:	np	
Lerna Cemetery 1	Gym.gr.48 (Wi 67)	ne	II	Ci	None				:		
Lerna Cemetery 2	1966.03 / Gym.gr.49 (Wi 67)	1966-15, 17	II	Ci	M	None	P	3	:	1 M?, Ai; 1 F?, Ai; 1 AO [e2]	

[d] Wesolowsky (1971, 1973) identified in this mortuary context: 3 adults over 30, 2 F, 1F?, 1 M, 1 C, 1 I.
[e1] Angel (quoted in Wiseman, 1969) identified in BL 1967-10, 30, 42: 1 F, YA; 2 M, MA; 1 F, MA; 1 C.
[e2] Angel (quoted in Wiseman, 1969) identified in BL 1966-15: 1 M, YA; 1 F YA. He did not examine BL 1966-17.

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Lerna Cemetery 3	Gym.gr.50 (Wi 67)	1967-02, 03, 04	II	RCh	?	?	P	3	:	2 ? Sex, Ai; 1 ? Sex, MA	
Lerna Cemetery 4	Gym.gr.52 (Wi 67)	1967-05, 06	II	RCh	dist	dist	P	?	:	1 C but dist	
Lerna Cemetery 5	1966.05 / Gym.gr.53 (Wi 67)	1966-04, 05	II	Ci	None	Cer, J, OV	S	11	:	1 F, MA; 1 M, Ai; 6 ? Sex, Ai; 2 AO; 1 C [e]	66-5E (Sample 20), I (Sample 22), K (Sample 23), L (Sample 24), Adults; G (Sample 21), M (Sample 25), Adolescents
Lerna Cemetery 6	Gym.gr.54 (Wi 67)	dist	II	Ci	dist	dist		?	:	dist	
Lerna Cemetery 7	Gym.gr.55 (Wi 67)	1966-14	II	Ci	None	Co, I	P	1	:	? Sex, Ai	
Lerna Cemetery 8	Gym.gr.57 (Wi 67)	ne	II	Ci	None				:		
Lerna Cemetery 9	Gym.gr.58 (Wi 67)	1966-03	II	Ci	None	None	P	4	:	1 ? Sex, M-OA; 2 ? Sex, Ai; 1 C [d, e1]	
Lerna Cemetery 10	1966.06 / Gym.gr.59 (Wi 67)	1966-16	II	Ci	None	Cer		4	:	1 F, Ai; 1 M?, Ai; 1 C; 1 I	

[d] Wesolowsky (1971, 1973) also identified 4 skeletons in this mortuary context: 1 M, rest not identified to sex or age.
[e] Angel (quoted in Wiseman, 1969) identified in BL 1966-04 and -05: 3 F, YA; 2F, MA; 2 M, MA; 1 M, OA; 1 M, OA?; 1 M?, Ai; 1 AO
[e1] Angel (quoted in Wiseman, 1969) identified 6 skeletons in this mortuary context: 1 M, MA; 1 F?, YA; 2 M, Ai; 1 F, Ai; 1 AO.

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Lerna Cemetery 11	Gym.gr.61 (Wi 67)	np	II	A	None	None		?	:	np	
Lerna Cemetery 12	Gym.gr.68 (Wi 69)	ne	II	RCh	None				:		
Lerna Cemetery 13	Gym.gr.83 (Wi 69)	1967-19, 32	II	Ci	None	None	P	3	:	1 M?, Ai; 2 ? Sex, Ai	67-19, Adult (Sample 35)
Bedrock Cutting 1	1967.10a / Gym.gr.69A (Wi 69)	1967-45	II	RCh	None	Cer, Co, F	S	5	:	2 ? Sex, Ai; 2 C; 1 I	67-45A, Child (Sample 30); D, Adult (Sample 31)
Bedrock Cutting 2	1967.10b / Gym.gr.69B (Wi 69)	np	II	RCh	None	None		?	:	np	
Bedrock Cutting 3	1967.10c / Gym.gr.69C (Wi 69)	1967-44	II	RCh	None	None	S	4	:	1 M?, Ai; 3 C	67-44, Child (Sample 29)
Bedrock Cutting 4	1967.04 / Gym.gr.70 (Wi 69)	1967-34, 40	II	RCh	M, L	None	P	2	:	1 F?, Ai; 1 I	67-40, Adult (Sample 32)
Bedrock Cutting 5	Gym.gr.71 (Wi 69)	np	II	T	M	None		?	:	np	
Bedrock Cutting 6	1967.06 / Gym.gr.72 (Wi 69)	1967-51	II	RCh	M, L	None	n/a	3	:	1 ? Sex, Ai; 1 C; 1 I [e]	
Bedrock Cutting 7	1967.03 / Gym.gr.73 (Wi 69)	1967-07, 08, 52	II	RCh	M, L	None	P	4	:	2 F?, Ai; 1 M?, Ai; 1 suba [e]	67-52, Adult (Sample 26)

[e] Angel (quoted in Wiseman, 1969) identified in BL 1967-51: 1 F?, YA, 1 C, 1 I; and in BL 1967-07, -08, -52: 1M, OA, 1 F, OA, 1 M, OA.

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Bedrock Cutting 8	Gym.gr.74 (Wi 69)	nc	II	T	None	None		?	:	np	
Bedrock Cutting 9	Gym.gr.75 (Wi 69)	1967-50	II	RCh	M, L	None	P	5	:	5 ? Sex, Ai	
Bedrock Cutting 10	1967.05 / Gym.gr.76	1967-46	II	RCh	M	None	P	1	:	F?, Ai	
Bedrock Cutting 11	1967.12 / Gym.gr.77 (Wi 69)	1967-23, 48, 49	II	RCh	M, L	Cer, J, Co	P	6	:	5 ? Sex, Ai; 1 C	67-23, Adult (Sample 33); 67-48, Adult (Sample 34)
Bedrock Cutting 12	Gym.gr.79 (Wi 69)	1967-17, 41	II	RCh	M, L	Cer		2	:	2 ? Sex, Ai	
Bedrock Cutting 13	1967.08 / Gym.gr.84 (Wi 69)	1967-47	II	RCh	M	Cer, B	S	5	:	3 ? Sex, Ai; 1 AO; 1 C	67-47A, Child (Sample 36); B, Adult (Sample 37)
Bedrock Cutting 14	1969.45 / Gym.gr.85 (Wi 69)	1969-82	II	RCh	M	Cer	P	4	:	2 ? Sex, MA?; 1 ? Sex, YA?; 1 ? Sex, Ai [d]	
Bedrock Cutting 15	Gym.gr.89 (Wi 69)	1967-38	II	Ci	M, but dist	n/a	n/a	1	:	C	67-38, Child (Sample 38)
Bedrock Cutting 16	1969.46 / Gym.gr.94 (Wi 72)	np	II	RCh	M, L	J	P	2	:	? Sex, Ai [a]	

[a] The excavation notes provided enough information to determine whether these skeletons are adults or children (Ai or suba).
[d] Wesolowsky (1971, 1973) identified in BL 1969-82: 2 M, Ai, 1 F, Ai, 1 ? Sex, Ai.

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Bedrock Cutting 17	1969.54 / Gym.gr.95 (Wi 72)	np	II	RCh	M, L	Cer	P	1	:	? Sex, Ai [a]	
Bedrock Cutting 18	1969.49,50 / Gym.gr.96 (Wi 72)	1969-80, 83	II	RCh	M, L	Cer	P	5	:	1 M?, YA-MA; 1 ? Sex, MA; 1 ? Sex, Ai; 1 AO; 1 I [d]	69-80B, Adult (Sample 43)
Bedrock Cutting 19	1969.53 / Gym.gr.97 (Wi 72)	1969-79	II	RCh	M, L	Cer, Co	P	9	:	1 M, MA; 1 F, YA; 1 M, M-OA; 1 F, Ai; 2 ? Sex, Ai; 2 C; 1 I [d]	69-79A (Sample 44), B (Sample 45), E (Sample 46), Adults
Bedrock Cutting 20	1969.52 / Gym.gr.98 (Wi 72)	empty	II	RCh	M, L	None	None	0	:	None	
Bedrock Cutting 21	1969.48 / Gym.gr.99 (Wi 72)	ne	II	RCh	M				:		
Bedrock Cutting 22	1969.47 / Gym.gr.100 (Wi 72)	ne	II	RCh	M				:		
Bedrock Cutting 23	1969.51 / Gym.gr.101 (Wi 72)	1969-81	II	RCh	None	Cer	P	5	:	3 ? Sex, Ai; 2 suba (1 AO?, 1 I?)	
L-Shaped Cutting 1	Gym.gr.40 (Wi 67)	dist	II	Ci	dist	dist		?	:	dist	

[a] The excavation notes provided enough information to determine whether this skeleton is an adult or a child (Ai or suba).

[d] Wesolowsky (1971, 1973) identified in BL 1969-80, -83: 1 F, Ai, 1 M, Ai, 1 ? Sex, Ai, 1 C, 1 I; and in BL 1969-79: 3 M, Ai, 3 F, Ai, 2 I.

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
L-Shaped Cutting 2	Gym.gr.41 (Wi 67)	dist	II	Ci	dist	dist	P	?	:	dist	
L-Shaped Cutting 3	1966.09 / Gym.gr.42 (Wi 67)	dist	II	Ci	dist	dist	P	?	:	dist	
L-Shaped Cutting 4	Gym.gr.43 (Wi 67)	np	II	RCh	dist	dist		?	:	dist	
L-Shaped Cutting 5	Gym.gr.44 (Wi 67)	np	II	Ci	dist	dist		?	:	dist	
L-Shaped Cutting 6	Gym.gr.45 (Wi 67)	1967-26	II	RCh	M, but dist	dist	dist	4	:	2 ? Sex, Ai; 1 AO; 1 C	
L-Shaped Cutting 7	Gym.gr.46 (Wi 67)	ne	I	T	None[1]				:		
L-Shaped Cutting 8	1966.10 / Gym.gr.47 (Wi 67)	1966-06	I	RCh	None	J		2	:	1 ? Sex, Ai; 1 C	
L-Shaped Cutting 9	Gym.gr.62 (Wi 69)	dist	I	T	dist	dist	dist	?	:	dist	
L-Shaped Cutting 10	Gym.gr.63 (Wi 69)	1967-25	I	Ci	?	?	P	2	:	2 ? Sex, Ai	
L-Shaped Cutting 11	Gym.gr.64 (Wi 69)	dist	I	Ci	dist	dist	dist	?	:	dist	
L-Shaped Cutting 12	Gym.gr.65 (Wi 69)	np	I	T	None	None	P	1	:	suba [a]	
L-Shaped Cutting 13	Gym.gr.66 (Wi 69)	np	I	T	None	None	P	1	:	suba [a]	

[1] Presence of lamps could not be scored.

[a] The excavation notes provided enough information to determine whether these skeletons are adults or children (Ai or suba).

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
L-Shaped Cutting 14	Gym.gr.67 (Wi 69)	1967-24	II	RCh	M, but dist	?		?	:	1 ? Sex, Ai but dist	
L-Shaped Cutting 15	Gym.gr.87 (Wi 69)	ne	II						:		
L-Shaped Cutting 16	Gym.gr.88 (Wi 69)	ne	II						:		
Fountain of the Lamps 1	1971.24 / Gym.gr.103	1971-27	II	RA		None	P	1	:	F?, Ai	
Fountain of the Lamps 2	1971.25 / Gym.gr.104	1971-30	II			None	P	1	:	suba (AO?)	

Graves in the Ancient City Center

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Hemicycle 1	n/a	np	II	None		J, Co	P	2	:	1 ? Sex, Ai [a]; rest np	
Hemicycle 2	1925.03/04	np	III	BCi		J, B	P	1	:	AO [c]	
Hemicycle 3	1925.08	np	III	BCi		None	P	2	:	suba [a]	
Hemicycle 4	1925.09	np	III	BCi		J, B		2+	:	np	
Hemicycle 5	1926.22	np	III	BCi		J, B	P	2	:	suba [a]	
N of Temple 1	1929.07	nr	II	RA or BV		None			:		
Temple Hill 1	1970.01	1970-04	I	T		None	P	1	:	M?, OA [f]	70-04, Adult (Sample 47)
Temple Hill 2	1970.08	1970-06	II	T		None	P	1	:	C [f]	
Temple Hill 3	1971.19 and 1971.20	1971-14, 16	III	BCi		None	P	6	:	1 M, YA; 1 M, MA; 1 M?, MA; 1 ? Sex, YA; 1 ? Sex, Ai; 1 AO-YA [f]	71-16A (Sample 48), B (Sample 49), C (Sample 50), D (Sample 51), Adults
Temple Hill 4	1971.21	1971-17	II	T		None	P	2	:	1 M?, YA; 1 C [f]	71-17A, Adult (Sample 52)

[a] The excavation notes provided enough information to determine whether these skeletons are adults or children (Ai or suba).

[c] More precise age class estimate than suba possible from the excavation notes due to the presence of detailed field drawing of grave in field notes.

[f] Age determination for the skeleton in BL 1970-06 taken from Burns (1982); Burns also identified in BL 1970-04: M, OA; in BL 1971-14 and -16: 1 M, YA; 2 M, MA; 1 M?, AO; in BL 1971-17: 1 F, OA; 1 C

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Temple Hill 5	1971.22	1971-18	III	BCi		J	P + S	52	:	28 adults (of which: 1 F?, OA; 1 F?, MA; 1 M?, MA; 1 F?, YA; 1 ? Sex, MA; 1 M, Ai), 10 AO-YA in age range, and 14 other subadults (of which: 6 AO; 4 C; 4 I) [f]	71-18A, Adolescent, (Sample 53); C (Sample 54), D (Sample 55), E (Sample 56), Adults; F, Child (Sample 57)
Temple Hill 6	1972.19	1972-18	III	BCi		None	?	8	:	6+ adults (of which: 1 M, YA; 1 ? Sex, YA); 1 C; 1 I [f]	
Temple Hill 7	1972.20 bottom layer	1972-19a	III	BV		J, B, W	P	9	:	3 adults (1 M?, YA; 1 F?, YA; 1 F?, MA); 1 AO; 3 C; 2 I [f]	72-19N (Sample 65), O (Sample 66), Children; Q (Sample 68), S (Sample 70), Adults; R, Adolescent (Sample 69)

[f] Burns (1982) identified in BL 1971-18: 37-40 adults or older adolescents (including 1 F, MA; 1 F, OA; 2 YA) and 6+ subadults (1 C, 5 AO); and in BL 1972-18: 6+ adults (of which, 1 M, YA and 1 ? Sex, YA), 1 C, 1 I. For BL 1972-19, Burns separated skeletons into two layers of burial activity, and identified in the lower section: 3 adults, 2 C, and 1 I.

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Temple Hill 7	middle layer	1972-19b	8th c +			J, B, W	S	32	:	30 older children to adults (of which: 1 ? Sex, MA-OA; 3 ? Sex, MA; 3 ? Sex, YA; 3 AO); + 1 C; 1 I [f]	72-19K (Sample 63), M (Sample 64), P (Sample 67), Adults; V, Adolescent (Sample 71)
	top layer	1972-19c	Byz			J	P	14	:	5 AO + (of which: 2 M?, YA; 2 ? Sex, MA-OA; 2 AO); 2 C; 4 I [f]	72-19C (Sample 58), I (Sample 62), Adults; D (Sample 59), E (Sample 60), Adolescents; G, Child (Sample 61)
Temple Hill 8	1972.70	1972-86	III	BCi		Cer, J, B	?	33	:	28 adults (of which, 2 M, YA; 2 M, MA; 1 F?, Ai; 1 F, YA); + 5 older children [f]	
Peirene 1	1898.01a	np	II	BV		None	P	8	:	np	
Peirene 2	1898.01b	np	III	BV			P	1+	:	np	
Peirene 3	1898.01c	np	III	BV			P	1+	:	np	
Peirene 4	1898.01d	np	III	BV			P	1+	:	np	

[f] Burns (1982) separated skeletons from BL 1972-19 into two layers of burial activity, combining the middle and upper layers that I identified into one section. In this upper section, Burns identified: 34 adults, 3 Ai, 8 C, 7 I. All osteological data for BL 1972-86 from Burns' analyses due to preservation.

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Peirene 5	1909.05	nr	II	BCi					:	np	
Peirene 6	1911.03	nr	III	BCi					:		
Peirene 7	1911.04	nr	III	BCi					:		
Peirene 8	1926.23	np	III	BV		J	P	1+	:	np	
Captives' Façade 1	1930.02	np	III	RA		Cer, Co	?	6+	:	np	
Captives' Façade 2	1930.03	nr	III	RA		Cer, Co			:		
Captives' Façade 3	1968.02	np	II	BCi		J	P	1	:	suba [a]	
NW Shops 1	1901.02	np	II	BCi	M?	None	P	1	:	? Sex, Ai [a]	
NW Shops 2	1901.03a	np	NPD	T		None	P	1	:	np	
NW Shops 3	1901.03b	np	NPD	T		None	P	1	:	np	
NW Shops 4	1901.04	np	II	BCi	M?	None	P	1	:	np	
NW Shops 5	1907.14	nr	II	BCi	M, but dist				:		
NW Shops 6	1963.12	np	II	A		None	P	1	:	suba [a]	
Forum NE 1	1937.24	np	II	BCi		None	P	2	:	2 suba [a]	
Forum NE 2	1937.32	A 131	III	BCi		None	P	2	:	2 C [b]	
Forum NE 3	not assigned	A 111	II	?				1	:	F, MA [b]	A 111, Adult (Sample 9)
S Basilica 1	1934.005	nc	III	BCi?	M, but dist	Cer	?	5	:	np	
S Basilica 2	1934.006	nc	III	BCi?		J	?	2+	:	np	
Central Shops E 1	1934.003a	nr	II	Ci					:		

[a] The excavation notes provided enough information to determine whether these skeletons are adults or children (Ai or suba).
[b] Angel (1942) identified in A 131: 2 C; and in A 111: M, YA.

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Central Shops E 2	1934.003b	nr	II	Ci					:		
Bema Church 1	1936.012 / Ivison 1993: GR.36.07.20	nc	III	BV		J, Co, W, I [1]	P + S	5	:	np	
Bema Church 2	1936.015 / Ivison 1993: GR.36.07.31	A 185, 186, 187	III	BV		Cer, J, Co, F [1]	P	16	:	1 M, YA; 1 F, YA; 1 F, MA; rest np [b]	
Julian Basilica 1	1914.03	dist	III	BCi		Cer			:	np	
Julian Basilica 2	1915.04	np	III	BCi		None	?	1	:	suba [a]	
Julian Basilica 3	1915.05	dist	III	BCi				0	:	none	
Julian Basilica 4	1915.07	np	II	BV		None	P	12	:	np	
Julian Basilica 5	1915.10	np	II	BV		None	P	13+	:	np	
Julian Basilica 6	1915.11	dist	II	BV			?	1	:	np	
Forum SE 1	1915.03	np	III	Ci		Cer	P	5	:	2-5 ? Sex, Ai [a]	
Forum SE 2	1915.12	nr	III	BV					:		
Forum SE 3	1933.133	1933-02	II	A	L, but dist	Cer, F	?		:	"bones of a chicken and the shell of an egg" [g]	
Forum SE 4	1934.001	np	III	BV		None	?	3+	:	np	
S Stoa 1	1934.009	np	II	Ci		None	P	1	:	suba [a]	
S Stoa 2	1937.26	A 119	III	T		None	P	1	:	suba [a, b]	

[1] Some artifacts in grave possibly related to reuse, not to original burials (Ivison, 1993: 74-5, 78-80).

[a] The excavation notes provided enough information to determine whether these skeletons are adults or children (Ai or suba).

[b] Osteological data for A 185, 186, and 187 is from Angel (1942). Angel also identified for A 119: F, no age identification; and for A 117: M, 30.

[g] Identification from Broneer (1933: 569); these remains were not examined for this research.

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
S Stoa 3	1937.27	A 117, dist?	III	P			?	1	:	M, YA [b]	
S Stoa 4	1938.16	np	II	BV		J	P	6	:	np	
S Stoa 5	1948.01	dist	II	RCh		None		1	:	np	
S Stoa W 1	1896-04	np	III	BCi?					:		
S Stoa W 2	1904.01	np	II	BCi		None	P	2+	:	np	
S Stoa W 3	1904.02	np	III	BCi		None	P	1	:	np	
S Stoa W 4	1933.203 / 1937.20 / 1938.04	np	III	BCi		B	P	1	:	? Sex, Ai [a]	
S Stoa W 5	1936.006	np	II	RCh		Cer, I	P	1+	:	np	
S Stoa W 6	1937.05	dist	III	BCi		B	?	2+	:	np	
S Stoa W 7	1937.08	ne?	III	RA			P	3+	:	np	
S Stoa W 8	1937.09, 15-19	A 113, 123-6	III	RA		Cer, J, Co, B, W, I	P + S	8	:	3 F?, YA; 1 ? Sex, MA; 1 ? Sex, Ai; rest np [b]	A 113 (Sample 6), A 123 (Sample 7), Adults
S Stoa W 9	1937.11	np, dist?	III	BCi		None	?		:	np	
S Stoa W 10	1937.12	A 129, 130	III	P		None	P	2	:	2 C [b]	
S Stoa W 11	1937.13	np	II	BCi		None	P	4	:	2 C [c]; rest np	

[a] The excavation notes provided enough information to determine whether these skeletons are adults or children (Ai or suba).

[b] Angel (1942) identified in A 113: F?, YA; in A 123: F?, YA; in A 124: ? Sex, MA; in A 125: F?, MA; in A 126: ? Sex, Ai; in A 129: C; in A 130: C.

[c] The excavation notes described dental development for two of these skeletons in enough detail to determine age class (NB 170: 173).

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
S Stoa W 12	1937.21	"box 21d-g"	II	RA		F	P	15	:	6 C, 7-8 I	
S Stoa W 13	1937.25	A 115, 118, 120-2	II	BCi		Cer, J, B	P	15	:	A 115: 1 F?, MA-OA; A 118: 1 M?, YA [b]; A 120: 1 F?, MA; A 121: 1 M?, MA; A 122: 1 M?, Ai; rest np [b]	A 121, Adult (Sample 8)
S Stoa W 14	1938.02	dist	II	BCi?				3	:	? Sex, Ai [a]	
S Stoa W 15	1938.03	dist	II	Ci?				1	:	? Sex, Ai [a]	
S Stoa W 16	1938.07	np	III	BCi		Cer	P	1	:	? Sex, Ai [a]	
S Stoa W 17	1938.10	1938-01, A 149	III	BCi		Cer, J, B, W, I	P	1	:	? Sex (M?), YA-MA [b, f]	A 149, Adult (Sample 10)
S Stoa W 18	1938.12	np	III	A		None	P	2	:	suba [a]	
S Stoa W 19	1938.15	A 127, 128	III	BCi		J	P	8	:	1 C; 3 I; rest np [b]	
S Stoa W 20	1938.17 / 1946.02	A 136-148, but dist	II	BCi	L, but dist	J	P	13	:	3 M, YA; 3 M, MA; 2 M, OA; 3 F, YA; 1 F?, MA; 1 AO [b]	
S Stoa W 21	1938.31	nr	III	BV		None	?	2+	:	np	

[a] The excavation notes provided enough information to determine whether these skeletons are adults or children (Ai or suba).

[b] Sex and age identification for A 118 from Angel (1942). Angel also identified, A 115: M, OA; A 120: M, MA; A 121: M, MA; A 122: M, MA; A 149: A, YA (see also Weinberg 1974 for this individual); A 127: C; A 127a: I; A 128: I; A 136: M, YA; A 137: M, MA; A 138: M, OA; A 139: F, YA; A 140: M, YA; A 141: F, YA; A 142: F, YA; A 143: M, AO; A 144: M, MA?; A 145: F?, MA; A 146: M, MA; A 147: M, YA; and A 148: M, OA?.

[f] Burns (1982) identified this skeleton as a M, Ai.

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
S Stoa W 22	1946.01	np	II	BCi		None		2?	:	np	
S Stoa W 23	1946.03	np	III	BCi		None		1	:	suba [a]	
S Stoa W 24	1950.04	np	III	Ci		I, F	P + S	3	:	? Sex, Ai [a]	
S Stoa W 25	1950.07	np	II	Ci		None		1	:	suba [a]	
S Stoa W 26	1953.01	?	II	T		None	P	2	:	suba [a]	
S Stoa W 27	1953.02	?	II	A		None	P	1	:	suba [a]	
S Stoa W 28	1953.03	1953-01	II	BCi		J	P	2	:	1 C; 1 I [f]	
S Stoa W 29	1972.10	1972-09, dist	NPD	Ci			?	3	:	1 F, YA; 2 I [f]	
Forum SW 1	1959.04	np	II	A		None		1	:	1 suba [a]	
Forum SW 2	1959.05	1959-07	II	BCi		None	P	4	:	1 F, Ai; 1 F?, Ai; 1 C; 1 I [f]	
Forum SW 3	1960.12	?	II	BCi		None	P	2	:	2 M, YA [h]	
Forum SW 4	1960.13	np	III	T		None	P	1	:	I [i]	
Forum SW 5	1960.14	1960-01	III	BCi		None	P	1	:	F, OA [j]	
Forum SW 6	1974.01	1974-01	III	P		None	P	1	:	I [f]	
Forum SW 7	1974.04	1974-04	III	BV		None	P	1	:	I [f]	
Forum SW 8	1974.05	1974-05 to 07	II	BV		Cer	P	3	:	1 ? Sex, Ai; 1 suba; rest np [f]	

[a] The excavation notes provided enough information to determine whether these skeletons are adults or children (Ai or suba).

[f] Osteological data for BL 1959-07 is from Burns (1982). Burns also identified in BL 1953-01: 2 C; in BL 1972-09: F, YA; 2 I; in BL 1974-01: I; in BL 1974-04: I; and in BL 1974-05 to -07: 1 M and 1 F, one of which likely YA in age at death, + 1 I..

[h] Osteological data for these skeletons from Gejvall and Henschen (1968) and Gejvall (quoted in Robinson, 1962: 110).

[i] Osteological data for these skeletons from Gejvall (quoted in NB 219: 52).

[j] Osteological data for this skeleton from Gejvall (quoted in Robinson, 1962: 112).

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Forum SW 9	1974.06	1974-08 to 12	II	BV		Cer	P	6	:	1 F? MA; 1 ? Sex, Ai [f1]; 1 F, YA [f2]; 1 AO [f2]; 2 C [f2]; 1 I	
Forum SW 10	1975.01	1975-01	II	BCi		None	P	4	:	2 ? Sex, Ai; 1 ? Sex, MA+ [f3]; 1 C [f]	
Forum SW 11	1975.02	1975-02	II	P		None	?	1	:	C [f]	
Forum SW 12	1975.04	1975-07	II	BV		None		1	:	I [f]	
Forum SW 13	1977.01	1977-01	III	T		None	P	1	:	1 suba [a]	
Temple D 1	1907.15	nr	II	BCi					:		
Temple D 2	1908.08	np	II	BCi		Cer	P	2+	:	np	
Temple F 1	1973.03	1973-10 to -19	II	BV		Cer	P	11	:	3 F, YA; 1 F, OA; 1 M, YA; 1 M, MA; 1 M, OA; 1 AO; 2 C; 1 I [f]	
Temple G 1	1969.30	1969-19	III	BCi		None	P	1	:	F?, YA [f]	69-19, Adult (Sample 41)
Temple G 2	1969.36	?	III	BCi		B	P	1	:	M, MA [f]	

[a] The excavation notes provided enough information to determine whether this skeleton is an adult or a child (Ai or suba).

[f] Osteological data for Grave 1973.03 and 1969.36 provided by Burns (quoted in Williams et al., 1974: 10). Burns (1982) also identified in BL 1975-01: 3 Ai, 1 C; in BL 1975-02: 1 C; in BL 1975-07: 1 I; and in BL 1969-19: 1 F, YA.

[f1] Burns (1982) considers it likely that this individual is male

[f2] Osteological data for these skeletons from BL 1974-07 provided by Burns (1982).

[f3] Burns (1982) identified age at death for one adult skeleton from BL 1975-01 as being at least 35.

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Temple G 3	1969.37	1969-21	III	BCi		None		1	:	C [f]	69-21, Child (Sample 42)
Temple H 1	1935.010	np	III	BV		None	?	3+	:	1 ? Sex, YA; rest np [c]	
W Shops 1	1908.02	np	II	?				1	:	suba [a]	
W Shops 2	1934.008	np	II	BCi		Cer, J	P	6	:	2 ? Sex, Ai; 1 suba; rest np [j]	
W Shops 3	1934.014	np	III	BCi		Cer, J, B, W	P	12	:	1 ? Sex, YA; 2 ? Sex, MA; 3 ? Sex, Ai; rest np [j1]	
W Shops 4	1934.015	dist	III	BCi	M, but dist	B	?	1+	:	np	
W Shops 5	1934.016	np	III	Ci	E-W	J		2	:	suba [a]	
W Shops 6	1934.017	np	II	BCi	E-W	None	P	1	:	suba [j2]	
W Shops 7	1934.020	np	II	T	E-W	None	P	1	:	suba [j2]	
W Shops 8	1934.021	np	II	Ci	E-W	None		1	:	np	
W Shops 9	1940.03		II	Ci		None		1	:	np	
W Shops 10	1965.18	np	II	A	E-W	None		1	:	suba [a]	

[a] The excavation notes provided enough information to determine whether these skeletons are adults or children (Ai or suba).

[c] The excavation notes described suture closure and dental development of one of these skeletons in enough detail to determine age class (NB 150: 196).

[f] Burns (1982; quoted in Williams et al., 1974: 3) also identified this skeleton to be a child.

[j1] Davidson (NB 144) provided osteological descriptions in the excavation notes such that individual skeletons in this grave context could be identified to be skeletally mature.

[j2] Davidson (NB 143) provided osteological descriptions in the excavation notes such that individual skeletons in these grave contexts could be identified to age class.

Graves on the City Outskirts

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Panayia 1	1998.29	1998-29	II	BCi		Cer, Co	P	1	:	C	
Panayia 2	1998.32	1998-32	II	T		None	P	1	:	M, YA	
Panayia 3	1998.33	1998-33	I	T		None	P	1	:	C	
Panayia 4	1998.34	1998-34	III	BCi	M?	Cer, OV	P	1	:	I	
Panayia 5	1999.04	1999-04	II	P		None	S	3	:	np	
Panayia 6	1999.05	1999-05	II	A		None	P	1	:	np	
Panayia 7	1999.06	1999-06	II	A		None	P	1	:	np	
East Wall 1	1930.10	nc	I	T		None		0	:	np	
East Wall 2	1930.13	nc	I	T		None	P	1	:	np	
East Wall 3	1930.14	nc	I	T		None		1	:	np	
East Wall 4	1930.15	nc	I	T		None		0	:	np	
East Wall 5	1930.18	nc	I	T		None	P	1	:	np	
East Wall 6	1930.19	nc	I	T		None		1	:	suba [a]	
East Wall 7	1930.21	nc	I	T		None	P	1	:	np	
East Wall 8	1930.22	nc	I	T		None		1	:	np	
East Wall 9	1930.23	nc	I	T		None	P	1	:	np	
East Wall 10	1930.24	nc	I	T		None	P	1	:	np	
East Wall 11	1930.25	nc	I	BCi		I	P	1	:	suba [a]	
East Wall 12	1930.26	nc	I	T		None	P	1	:	np	
East Wall 13	1930.28	nc	I	T		None	P	1	:	np	

[a] The excavation notes provided enough information to determine whether these skeletons are adults or children (Ai or suba).

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
East Wall 14	1930.29	nc	II	Ci		None	P	1	:	np	
East Wall 15	1930.30	nc	I	A		None		1	:	1 suba [a]	
Kraneion Basilica 1	1928.08	dist	II	BV		B, OV[2]	dist	1+	:	np	
Kraneion Basilica 2	1928.09 (1928.03)	nc	III	BCi		Cer, J, B[2]		1+	:	np	
Kraneion Basilica 3	1928.10	dist	II	BV		Cer, Co[2]		12	:	np	
Kraneion Basilica 4	1928.11	dist	II	BV		None[2]		0	:		
Kraneion Basilica 5	1928.12	nr	III	BCi		Cer[2]			:		
Kraneion Basilica 6	Not assigned	A 95, dist	II	BCi					:	1 M?, YA? [b]; rest dist or np	
Kraneion Basilica 7	1934.018	nc	II	Ci	L, but dist	J, B[2]	P	2	:	np	
Kraneion Basilica 8	1934.019	nc	II	BV				3	:	np	
N of Village 1	1961.27 suggested[1]	nc	I	T		None	P	1	:	np	
N of Village 2	1961.29 suggested[1]	nr	I	A		None			:		
N of Village 3	1961.30 suggested[1]	ne	I	T					:		
N of Village 4	1961.31 suggested[1]	1961-22?	I	T		None			:	?	

[1] Grave numbers for these contexts have been suggested based on the Corinth numbering system.
[2] Graves in the Kraneion Basilica were likely disturbed or reused, and all original objects placed in graves may not be preserved (Shelley, 1943).
[a] The excavation notes provided enough information to determine whether these skeletons are adults or children (Ai or suba).
[b] Angel (1942) identified this skeleton to be M, YA.

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
N of Village 5	1961.32 suggested[1]		I	A					:		
N of Village 6	1961.34 suggested[1]	1961-22?	I	BCi		Cer, Co			:	?	
Roman Bath 1	1967.02	1967-15	II	T		J, I	P	2	:	?	
Roman Bath 2	not assigned	1968-29	II	T		None	P	3	:	3 I [f]	
Temple C 1	1908.01	nc	II	BCi		Cer		1	:	np	
Temple C 2	1908.03	nr	II	BV					:		
Temple C 3	1908.05a	nr	II						:		
Temple C 4	1908.05b	nr	II						:		
Temple C 5	1908.06a	nr	III	BCi?					:		
Temple C 6	1908.06b	nr	III	BCi?					:		
Temple C 7	1908.06c	nr	III	BCi?					:		
Odeion 1	1909.02	nc	NPD	T	M, but dist	J	P	2	:	suba [a]	
Odeion 2	1909.03	nc	NPD	T		None	P	1	:	? Sex, Ai [a]	
Odeion 3	1909.06	nc	NPD	T	L, but dist	J	P	2	:	suba [a]	
Theater 1	1929.60	nc	III	BCi		J, Co	P	1	:	suba [a]	
Theater 2	1929.61	nc	II	BCi		None	P	2	:	np	
Quarry 1	1928.04	nc	III	BCi		Cer, J, B		4	:	np	
Quarry 2	1928.05a	nr	II	T					:		

[1] Grave number for this context has been suggested based on the Corinth numbering system.
[a] The excavation notes provided enough information to determine whether these skeletons are adults or children (Ai or suba).
[f] Burns (1982) identified in BL 1968-29: 3 I.

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Quarry 3	1928.05b	nr	II	T					:		
Quarry 4	1928.05c	nr	II	T					:		
Quarry 5	1928.05d	nr	II	T					:		
Quarry 6	1928.05e	nr	II	T					:		
Quarry 7	1928.07	nc	II	BCi		None		1	:	suba [a]	
Ravine 1	1960.02	nc	II	P		Cer	P	2	:	1 ? Sex, Ai; 1 AO [i]	
Ravine 2	1960.03	nc	II	P	M, but dist	None	P	3	:	1 M, YA; 1 AO, 1 I [i]	
Ravine 3	1960.04?	nc	II	P		None	P	3	:	1 F, YA; 1 F?, MA; 1 I [i]	
Cheliotomylos 1	1930.45	nc	I	T			P	1	:	np	
Cheliotomylos 2	1930.52	nc	II	RA		None	P	1	:	1 ? Sex, Ai [a]	
Cheliotomylos 3	1930.60	nc	II	Ci		None		1	:	np	
Cheliotomylos 4	1930.85	nc	I	A		None	P	1	:	1 I? [c]	
Cheliotomylos 5	1930.116	nc	NPD	Ci		None	P	3	:	np	
Cheliotomylos 6	1930.141	nc	I	T		Cer, Co	P	1	:	np	
Cheliotomylos 7	1930.144	nc	I	T		None	P	1	:	np	
Cheliotomylos 8	1930.145	nc	I	T		None		1	:	1 suba [a]	
Cheliotomylos 9	1930.146	nc	I	T		None	P	2	:	np	
Cheliotomylos 10	1930.149	nc	I	T		None	P	1	:	np	

[a] The excavation notes provided enough information to determine whether these skeletons are adults or children (Ai or suba).
[c] The excavation notes described dental development for this skeleton in enough detail to determine probable age class (NB 553: 18).
[i] Osteological data for these skeletons from Gejvall (quoted in Robinson, 1962: 116-117).

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
Tseliolophos 1	1931.84	nc	II	Ci		Cer, Co, B, OV		12	:	np	
Tseliolophos 2	1931.86	nc	I	RA	L, but dist	None		0	:	None	
Tseliolophos 3	1931.87	nc	I	BCi	M, L	None	P	1	:	np	
W City Wall 1	1932.01		III	BCi		B			:		
W City Wall 2	1932.100a	?	III	BCi		J, B, W		6	:	1 M, YA-MA; 1 M?, YA-MA; 1 M, Ai; rest np [k]	
W City Wall 3	1932.100b	nc	III	BCi		J, B		2+	:	np	
W City Wall 4	1936.002a	dist	I	RA	L, but dist	J, I			:		
W City Wall 5	1936.002b	dist	II	BV	L, but dist				:		
W City Wall 6	1936.002c	dist	II	BV					:		
W City Wall 7	1936.002d	dist	II	BV					:		
W City Wall 8	1936.004	dist	III	BCi	M, but dist	J	?	8	:	1 suba [a]; rest np	
W Ridge 1	1963.07	nc	III	BCi		Co, B	P	1	:	np	
W Ridge 2	1963.14	dist	I	T		None	P	1	:	np	
W Ridge 3	1963.15	dist	I	T					:		
W Ridge 4	1963.18	nc	I	T		None	P	1	:	np	
W Ridge 5	1963.19	dist	III	BCi					:		

[a] The excavation notes provided enough information to determine whether this skeleton is an adult or a child (Ai or suba).

[k] Osteological data for these skeletons provided by Koumares (quoted in Davidson and Horváth, 1937: 230).

Grave	Grave Id	BL	P	Grave Form	Comm	Grave Goods	CT	MNI		Skeletal Data	Isotopic Samples
W Ridge 6	1963.20	dist	I	?			P	1	:	np	
Anaploga 1	1962.27	1962-06	NPD	BCi		Co	P	1	:	? Sex, Ai	
Anaploga 2	1962.29	1962-07 (-54?), dist	NPD	BCi		Co	P	2	:	F?, AO [f]	
Anaploga 3	1969.43	1969-49	I	T		None	P	1	:	M, MA [f]	
Roman Villa 1	1932.97	dist	II	T	L, but dist	Cer, Co	P	2	:	np	
Acrocorinth 1	1926.02	nc	II	BCi		Co, J	P	3	:	3 ? Sex, Ai [a]	
Acrocorinth 2	1926.04	dist	III	?		None	P	1	:	1 suba [a]	
Acrocorinth 3	1926.13a	dist	III	BCi			dist		:		
Acrocorinth 4	1926.15/17/18	nc	III	BCi		Cer, J, B	?	10	:	np	
Acrocorinth 5	1926.16	dist	III	BCi			?	10	:	np	
Acrocorinth 6	1926.19	nc	III	BCi		J	P	2	:	np	

[f] Osteological data for these skeletons provided by Burns (1982).

[a] The excavation notes provided enough information to determine whether these skeletons are adults or children (Ai or suba).

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