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ΤΑ ΟΣΤΑ ΜΙΛΟΥΝ: PRELIMINARY ANALYSES OF CLASSICAL AND HELLENISTIC PERIOD (490-146 BCE) BURIALS FROM ATHENS, GREECE

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Abstract

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The Classical period, between the 5th and 4th centuries BCE, in Ancient Greece is recognized as a "Golden Age" and characterized by an influx of creative thought, artistic achievements, and economic prosperity. This cultural burgeoning and economic prosperity also resulted in a marked improvement in measures of overall health that continued into the Hellenistic period, preceding Greece's eventual absorption into the Roman Empire. Analyses of contemporary skeletal samples suggest increases in nutritional diversity and longevity as well as a reduction in various skeletal stress markers. As a contribution to this growing body of knowledge, this study presents a synthesis of artifactual, stratigraphic, and skeletal evidence for eleven previously unpublished burials recovered from four Classical and Hellenistic-era, extramural archaeological sites in Athens that have been under continuous excavation for the past twelve years. These sites have yielded fragmentary (N=5) skeletal individuals dated to Classical period and both individual (N=4) and commingled remains (MNI=17) from the Hellenistic. Results are reported from macroscopic and radiographic analyses of growth patterns, skeletal stress indicators, and evident pathologies. Interpretation of these findings in relation to historical material on contemporary Classical and Hellenistic Greece, and specifically on Athens, informs us that these skeletons fall within the historical norms of social, ecological, and demographic trends of the designated periods. Biosocial implications of recorded pathologies address issues of disability, oral hygiene, and chronic disease. In addition to the skeletal analysis, artifacts and grave practices factor into the identification of these Classical and Hellenistic individuals. By presenting novel osteological evidence from several Classical and Hellenistic sites, this study further contributes to the growing bioarchaeological literature on life and health in the ancient Greek world.

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Introduction

τοιαῦτα σοΰστι. τῶν ἀρειφάτων δ᾽ ἐγὼ πρεπτῶν ἀγώνων οὐκ ἀνέξομαι τὸ μὴ οὐ τήνδ᾽ ἀστύνικον ἐν βροτοῖς τιμᾶν πόλιν.

Such blessings are yours [to give]. I [for my part] will not allow this city to be without honor among mortals, this city victorious in the glorious contests of deadly war. (Aeschylus, *Eumenides* 913-915)

Although Aeschylus wrote shortly before the "Golden Age" of Athens, the city's cultural, philosophical, and architectural prowess had lost none of its Archaic promise. The age that followed this Archaic phase was a victorious beacon along the Mediterranean landscape. With the culmination of intellectual, artistic, and militaristic achievements at the turn of the fifth century, Athens rose above the other poleis of Hellas to become a major power in the Mediterranean (Pomeroy 1999).

Despite the romantic portrayal of Classical Athens, the occupants of the polis and its demes underwent a tumultuous period of war, plague, and eventual submission to other Greek city-states and the Macedonian empire (Day 1942; Pomeroy 1999). The brilliant textual and literary remnants of ancient Athens led classicists and historians to cling to the idealized representation of a thriving era. Eventually, archaeological projects yielded supplemental, tangible evidence for this theory of fourth and fifth century Athens: beautiful pottery, statues, and architectural feats. In the scope of burials, artifacts, geology, and topography overshadowed actual remains (Morris 1987).

This paper seeks to retrieve, through skeletal analyses and complementary (or contradictory) historical textual/contextualization, a representation of specific individuals within the greater population of Athens, Greece, during the Classical and Hellenistic ages. The preliminary nature of this analysis restricts results to visible, non-invasive information about the sample: age, sex, pathologies, and occupational markers. Finally,

the obtained data are viewed through a bioarchaeological and anthropological lens, comparing the results with primary literature, in-depth studies of the ancient Athenian environs, and reports from past excavations. This study will demonstrate a holistic approach to "resurrecting the dead" through their written words and their skeletal remains, thereby allowing the people behind the bones to talk.

Background

Introduction to bioarchaeology through an archaeological lens

> [I]n order to understand the whole, it is necessary to have the parts; while to understand the parts, it is necessary to have some comprehension of the whole (Hoy 1978: vii)

This quote by Hoy (1978) captured one facet of twentieth century theory in archaeological thought, the Hermeneutic Circle (Small 1995), and provided foundation for interdisciplinary interaction between classical, anthropological, and archaeological thought under the umbrella of New Archaeology. Forerunners in this new approach and interpretation to archaeological thought—David Clarke, Colin Renfrew, and Lewis Binford—emphasized systems of thinking, external adaptation of culture, scientific approaches to archaeology, cultural process, and population variability. They sought the answers to *why* texts were written or certain artifacts utilized (Johnson 1999). The spirit of these inquiries stemmed from much of the culture-historical archaeology of the later 19th and early 20th century. Jumping from the innovative, nationalistically motivated springboard of Kossina's (1895) works, Childe (1929) approached archaeological culture as "the means for providing an ethnographic interpretation of how specific groups had lived" (Trigger 2006: 246).

When these archaeological implications were reintroduced to textual materials, their complementary nature became inherent (Small 1995; Johnson 1999). Postprocessual thought of the later 20th century encompassed the archaeological and textual relationship through culture, material culture, and explanation (Yoffee and Sherratt 1993). Respectively, texts were analyzed for their important contextual information on individual and small group levels (Johnson 1999); Kosso (1995) states

that texts may not be/show the same evidence as archaeological remains, but they are "independent participants in the accountability of that evidence" (183). Therefore, understanding the text and its cultural and ethnographic significance is crucial. The preserved word is a textual informant for the classicist, who can interpret the author's intent, ability, and activity for anthropological analysis (Blakely 2006). Congruent with the textual informant is the archaeological informant (i.e. artifacts) that was "created at a particular time for a particular audience" (Arafat 1990: 48) thus reflecting, or projecting, its audience.

Contemporaneous to New Archaeology, bioarchaeology emerged in the mid-twentieth century with the amalgamation of skeletal biology and archaeology (Armelagos 1993; Walker 2008). Bones were to artifacts what artifacts had been to textual history. The study of ancient disease and physiological stress, paleopathology, initiated by Hooton (1930), cohered with archaeological and contextual information for a complete anthropological understanding of past societies. The information incorporated artifacts, textual sources, and geology with skeletal remains to answer the questions J. Lawrence Angel (1953) put forward in the embryonic phases of the discipline: "1) what population changes contributed to or resulted from the growth processes of Greek civilization? 2) what were the sources of the extra human energy and adaptability and capacity to learn at this time? 3) what were the social biological (as distinct from economic or political) difficulties which stifled concerted energy to meet the society's challenges and so allowed stagnation and decline?" (1230)

As Clyde Collins Snow and John Fitzpatrick (1989) so poetically captured in their article's introductory comments, bones are the best witnesses of "the past life and death

of the person whose living flesh once clothed [him/her]" (243). Incorporation of new scientific techniques and technologies has allowed for dietary/nutritional, epidemiological, and genetic testing of skeletal remains (Larsen 1997; Knudson and Stojanowski 2008). The microscopic picture of an individual can then be incorporated and contrasted with other individuals within and between populations for a macroscopic view of a specific period. Paleodemography was born from these studies and has allowed anthropologists to understand the progress (or lack thereof) of mankind over the centuries and across populations (Morris 1987).

Despite constructive, critical opposition raised by Wood et al. (1992) about paleopathological diagnoses and demographic interpretations and implications, bioarchaeology has withstood the criticism and proved its value (Knudson and Stojanowski 2008; Goodman 1993). Knudson and Stojanowski (2008) and Díaz-Andreu and Lucy (2005) presented arguments for an emerging research theme of the identity of a past person and its application to population studies. While demographic conclusions cannot be made with limited sample sizes, the gathered data from few individuals offers an invaluable microscopic look at a society. Affirming the sentiment of Snow and Fitzpatrick, the progress made in the recent decades of bioarchaeology has given voice to once muted bones.

The innovation and influence of J. Lawrence Angel

Perry (2007) captured the importance of incorporating osteological data into a historical context in her defense of bioarchaeological: "In historical bioarchaeology, as opposed to history or bioarchaeology alone, the associations between biology and

behavior can be tested and verified to better understand larger cultural and political processes". Pioneering work in this field commenced with the renowned, influential research of J. Lawrence Angel (1975) that spanned millennia of Greek history, from the Upper Paleolithic (30,000 BCE) into modern day (c. 1960). Angel introduced bioanthropology to Aegean archaeology, thereby expanding the classical approach to archaeology and presenting the field with a plethora of investigative possibilities:

> This richness of material (despite lacunae) has helped to create among classical archaeologists, in the wholeness with which they must view ancient life, a more 'anthropological' point of view (Angel 1953)

His research on longevity, diet, pathologies, and human relationships with the environment and disease (to name a few) has provided the referential framework for modern osteological comparisons. Since then work has progressed throughout Greece to apply paleopathological, paleodemographic, and paleoecological studies to burials and settlements (Buikstra and Lagia 2009).

Prior to the Angel, archaeology in Greece was solely confirmation of ancient text (Jacobsen and Cullen 1990). Excavations throughout Greece were initiated by classicists with hopes of validating and glorifying the textual history of Greek poleis, the roots of Western civilization, which Morris (1994) classifies as the continental view of past Greece. At the turn of the twentieth century, Montelius (1899, 1903) investigated Greece as the center of innovation for Western civilization following an 1880s increase in the interest of cultural diffusion across time and land (Trigger 2006). This embryonic culture-historical archaeology that then grew from Montelius' work was nationalistically driven with nations desiring to know their exact history (2006). Thus, Greece's archaeological intentions were grounded, like most other nations, in glorifying its past

and protecting its future. In order to maintain European support, whether financial or militaristic, Greece had to present itself as the seat of Western civilization, to which all offspring nations were indebted (Morris 1994). Until the mid-1900s, sites were only approached for their artifactual richness and, according to Becker (1977), human skulls were saved but postcranial elements were disregarded (Jacobsen and Cullen 1990).

Since Angel, archaeological excavations have been conducted throughout Greece and especially Athens to unearth the physical, accurate manifestations of the ancient Greek world. Work by Lagia (2000), Liston (1993), and Fox (2005) also offers individual and population assessments that have provided modern reference (and referential collections). Thus far, the results presented by the aforementioned individuals and others have supplemented the statistics set by Angel.

Despite the mass quantities of unearthed remains within Athenian archaeological sites, many still remain boxed away from analysis. While recent publications, like *New Directions in the Skeletal Biology of Greece* (Schepartz et al. 2009), flex the impressive strength of bioarchaeology in the recent decades, inadequate time and resources are allotted in archaeological excavations to *in situ* skeletal analysis and later research. The capacity for skeletal analysis, on macroscopic, microscopic, and biochemical levels, exists, but until Greek archaeology reaches a modern state of maturation and acquires the necessary funding, the disjunction between laboratory and field settings will stunt bioarchaeological progress in Greece (Morris 1992).

Historical and ecological backdrop of Athens

> And in accordance with their verdict the country was adjudged to Athena, because Kekrops bore witness that she had been the first to plant the olive.

> Athena, therefore, called the city Athens after herself. (Pseudo-Apollodorus, *Bibliotheca* 3.14.1-2)

A bioarchaeological perspective requires cultural context. Since culture is the inherent, indivisible product of politics, economy, and social framework, a comprehensive history of both Classical and Hellenistic periods is mandatory for this analysis.

The Classical Age of Athens (490-346 BCE)

After the Persian defeat by the Athenians at the Battle of Marathon and subsequent retaliatory decimation of Athens ten years later in 480 BCE, the *polis* entered a period of time scholars eventually entitled "The Golden Age." The embryonic ideology of democracy took root and flourished in the Athenian soil, leading to a very idyllic vision of the period. A revived civic piety arose, a determination to eliminate all authoritarian vestiges of Persia. Politically, Athens took a position above her neighboring poleis. With a naval power formidable enough to withstand the Persians, Athens "offered" her protection to city-states who provided the designated resources or comparable funds. Centralized in Delos, the Delian League comprised approximately one hundred and fifty poleis. However, one-sixtieth of a city's contribution was a direct dedication to Athena and, consequently, Athens; the treasury was also allocated and utilized according to *Athenian* officials (Pomeroy et al. 1999). Upon relocation of the treasury to Athens, the city solidified her economic stronghold and flaunted this wealth with architectural exploits upon the Akropolis. Such human excellence was furthermore reflected in the literary, dramatic, artistic, and philosophical achievements of the time.

Tensions between the Delian League constituents eventually placed Athens in a state of war with her Peloponnesian nemesis, Sparta. While the First Peloponnesian War

was short-lived, the consequences of the Second Peloponnesian War debilitated the economic stronghold of Attica. Thucydides, in *The Peloponnesian War* 7.28, reflected upon the dire financial downfall:

> ..the Athenians were becoming embarrassed financially, and it was about this time that they imposed upon their subjects a tax of five per cent on all imports and exports by sea, thinking that this would bring in more money. Expenditure was not the same as it had been, but had grown bigger as the war grew bigger, while revenue was declining

Athens lost 50,000 citizens to plague including 5,000 hoplite soldiers and 12,000 sailors (Pomeroy et al. 1999). From 431 to 425 B.C.E., Gomme (1967) estimated a downward population change in Attica, of which Athens was capital, of nearly 100,000 people. In her weakened state, attempts to resurrect Athens only ended in civil unrest and division. Between 404 and 403 B.C.E. nearly 1,500 citizens died under the Spartans' newly enforced authority, the Thirty [Athenian] Tyrants (Pomeroy et al. 1999). The Athenian male population was halved within thirty years. Economic recovery after the warring fifth century only inched along, hindering ambitious Athenians from political progress and reestablishment as a Mediterranean power (Gomme 1967).

The diet of the Classical period, according to textual data, spans the gamut, including militaristic rations of cheese and onions (Compton-Engle 1999; Aristophanes *Peace* 1129) and urban (Athenian) meals with figs, wine, bread, and fish (559-565). Angel (1975) orchestrated dietary analyses on urban, Classical populations and found increases in health associated with a more protein-rich diet than previous eras: eggs, meat, fish, and grain imports. The grain imports provide especially intriguing evidence of a "re-identification" or analog of portrayed-versus-actual Athenian identity. Mythologically sprung from the earth, these autochthonous Athenians exhibited pride in

their agricultural endeavors; to be an Athenian citizen, in fact, required land ownership. The "Mediterranean Triad", the staple foods—olives, grapes, and grain—of ancient Greece exemplified these earthly roots (JACT 1984). The reverence that was placed on land and harvest can be understood in a vow made by the Athenians in Classical wartime:

> οὐ μὴν ἀλλὰ καὶ τῆς γῆς συνεβούλευεν ἀντέχεσθαι τοῖς Ἀθηναίοις, καὶ τὸν ἐν Ἀγραύλου προβαλλόμενον ἀεὶ τοῖς ἐφήβοις ὅρκον ἔργῳ βεβαιοῦν. ὀμνύουσι γὰρ ὅροις χρήσασθαι τῆς Ἀττικῆς πυροῖς, κριθαῖς, ἀμπέλοις, ἐλαίαις, οἰκείαν ποιεῖσθαι διδασκόμενοι τὴν ἥμερον καὶ καρποφόρον (Plutarch, *Alcibiades* 15.4)
>
> However, he counseled to the Athenians to hold themselves before the land, and to confirm in deed an oath always put forward to the ephebes in the place of Agraulus. For they vow to themselves to regard the boundary stones of Attica, the wheat, the barley, the vines, the olives having been taught to make as their own the earth calm and fruitful

Within each entity is an identifiable link to Greek tradition and persona. As aforementioned, the olives represented a religious association with Athena as well as a principal, tradable crop that could withstand the dry climate (Rhizopoulou 2004). Grapes became the wine that was consumed daily and held ritual significance, the concept of gods entering the body through drink. Enthusiastic, filled with the god, men partook in intellectual inquiries that are captured best in the symposium (Paterson 2003). Lastly, grain had ancestral significance in its representation of Greek agriculture. In the mysteries at Eleusis, it was believed that Demeter granted to Triptolemos agriculture that he could subsequently spread over the earth (Burkert 1985). Hesiod's (1993) *Works and Days* narrates the instructions of Demeter to the prince that emphasize the need to *work* and be vigilant in order to reap a successful harvest So in this celebration the Athenian perception of agriculture and its cruciality is presented: Greeks originated the cultivation that arguably facilitated modern civilization. However, the arid soil was not conducive to grain production, resulting in the import of barley and wheat (Sallares 1991). This

outcome renders a dichotomy between the autochthonous, rural citizens and the urban Athenians. The challenge that emerged was between urbanization and a loyalty to Athenian tradition that emphasized an agrarian basis.

Nevermore was this theory shown than in the grain subsidies administered during the Peloponnesian War (Day 1942). Documentation and inventories from this practice echoed the Periklean credo: interest "not only in his [one's] own affairs but in the affairs of the state" (Thucydides 2.40). But when war destroyed much of the land for agriculture and individuals flocked to urban environments for employment, occupational shifts and sharp socioeconomic class discrepancies resulted. Not only were resources reduced within Athens but the population increase to follow in the successive years exacerbated the negative situation (Day 1942). However, this increase has been called into question by population figures taking into account a high fertility, birth, and death rates; post-plague numbers of citizens, metics, and slaves decreased in Attica until the fourth century (Gomme 1967). Regardless, Grmek (1989) maintains that the gravity of the conditions after the plague and war was underrepresented, considering the serious overcrowding, urbanization, and refugees.

During this period, nevertheless, scientific medicine was emerging with Hippocrates and his Hippocratic school. Thus was established a corpus of medical knowledge that ventured from the supernatural causes and focused on rational, natural explanations (Eijk 2005). Medicine was regarded as a healing art, and the ἰατρός was respected for his advice and capabilities. Despite the toll war and plague had on Athenians, the average ages at death increased from earlier periods for females and males, 36.2 years and 45 years respectively (Angel 1975; Pomeroy et al. 1999).

Reaching those ages, however, was a major accomplishment, as reflected by Mimnermus via the mouthpiece of Diogenes Laertius (1972) in *Lives of Eminent Philosophers*: αἲ γὰρ ἄτερ νούσων τε καὶ ἀργαλέω νμελεδωνέων/ ἑξηκονταέτη μοῖρα κίχοι θανάτου (Would that by no disease, no cares opprest,/ I in my sixtieth year were laid to rest). The poet and politician, Solon, responded to this couplet, saying he intended to live to eighty years (*Lives* 1.2.61). While the average person within Athens did not reach eighty years of life, the ideology stemmed from a possible reality. Pythagoras classified the stages of men into four twenty-year phases, from youth to old age (*Lives* 8.1.10), so a long life was attainable under the ecological conditions of the ancient world. Applying modern percentages of population distribution to Classical Athens, only 0.49-0.86% of male citizens lived to forty and an even lower 0.3-0.45% survived until fifty (Gomme 1967). Sattenspiel and Harpending reevaluated the Classical data from Angel's 1975 study (factoring the number of individuals at each age) and refigured the mean age at death to be 23.3 years (1983). Although Athenians consumed eggs, meat, and fish, they relied heavily upon imported barley grain and other abrasive cereals (Sallares 1991), which wore down teeth without the modern consequences of cavities (Angel 1975). A decrease in osteoarthritis from the Archaic to Classical period did occur, but the condition still remained the "most common disease diagnosed by paleopathologists" (Grmek 1989: 80).

The Hellenistic Period (346-136 BCE)

The Hellenistic age, in Athens, was inaugurated by the occupation and conquest of Greece by the Macedonian ruler, Philip I. Despite the obvious political shift, Hellenistic Athens maintained unofficial autonomy under imperial rule, retaining "the

main features of a city belonging to the Classical age" (Chamoux 1981: 167): cultural identity and survival. The vast scope of the Macedonian Empire was not conducive to frequent surveillance, so cities like Athens were able to exist under their ancestral laws (Chamoux 1981). Though economic recovery seemed promising with the Athenian Confederacy and renewed trade, foreign competition soon overtook Athenian maritime footholds (Day 1942). Inflation throughout the empire caused decreases in Athenian olive oil exports and inverse increases in necessary grain imports.

Without the funds and resources to maintain agricultural enterprises, farmers flocked to the city for employment. The occupational stratum was no longer concentrated in rural but urban labor. More laborers entering the work force resulted in competition; wages plunged below living expenses, which gradually increased (Day 1942). Echoing the Classical period, the food sources within Athens could not meet the demands of her increased populace. Even the quality of food was lessened to primarily bread and decreased meat intake, described merely as "adequate" (Angel 1975: 183). Athens was losing her autochthonous identity as a result of foreign imports. Despite social differences, Athenians banded together to ensure the survival of its most destitute of citizens. Distribution of basic cereal grains fell into the State's control, leading to positions like "Wheat Commissioners" (Chamoux 1981: 189). Even after Demetrius I removed the strangling yoke Cassander had on Athens, the city did not truly begin an upward turn until the Macedonian exit in 229 B.C.E. Economic progress ensued, though not sufficiently to erase the deficits of civic maintenance. Athens relied on the taxation of her people, and her cultural allure attracted wealthy foreign patrons for funding (Day 1942). Many individuals visited the ancient city to imbibe her philosophical,

architectural, and artistic past. Considering the praiseworthy lines about Athens by Pausanias, in his *Periegesis*, one cannot be surprised by the reception with which the Roman Empire received its Greek province (Leake 1841). When the Romans ultimately conquered Greece, they respected the poleis' self-rule and treated them as hubs of modern civilization.

Religion, death, and burial throughout the Classical and Hellenistic periods

An overwhelming sphere of archaeological analysis revolves around van Gennep's *rites de passage* (1960). This foundation of burial practices is essential to understanding the eccentricities of ancient Greek traditions (Morris 1992; Danforth 1982). For the deceased, he or she enters a liminal phase between death and the afterworld, a liminality projected upon the family and friends of the deceased. Therefore, the presence of grave goods and the steps undertaken in the burial and preparations are determined carefully to ensure a smooth transition into an afterlife.

In ancient Greece, the rite of burial was likewise practiced to honor the deceased in such a manner as was deemed fitting. Much of the inspiration for earlier, and even into the later centuries B.C.E., burials arose from the Homeric account of Patroclos' funeral (Morris 1992; Prichett 1985). The lavishness invested in the games and sacrifices is, probably by modern Western standards, obscene. However, this commemoration of the dead was the ultimate honor Achilles could bestow upon his companion. It suggests a certain reverence for the dead, a need to continue homage throughout one's life.

Around 470 B.C.E. war burials took place away from the battlefield, at home so the city might memorialize her dead (Pritchett 1985). Metcalf's (1981) study of ritual

economy in the Berawan society demonstrated the multifaceted elements that enter into burial practices, the symbolism and finances that determine a society's and individual's reaction to death. For practicality, the war dead were cremated and then transported back to Athens; mass inhumations of soldiers and sailors have been infrequent in archaeological findings (Pritchett 1985). For the Greeks, in general, both cremation and inhumation were employed. Certain studies linked burial practice and presentation to family preference (Morris 1987). While some academics have suggested an increase in cremation during the Hellenistic age (Ubelaker and Rife 2007), Nock (1932) attributed a shift from cremation to inhumation to the rising fuel prices in the Hellenistic age. Cremation has been thought for many years to be the most expensive burial option (the cost of fuel to reach and sustain the heat of the fire), but a new generation of scholars considers inhumation and cremation prices relative to one another (Morris 1992); precious metal grave objects potentially surpassed the cost of wood. Ubelaker constructed a basic overview of inhumation and cremation patterns on a temporal scale:

> [C]remation occurs simultaneously with inhumation, though with variable frequency, down through the Classical period, or until the late fourth century BC. During the Hellenistic era, or the late fourth to first centuries BC, cremation was widely practiced in Greece, and it was the standard custom in chamber tombs belonging to the royalty and elites of Macedonia (Ubelaker 2007: 40)

Within the sociodemographic context of Athenian history, burial practices have been just as closely associated with society as with religion. When the fallen Marathonomachoi were laid to rest in Athens a cult was established in their honor with a polemarch to uphold the annual rituals for commemoration (Jacoby 1944). Clearly there is public overlap of social and religious practices; the State itself provided the funds for a religious rite that the people undoubtedly requested.

This state honor brings to mind another aspect of social demarcation in burials. Not only was the funerary pomp and celebration indicative of social status, but oftentimes location factored significantly into the internment of the deceased. According to Plutarch, intramural (within the wall) burials were forbidden from 500 BCE onward (Jacoby 1944). Morris (1987) and Parker (1983) showed that during the Archaic and Classical period in Athens, renowned heroes and leaders had reserved burial loci in and around the Agora. Consequently, it was inferred that placement adjacent to the Agora meant "something very special," a prominent figure in society. Later during the Hellenistic period, Pausanias mentioned a possible decree that was enacted when burial plots within the Kerameikos were being quickly utilized. Hence, part of the Kerameikos was barred from private burials and only available as a State cemetery for the war dead (Jacoby 1944).

Babić (2005) described the economical implications behind burials in an overall context. There has been an assumption that inequality of status is evidenced in tombs, crypts, and graves (Babić 2005). However, comparisons of grave goods between Archaic-Geometric and Classical eras indicated more lavish representations in the former period (Morris 1992). This data would suggest a flourishing Archaic Athens; yet the textual and skeletal evidence at the height of the Classical period called this statement into question, and recommends a reassessment of grave goods in relation to osteological and textual evidence in Greek burial practices. Viewing grave goods as a direct "index of wealth" is naïveté according to Morris (1992: 106).

The Sites

The sites under inquiry are located at addresses/intersections within modern day Athens, Greece: 27 Myllerou and Thermopylon-Peiraios (Classical period); and Psaromiligkou-Samouil-Ag. Asomaton and Lenorman-Vasilikon-Tripoleos (Hellenistic period). The actual excavations took place between 1997 and 2001 under the aegis of the Greek Department of Culture and the direction of archaeologist Tonia Kokkoliou (2009). Through stratigraphical, geological, and artifactual analyses, conducted by researchers in association with the Athenian Ephorate, the first two sites were dated to the Classical period while the latter two fell into the Hellenistic era. All four locations are situated outside the Themistoclean wall (τοῖχος) of ancient Athens. Positioning of the sites in relation to modern and ancient times is shown in Appendix I. The osteological remains from the burials at these sites were sent to the Wiener Laboratory for skeletal analysis.

<u>27 Myllerou & Thermopylon-Peiraios</u>

When interpreted in relation to the ancient city landscape and layout, the Myllerou and Thermopylon-Peiraios sites were not situated along a major byway, like the renowned road between the Academy and Kerameikos or the Sacred Way (ἱερά ὁδός). The remains within this site were found in separate burial pits.

<u>Psaromiligkou-Samouil-Ag. Asomaton</u>

This site is located just outside the remains of the Themistoclean wall. At this position in the Hellenistic age, the burial was near the major Dipylon Gate entrance (see Appendix I). The proximity of this site to the walled city suggests immediate socioeconomic implications. Burial 2 from the Psaromiligkou-Samouil-Ag. Asomaton

site has been identified as the family tomb of a prosperous kin group. The remains were unearthed within a vaulted tomb below the modern day street.

Lenorman-Vasilikon-Tripoleos

Situated well beyond the Athenian walls, this site was found between Plato's Academy and the Road to Colonus. In ancient times, this region was residential but not heavily developed.

Methods

The remains from the four sites and twelve burials were analyzed and photographed according to the *Standards for Data Collection from Human Skeletal Remains* (Buikstra and Ubelaker 1994). Preliminary inventories were taken for individual and commingled remains, thereby determining the number of people represented within the sample. Individual skeletons were aged, where applicable, according to pubic symphyses (Brooks and Suchey 1990), auricular surfaces (Lovejoy et al. 1985), epiphyseal fusion (Scheuer and Black 2004), cranial suture closure, and dental eruption (Ubelaker 1989) and wear (Lovejoy 1985). Individuals under twenty-five were primarily aged according to *The Juvenile Skeleton* (Scheuer and Black 2004). In commingled remains, when remains were too fragmentary, aging was less determinant and limited to 'adult' (Ad), 'subadult' (J), and 'infant' (I) categorization. Remains were then sexed according to sexually dimorphic pelvic dimensions, cranial morphology, and long bone morphology and metrics. General measurements of cranial and postcranial fragments were obtained. For cremations, the mass of each bone was recorded. Fragments were examined for taphonomic changes and indicative wear/occupational markers. Finally, bones were carefully inspected for macroscopic pathologies. A Wild Stereozoom M10 microscope was employed for magnified surface images. Some pathologies required radiographic analyses using a MinXray 750 X-ray unit for diagnoses.

Forms used from the *Standards* are available for review in Appendix II as well as photographs of selected bones and burial findings in Appendices III and IV.

Results

The following results have been organized according to individual inhumations, commingled remains, and cremations. Photographic documentation of specific bones, fragments, and grave items can be found in Appendices III and IV.

Individual burials

Classical Period (490-336 BCE)

Burial 19, young adult roughly between twenty and twenty-four years, aged according to dental eruption standards and tooth wear, speculative female, sexed by cranial gracility and fragmentary greater sciatic notch.

Burial 20, young to middle adult (20-40 years) with an arguably narrower range of thirty to thirty-five years, insufficient postcranial fragments resulted in aging via dentition eruption and wear, probable female, gracile mandibular torus and unpronounced masseteric tuberosity but cranial metrics and morphological standards fall within the masculine range, gracile postcrania. The delineation between the head and neck on the left femur has disappeared beneath a layer of bone along the posterior region. Such growth suggests frequent contact between proximal femur and acetabular surface from constant lowering of the body/squatting (Capasso et al. 1998). The individual demonstrates clear alveolar resorption of M2 in the left side of the mandible. On the right mandible, complete destruction of the M1occlusal surface has occurred and subsequent root caries along the cemento-enamel junction (CEJ) of PM2 and smooth caries on distal-buccal region of M2. Calculus was deposited on the lingual and buccal surfaces of the right and left I2 and left canine. Osteophytotic activity is apparent at the

radial notch (ulna) and radial tuberosity (radius), the proximal articulation between forelimb long bones. Excess bone deposition occurs at the atlanto-axial junction, on the C1 body and C2 dens. The inferior border of the left acetabulum exhibits notable "pocketing" in the bone that suggests reactive bone remodeling. These cranial and postcranial pathologies will be expounded upon in a biocultural context in the discussion.

Burial 26, twenty to twenty-five years, based on recent fusion of S1-S2 and dental wear patterns, male, sex determination from cranial morphology, long bone robusticity, and sacral dimensions. Statistically significant atrophy, relative to the right femur and tibia, is evidenced in the lower left limb. The compressed femoral head and hyperossification of the gluteal tuberosity on the left femur communicates a serious trauma to the left hip joint. Evidence of dental caries is apparent on the right side of the mandible along the distal region of M1. Skeleton found with iron remains (6 cm x 2.5 cm) and four *Capra* foot bones.

Burial 46, young adult (18-20 years), aged according to recent fusion of the iliac spine and ischial tuberosity and incomplete fusion of S1-S2, female, sexed according to obtuse sciatic notch and oval-shaped obturator foramen. Within the fragments is evidence of trauma: the right first metacarpal and right first rib. Osteophytic growth is visible on the proximal facet of MC1 and on the superior portion of the rib angle.

Burial 85, age unknown, sex unknown, fragments of a left clavicle, right ulna, and cranial vault are inconclusive determinants of age and sex.

Hellenistic Period (336-146 BCE)

Burial 13, middle adult (31-38 years), aged the pubic symphysis according to the Suchey-Brooks method, female, telltale female pelvic characteristics consisting of an

obtuse subpubic angle, concave ischiopubic ramus, and defined ventral arch. There do not appear to be any major anomalies outside normal skeletal variation. The femoral neck-to-shaft angle is slightly more acute in the left femur, but lack of innominate remains prevents further deductions. Moderate lipping along the left femoral head is consistent with age wear. Finally, postmortem exposure to metal, presumably bronze, has resulted in taphonomic discoloration of the proximal (posterior neck) and distal (lateral epicondyle) ends of the right femur. The green color is not visible in the other skeletal remains.

Burial 290, 15-19 years, third (M3) maxillary left and right molars (1 & 16) were still in their dental crypts and unerupted, and the spheno-occipital synchrondrosis (basal suture) is unfused, speculative female, the cranial gracility and notably feminine mastoid process fragments. This burial consisted primarily of cranial fragments with one two postcranial long bone fragments. Dental pathologies, therefore, are the only visible stress marks on this individual. The right side of the mandible exhibits alveolar resorption and an abscess below the antemortem-lost first molar (M1). Right mandibular premolars also exhibit significant occlusal wear that is generally uncommon in a young adult; such deterioration could be an effect of oral infection from bacteria.

Commingled remains

Hellenistic Period

Burial 1 contains a minimal number of five individuals. Of this number, two individuals have definitive evidence of lumbar osteophytosis, with compression of two cervical vertebral bodies in a possible third individual. Spinal arthritis is manifested by

compression of vertebral centra, Schmorl's nodes, and extensive lipping and exotoses. Among the postcranial fragments were notable pathologies: a bony spur on the medial side of a left humeral shaft indicative of a genetic trait or trauma to the distal shaft; a pierced olecranon fossa revealing hyperextension of the elbow joint; and a well-defined linea aspera suggesting above average use of the abductors and vastus muscles (White 2005).

Burial 1, Individual 1.1, around 25-29 years, left auricular surface analyzed for wear, female, sexed according to dimorphic dimensions of the ilium, obtuse greater sciatic notch.

Burial 1, 1.2, around 20-24 years, aged according to standards in auricular surface wear, female, defined greater sciatic notch as wide and feminine.

Burial 1, 1.3, middle adult (35-50 years), cranial suture fusion standards, speculative male, somewhat prominent nuchal crest and ambiguous mastoid process. The left temporal bone exhibits osteophytic activity at the petrous pyramid-squama boundary; the 'deteriorated' appearance of the petrous pyramid (factoring in taphonomic, postmortem changes) suggests that this individual may have been suffering from an inner ear condition.

Burial 1, 1.4, 35-50 years, cranial suture fusion standards, sex undetermined, no cranial or postcranial fragments with sexually dimorphic characteristics

Burial 1, 1.5, old adult (> 55 years), dental wear and resorption, probable male, mental eminence masculine along with a robust mandibular torus. The right canine and first premolar are still intact within the torus; the roots of the left second incisor and canine, as well as the right second incisor, remain after antemortem loss of their crowns;

and finally, two maxillary molars *ex situ* show significant occlusal wear down to the dentin. Alveolar resorption has occurred along the right side of the mandible between the second molar and second premolar and is mirrored on the left between the second molar and first premolar. Alveolar resorption was still active at the individual's death, evidenced by the bone deposition in place of the left molars. The condition of this mandible suggests very poor dental health throughout the individual's life. Unfortunately, the commingled remains prevented thorough analysis of this individual with postcranial and cranial fragments.

Burial 2 represents a minimum number of 3 adults, through cranial and femoral fragments, and 3 subadults. Pathologies among the remains include arthritis and osteophytosis of the vertebral column as well as dental caries. Two of the three adult individuals exhibit osteophytic growths in the lumbar vertebrae. A specific case of poor dental health is notable in right and left maxillary fragments with M1 mesial-occlusal destruction of the enamel.

Burial 2, Individual 2.1, 24-30 years, range determined through dental wear and cranial suture closure, female, less pronounced mastoid process and nuchal crest indicative of female individual.

Burial 2, 2.2, 27-43 years, cranial suture closure, probable female, mastoid process suggestive of female but only sexually dimorphic feature for sexing.

Burial 2, 2.3, old adult (>50 years), obliteration of cranial sutures, female, very definitive, feminine mastoid process though in conjunction with an ambiguous nuchal crest. The cranial vault is sufficiently thicker than the other crania and shows significantly increased meningeal grooves along the right parieto-frontal region, giving

the appearance of crevasses and pits. The etiology of this increased cranial vascularization cannot be exacted do to the commingling and lack of remains. Still, the possibility of trauma or chronic disease cannot be eliminated as a pathological condition.

Burial 2, 2.4, under 1 year, unfused jugular and condylar limbs of pars lateralis of the occipital, indeterminate sex. Significant bony formation along the cruciform eminence, sigmoid sulcus of occipital, and internal temporal squama exists. Endocranial lesions from meningitis, trauma, and other hemorrhagic-inducing disorders have similar manifestations. A study by Lewis (2004) on endocranial lesions, however, concluded that the majority of cranial vault bone formation in infants under 6 months was the result of rapid growth and not a pathological disorder. Considering the age of the individual and the focused area of hypervascularization, along the sulci, the hyperostotic appearance is the probable result of natural growth and remodeling in early life.

Burial 2, 2.5, 1-2 years, fusion of the foramen ovale but incomplete fusion of the foramen spinosum on the sphenoid, dental formation and development of the mandible place the individual around two years (± 8 months), indeterminate sex.

Burial 2, 2.6, adolescent 10-14 years, left femur without fusion of proximal epiphyses (caput, greater trochanter, and lesser trochanter), unknown sex, no other fragments linked to individual with sex-determining features.

Burial 304B contained the commingled remains within an amphoreas (amphora) and had a minimal number of five adults and 1 juvenile, determined by femoral, scapular, and cranial fragments. The preservation of the greater sciatic notch in iliac fragments allowed for the sex determination of two adults, one male and the other female. Osteophytes were recorded on two adjacent thoracic vertebrae. Occupational markers

appeared on the proximal end of two right femora, articular border convexity associated with squatting and sartorial posture (Capasso et al. 1998).

Burial 304B, 304.1, 35-45 years, dental wear age determinant, male, defined robust mental eminence and glabella. M2 on the right side of the mandible was lost antemortem, but the resorption process was not fully completed before the individual died. Meanwhile, the left mandibular M2 and M3 exhibit enamel destruction, down to the dentin, along the mesial-occlusal edges. A carious lesion is also detectable at the CEJ of M3. A bone spur, arguably myostitis ossificans traumatica, on the right temporal line indicates an external trauma to the cranial vault that the individual lived through.

Burial 304B, 304.2, 20-25 years, dental eruption and wear, male, robusticity of mandibular torus and masseteric tuberosity. Along the distal surface of the right mandibular M2 is antemortem carious damage.

Burial 304B, 304.3, adult < 25 years, S1 fragment unfused, speculative male, sacral promontory dimensions compared with recorded averages (Flander 1978).

Cremated remains

Hellenistic Period

Burial 4, adult, epiphyseal fusion evidence in fragmentary femora and innominate in additional to general development and growth of bones, female, sex determined by notably wide greater sciatic notch only. The cremated remains of this individual were found in conjunction with Burial 2. Burn colorations suggest an incendiary source originating along the right side and moving to the left side. Transverse, longitudinal, and circular cracks along the long bones indicate that the flesh of the individual was not

removed prior to cremation. This burial and subsequent cremation will be discussed in greater socio-historical detail in the following section. A strigil, a characteristically male grave good, was found along among the remains and will be addressed later.

Burial 16, adult, fusion of ischial tuberosity and long bone (radius and femur) cortical dimensions, undetermined, no sexually dimorphic fragments. The bones of this cremated individual are a consistent white to pale blue/brown color, the result of a well-maintained and evenly distributed fire. Cremation techniques and consequences are elaborated in the discussion.

Table 1: Average age at death figures for adolescents to adults

	Individual Range	Individual Mean	Commingled Range (Adults)	Commingled Mean	Total
Classical	(N = 4) 18-40 years	24 years	----	---	24 years
Hellenistic	(N = 2) 15- 38 years	26 years	(N=10) 20-60 years	38 years	36 years

Discussion

The following discussion highlights specific or reoccurring results from the sites and their significance in a cultural, social, and historical context. This section is divided into discussions on age at death, cremation, grave goods, and biocultural implications of pathologies.

Age at death

As a result of the limited number of "ageable" individuals, the statistics are presented with a major caveat. While the average age at death for the Classical period is 24 years, significantly below the 36.2 and 45-year estimates of Angel, the figures represent a *very* small aliquot of the population. The age results for the Classical individuals seem to favor the mean age distribution (23.3 years) obtained by Sattenspiel and Harpending (1983) in their revised assessment of Angel's earlier work; however, the authors state that this value is a probable underestimate of the actual average age. Despite a more substantial number of "ageable" individuals in the Hellenistic sample (N=10), the 38-year average age estimate, although comparable to maintained figures of 42.4 and 36.5 years (Angel 1975), has only microscopic implications for the whole Athenian population. The overall age at death ranges do not contradict the Angel figures.

Cremation

Two Hellenistic burials, 4 and 16, were cremated prior to inhumation. The transverse and longitudinal cracks along the bone fragments indicate that the flesh was not removed from the bones before cremation; as the body burns, the periosteum and soft

tissues shrink, pulling away from the bone and resulting in the curved transverse lines (Symes et al. 2008). The color spectrum of the remains also allows for inferences about the act of cremation. Body positioning and tissue shielding affect the order of bones burned. Skeleton 4 demonstrated burn patterns and discoloration consistent with a pugilistic postured individual (Symes et al. 2008). The charred appearance of the left pelvis does leave one questioning the act of cremation. Since bones become distorted and lightly colored after steady burning, the cremains of this individual reveal short duration of the fire. Individual 4 was found in conjunction with the artifactually wealthy tomb of Burial 2, so the incompleteness of this cremation seems counterintuitive to the socio-economic status. Unfortunately, the cause of a poorly rendered cremation is only speculative. Dorpfeld (1905) theorized that most corpses were burned, albeit incomplete in some cases, for symbolic reasons, a removal of life (breath and soul) from body. However, the remains of burial 16 are more fragmentary and communicate a more sustained and complete cremation; the long bone diaphyses are calcined, and the vertebrae, some of the last bones burned, are lightly colored and fissured. In a recreation of cremations at 670 to 810°C, the bones represented those of burial 16 after at least 50 minutes of firing (Bohnert et al. 1998). In order to obtain the porcelain, calcined appearance of the fragments, the fire needed to reach temperatures of 800 degrees Celsius (Shipman et al. 1984). The duration and intensity of the fire involved in the burial 16 suggest a better-executed cremation than burial 4.

Another discussion to bring forward is the presence of cremations within the Classical and Hellenistic burials. Of the population represented in this sampling, cremations only exist in the Hellenistic period. Though the sample is too small for

conclusive statements, the evidence supports Ubelaker's (2007) views of cremation as a common practice even after the Classical period, not eliminated by economic restraints. Regardless, Plato addressed, in *Critias*, the extensive deforestation that occurred during the fifth century to meet the consumptive demands of the burgeoning population and war resources (Jeskins 1998). In areas such as Athens where fuel was less plentiful, cremation could be considered as much a sign of socioeconomic status as grave artifacts. Further skeletal remains must be inquired for socioeconomic markers of diet and nutrition.

Grave goods: Presence and purpose

While some of the skeletal remains were housed within their burial artifacts (Burial 304B), objects, or traces of objects, were found alongside the bones as grave goods. Burial 4 contained a strigil, burial 13 copper or bronze, and burial 26 iron remains and foot bones from the genus *Capra* (i.e. goat). Early theories about grave artifacts centralized around the concept of ritual, especially in the case of Egypt pharaohs and kings (Morris 1992, 104); what items remained alongside the dead went with him to the next life. In the ancient Greek world, the grave goods have been thought to represent patterns in luxuries, dress, and etiquette (Cannon 1989; Small 1995).

Burial 13, from the Hellenistic period, was presented for osteological analysis without artifactual detail. However, taphonomic discoloration of the right femur suggests burial with copper or bronze articles. From the Classical period, burial 26 had iron imbedded in his femoral distal epiphysis. The metal was concave in such a way as would fit against the longitudinal curve of the foreleg. Whether this metal is from military

armament is only speculative, but the implications of iron and bronze within the burial are salient. Homeric narratives tell of men (warriors) being burned in their armor as a sign of respect: "He hilled Eëtion/but did not strip his armour, for his heart respect the dead man,/but burned the body in all its elaborate war-gear/and piled a grave mound over it" (*Iliad* 6.417-419). But due to the expense of metal in ancient Athens, most burials contained clay-fired lekythoi and pyxides (Cannon 1989); even the military was ill-financed to equip its soldiers with proper arms, so men with personal, metal armor were those sent to the battlefront, the hoplites (Whitehead 1991). Even in the Hellenistic period, when bronze was less rare and oftentimes accompanied by gold, such a valuable good was preserved for the living. In Classical Athens, the practice of burying precious metals was considered "hardly appropriate" (Morris 1992: 123). Therefore, these individual burials could support the continuous theory of a competitive social spirit to express one's own or one's desired status (Cannon 1989). Childe (1945) believed an increase in quality or quantity of grave goods was a canary for failing political and social environments (Morris 1987).

The strigil and astragaloi (knucklebones) seem to contradict Morris' (1987) belief in burials as "ritual expression of social structure" (40) as opposed to a social system. These objects have daily functionality, a strigil for cleaning/purification and knucklebones for entertainment. However, interpretation of Thucydides' writing leads Hedrick (1995) to conclude that ostentation and utility were difficult to distinguish during the Classical period. The ancient bone dice add a particularly intriguing aspect to the young man's burial. Since the foot bones are the only remains of the animal, their placement within the grave is presumably intentional and intended to provide a symbolic

reflection of the deceased in life. Multiple classical burials within Athens of young men have contained both strigils and astragaloi (French 1990); one of the individuals in this earlier excavation was surrounded by a lyre, pots, and styluses in addition to the aforementioned, harkening, once more, the personal implications of burial goods.

Regardless, a reflection of daily life may not be portrayed by the presence of a strigil in the burial of individual 4. Oftentimes, archaeological sites have shown strigils to be associated with male burials (Houby-Nielson 2000). In Athens, grave monuments of the Classical period exemplify this practice. However, the skeletal remains communicate a female individual, conflicting with the masculine instrument. There have been similar discoveries of female remains with designated 'male' goods (Horsnaes 2002); at Olynthos, Robinson (1932) found strigils only associated with male burials of the fourth and fifth centuries B.C.E., but Etruscan tombs of the third century showed a common practice of strigils within female graves (Eldridge 1918). This specific case magnifies one of the many issues that arise with burial generalizations based purely on artifactual findings, as well as a need for thorough bioarchaeological analyses of sites.

Biocultural implications of pathologies

Disability

Of the twelve burials, burial 26 exhibited immutable evidence of physical disability. Because of the individual's young age—absence of age markers like osteoporosis and consistent joint wear—the probable cause of this high impact trauma was a fall from a height (Kyle 1992; Pipkin 1957). As a result of a proximal fracture of the left femur, the man distributed his weight on the right lower extremities. This shift in

weight can be accounted for by a reshaped right femoral head and acetabulum and comparisons of the femoral and tibial diameters. The linear edges and thinned superior border of the hip socket demonstrate an atypical ball-and-socket movement between pelvis and femur. In order to compensate for this new weight distribution, the body adjusted its biomechanical structure and function for right leg weight-bearing. While bone length is indicative of childhood and pre-adult trauma and stress, bone diameter fluctuates throughout an individual's life based on environmental and nutritional factors. The midshaft diameters, anterior-posterior and medial-lateral, are 30% and 15% greater in the right than left femur in addition to a 24% midshaft circumference discrepancy between right and left femora. Also, the right tibia has a larger diameter (36%) and circumference (22%) at the nutrient foramen than in the left tibia. The right fibula has a maximum proximal neck diameter 29% larger than the left as well as a minimum proximal diameter that is 26% larger. Radiographs were taken of the individual's lower limbs for further comparison. Cortical bone thickness was notably greater on the right side, echoing the previous evidence of a withering left leg.

According to Rose (2003), disabilities within the ancient world were viewed case-by-case; communities did not class persons into classes as a result of physical anomalies. Since disease prevalence and war conditions in Athens were higher than modern day, physical afflictions were part of the status quo (Braddock 2001). Disabled persons within Greek history, the blind prophets and epileptic children, were not shunned by society or considered lesser persons but sought for counsel and worshipped in cult practices (Longrigg 1998). Veterans of war were acknowledged for their wounds and sometimes subsidized, though disabled persons had to prove their helpless states:

> Greeks who sustained injuries on the battlefield would often be expected to continue to fight, as mobility was not always a requisite for combat participation. Existing court records provide compelling evidence that the linkage between disability and entitlement to monetary support from the government was not absolute. Individuals with disabilities in Greece would have had to prove that they truly were economically needy and not just physically disabled to receive a small food grant (Braddock 2001)

In the case of individual 26, the young man had survived the initial trauma of his wound, but the "healing" he experienced was insufficient for complete recovery. At the time of this fracture, the Classical age, Hippocrates had begun his school of medicine and written various treatises on treatment of the body. In his work, *On Fractures*, Hippocrates mentioned methods for care of a damaged upper leg:

> If the thigh bone is fractured, it is most important that there should be no deficiency in the extension that is made, while an excess will do no harm...[t]he thigh-bone gets firm in forty days (Hippocrates, *On Fractures*, 19)

Hippocrates made further note of the need to rest the limbs and limit movement. Consequences of not following this prescription were further included in his work:

> When the bones are not properly replaced, but there has been some defect in this respect, the hip, the thigh, and the leg become wasted, and vice versa (14).

Although the individual did not have the proper means to fully heal from his fracture, whether a result of financial or resource constraints, he would not have been an all out burden on his society. Garland (1995:34) maintains that the lame in ancient Greece "fared better than the blind in economic terms since there were many more skilled and semi-skilled occupations of a sedentary nature" like pottery and leatherworking. When viewed in light of his burial position and goods, the man in taphos 26 continued to function in his society until his early death.

Chronic disorders

Another pathology recorded in seven of the seventeen adults within the Hellenistic period was vertebral osteophytosis, located primarily in the lumbar region of individuals but appearing in the neck among the cervical vertebrae and the middle back in the thoracic vertebrae. As a result of the commingling and the inconclusive age of cremains, the ages of those afflicted are more accurately presented in terms of a range: 20 to over 50 years. This range is certainly viable in view of past bioarchaeological findings; arthritis was a chronic affliction in both young and older adults (Nutton 2004). Hippocrates even attributed arthritis to horseback riding consequences, a result of the limbs being pulled downward (Hippocrates *De aere aquis locis*, 22). While this mention of osteoarthritis demonstrates a general awareness of the condition and search for etiology, the affliction was never seriously treated aside from herbal remedies. The lack of attention paid to truly alleviating the chronic problem could be accounted for by, what Nutton (2004) argues to be, an indifference in doctors toward the elderly since "the gradual physical and mental deterioration of old age [was] part of an inevitable process". Artistic representations of aged persons were oftentimes biased against a weakened frame and senility. Laws were mandated whereby children had to support their parents. Just as the aforementioned burial 26, the arthritic people may have been in extreme pain, evidenced by the extensively active osteophytosis, during their lifetimes, but they continued to function in a less-than-sympathetic society (Gilleard 2007).

Dental Hygiene

Within the Classical and Hellenistic burials, six individuals exhibit significant dental pathologies worth readdressing. Dental wear and enamel destruction is influenced

by an individual's diet, providing detail about past population food intake. Carious lesions of the teeth, recorded in the six aforementioned individuals, have oftentimes been labeled the "disease of civilization" (Grmek 1989: 115); caries are associated with high-carbohydrate diets that decay the tooth enamel when oral hygiene is neglected. During classical times, the caloric intake included softer, less abrasive breads than previous generations (Grmek 1989). This pattern follows suit with Angel's (1975) findings of a decrease in dental lesions from Late Iron (6.7 lesions/mouth) to Classical ages (4.0) then increase into the Hellenistic period (5.5). While, in this study, there are two more cases of dental pathologies in the Hellenistic period than the Classical, the findings, without isotopic diet analyses, do not directly validate Grmek and Angel.

Within Athens these individuals would have functioned normally despite their, by modern standards, subpar oral health. In a society where newly emerging doctors, like Hippocrates, were dentists, the focus on health generally focused away from the mouth. However, Hippocrates seemed to possess some understanding of oral health on the overall body in his mention of dental eruption in children coinciding with postcranial conditions (Guerini 1909: 50). For the majority of the Hippocratic *Corpus*, dental care is unaddressed until a reference and remedy to foul breath emerges in *On the Diseases of Women*.

> When a woman's mouth smells and her gums are black and unhealthy...one pounds in a stone mortar some marble or whitestone and passes it through a sieve one then mixes equal parts of these ingredients and with this mixture one rubs the teeth and the interior of the mouth afterward one rubs them again with greasy wool and one washes the mouth with water. One soaks the dirty wool in honey and with it one rubs the teeth and the gums inside and outside. One pounds dill and anise seeds two oboles of myrrh. One immerses these substances in a cotyle of pure white wine; one then rinses the mouth with it holding it in the mouth for some time; this is to be done frequently and the mouth to be rinsed with the said preparation (2)

The lack of dental care for men leaves much to be desired as to whether oral health differences existed between men and women. Were men considered to have superior oral health to women in ancient Athens, subsequently resulting in a lack of written material on the matter? Of the 'sexable' individuals in question, four are male and one female, which coincide with the conclusions by Grmek (1989): male teeth demonstrate greater wear than female as a result of the male muscular chewing apparatus. While these statistics are not sufficient to conclude a four-to-one male-to-female ratio, the results do put the dental work of Hippocrates in question and demonstrate the conflict between textual and skeletal evidence that arises.

Conclusion

Preliminary analyses of the skeletal remains from four archaeological sites, which span over three centuries of ancient Athenian history, have yielded a plethora of information about the individuals represented in the individual and commingled burials. After the skeletal samples were interpreted, the knowledge was illuminated in terms of primary textual sources and previous osteological research. A very cursory evaluation of the sites' geography and distribution from the city was rendered to supplement the skeletal evidence.

The burials were found to contain the remains of twenty-one adults (individuals over 15 years), four juveniles, and one indeterminate person. Categorizing these people into their corresponding era, the Classical period contained four inhumed adults and the Hellenistic period fifteen inhumed and two cremated adults and four inhumed juveniles. Results painted a sample population consistent with previous skeletal analyses stemming from Angel to modern day. Average ages at death fell within the realm of recorded Classical and Hellenistic populations. Regarding pathologies, poor oral health and arthritis of the vertebral column and postcranial joints were the prominent conditions diagnosed in the analyzed individuals. In view of the chronic nature of these pathologies, and in addition to the case of the healed femoral trauma, the concept of disability and its social consequences in the ancient world was discussed. Interpreting these findings with textual and previous archaeological work, the individuals were concluded to be "everyday" persons within their society, living with conditions prevalent in the later centuries B.C.E. This aspect of data interpretation allowed for an anthropological look at the individuals, placing them in an evaluative socio-historical context. Finally, the

relationship between skeletal data and grave goods came under scrutiny when osteological results conflicted with gender-specific artifacts. Potential errors may have occurred during artifactual and skeletal processing to account for this anomaly, but previous work has shown that such atypical burial discoveries exist. There existence presents the bioarchaeologist and archaeologist with more questions for answering.

The information obtained from the skeletal remains of four Athenian sites continues to add to the repertoire of Classical and Hellenistic burials in and around the ancient city. Despite the fragmentary state of the bones, interpretations were still possible although the nature of some of the analyses was speculative. At this point too few individuals were represented to make broad demographic conclusions and comparisons. Therefore, an individualized and site-specific approach to bioarchaeological analysis was taken. This focused study of limited individuals allowed for a more personal assessment of each identity in relation to his/her environment. With further skeletal samples and biochemical investigations of the remains, more information can be added to this preliminary set of data. Ultimately, this study hopes to contribute to the growing bioarchaeological literature on life and health in the ancient Greek world.

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Appendix I: Historical, geographical perspective

Figure 1: Ancient Athens superimposed over modern day city. Classical (C) and Hellenistic (H) sites (27 Myllerou, Thermopylon-Peiraios, and Psaromiligkou-Samouil-Ag. Asomaton) demarcated outside Themistoclean Wall (n.b. the Lenorman site is not within the scope of the plan)

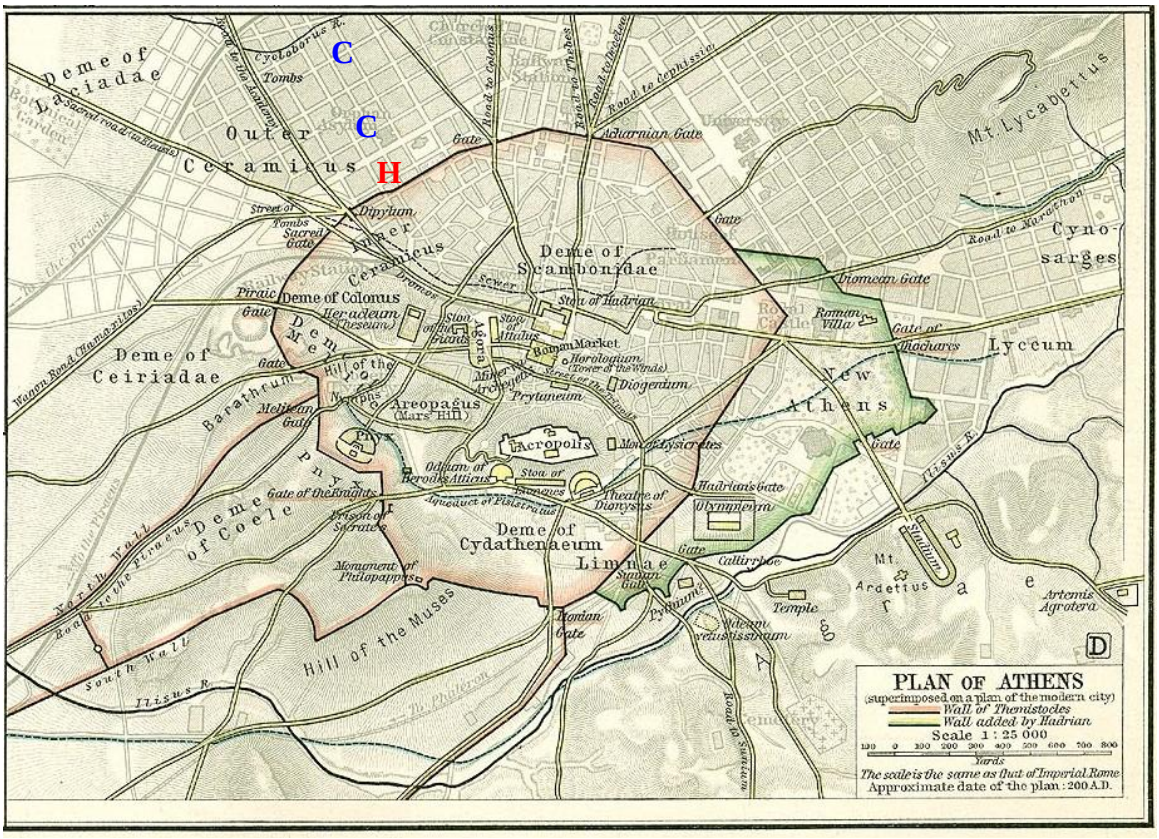

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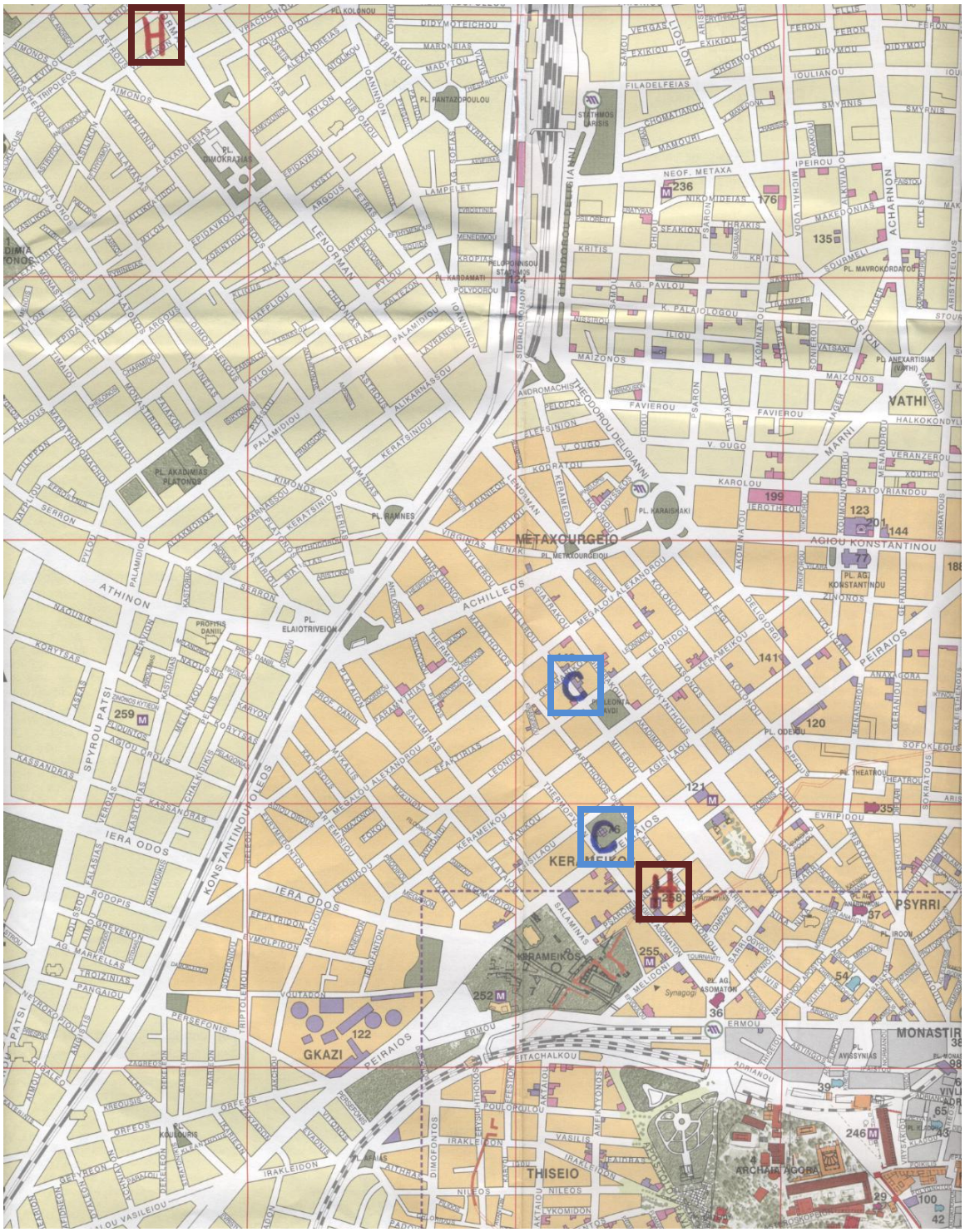
Figure 2: Classical (C) and Hellenistic (H) sites in modern Athens from left to right: Lenorman-Vasilikon-Tripoleos, 27 Myllerou, Thermopylon-Peiraios, and Psaromiligkou-Samouil-Ag. Asomaton



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Appendix II

INVENTORY RECORDING FORM FOR COMPLETE SKELETONS

Site Name/Number _____/_____ Observer _____

Feature/Burial Number _____/_____ Date _____

Burial/Skeleton Number _____/_____

Present Location of Collection _____

CRANIAL BONES AND JOINT SURFACES

	L(left)	R(right)
Frontal	___	___
Parietal	___	___
Occipital	___	___
Temporal	___	___
TMJ	___	___

	L	R
Sphenoid	___	___
Zygomatic	___	___
Maxilla	___	___
Palatine	___	___
Mandible	___	___

POSTCRANIAL BONES AND JOINT SURFACES

	L	R
Clavicle	___	___
Scapula		
Body	___	___
Glenoid f.	___	___
Patella	___	___
Sacrum	___	___

	L	R
Os Coxae		
Ilium	___	___
Ischium	___	___
Pubis	___	___
Acetabulum	___	___
Auric. Surface	___	___

VERTEBRAE (individual)

	Centrum	Neural Arch
C1	___	___
C2	___	___
C7	___	___
T10	___	___
T11	___	___
T12	___	___
L1	___	___
L2	___	___
L3	___	___
L4	___	___
L5	___	___

VERTEBRAE (grouped)

#Present/# Complete

	Centra	Neural Arches
C3-6	___/___	___/___
T1-T9	___/___	___/___

Sternum: Manubrium ___ Body ___

RIBS (individual)

	L	R
1st	___	___
2nd	___	___
11th	___	___
12th	___	___

RIBS (grouped)

#Present/# Complete

	L	R	Unsided
3-10	___/___	___/___	___/___

Series/Burial/Skeleton_____

Observer/Date_____

LONG BONES

		Diaphysis			
	Proximal Epiphysis	Proximal Third	Middle Third	Distal Third	Distal Epiphysis
Left Humerus	____	____	____	____	____
Right Humerus	____	____	____	____	____
Left Radius	____	____	____	____	____
Right Radius	____	____	____	____	____
Left Ulna	____	____	____	____	____
Right Ulna	____	____	____	____	____
Left Femur	____	____	____	____	____
Right Femur	____	____	____	____	____
Left Tibia	____	____	____	____	____
Right Tibia	____	____	____	____	____
Left Fibula	____	____	____	____	____
Right Fibula	____	____	____	____	____

Left Talus_____
Right Talus_____
Left Calcaneus_____
Right Calcaneus_____

HAND (# Present/# Complete)

	L	R	Unsided
# Carpals	____/____	____/____	____/____
#Metacarpals	____/____	____/____	____/____
#Phalanges	____/____	____/____	____/____

FOOT (# Present/# Complete)

	L	R	Unsided
#Tarsals	____/____	____/____	____/____
#Metatarsals	____/____	____/____	____/____
#Phalanges	____/____	____/____	____/____

Comments:_____

INVENTORY RECORDING FORM FOR COMMINGLED REMAINS AND ISOLATED BONES

Site Name/Number _____/_____ Observer _____

Feature/Burial Number _____/_____ Date _____

Burial/Skeleton Number _____/_____

Present Location of Collection _____

Report all cranial bones separately. Group Cervical Vertebrae 3-6; Thoracic Vertebrae 1-9; Ribs 3-10; Carpals; Metacarpals; Tarsals (other than Talus and Calcaneus); Metatarsals; Hand and Foot Phalanges. Vertebrae other than those grouped above should be reported individually. Identify **bones** by name, indicate **L** (left); **R** (right); **B** (Both); **M** (Midline); **?** (Unsidable). Code articular regions, long bone diaphyses, and vertebrae by **segments**: **PE** (proximal epiphysis), **P1/3** (proximal third of diaphysis), **M1/3** (middle third of diaphysis), **D1/3** (distal third of diaphysis), **DE** (distal epiphysis); **B** (vertebral body or centrum), **NA** (neural arch). Otherwise, leave this category blank. Code **Completeness** according to the following:**1** = >75% present; **2** = 25% - 75% present; **3** = <25% present. MNI reflects the minimum number of individuals recorded on this line. **Count/Wt** refers to the number/weight of fragmented materials. **Age** and **Sex** determinations should be entered as counts (see text for codes).

Bone	Side	Segment	Completeness	MNI	Ct/Wt	Age	Sex

IMMATURE REMAINS RECORDING FORM: BONE UNION AND EPIPHYSEAL CLOSURE

Site Name/Number _____/_____ Observer _____

Feature/Burial Number _____/_____ Date _____

Burial/Skeleton Number _____/_____

Present Location of Collection _____

Stage of Union: blank = unobservable; 0 = open; 1 = partial union; 2 = complete union

EPIPHYSEAL FUSION

Bone	Epiphysis	Stage of Union	
Cervical Vertebrae	superior		
	inferior		
Thoracic Vertebrae	superior		
	inferior		
Lumbar Vertebrae	superior		
	inferior		

		L	R
Scapula	coracoid		
	acromion		
Clavicle	sternal		
Humerus	head		
	distal		
	medial epicondyle		
Radius	proximal		
	distal		
Ulna	proximal		
	distal		
Os Coxae	iliac crest		
	ischial tuberosity		
Femur	head		
	greater trochanter		
	lesser trochanter		
	distal		
Tibia	proximal		
	distal		
Fibula	proximal		
	distal		

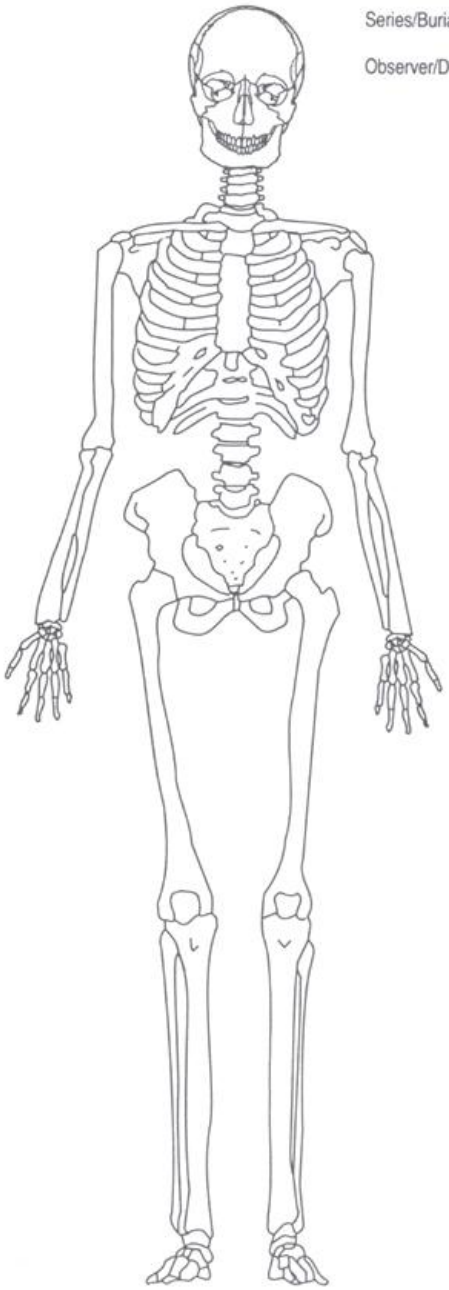
PRIMARY OSSIFICATION CENTERS

Bone	Area of Union	Extent
Os Coxae	ilium-pubis	
	ischium-pubis	
	ischium-ilium	
Sacral Segments	1-2	
	2-3	
	3-4	
	4-5	
Cervical Vertebrae		
	neural arches to each other	
	neural arches to centrum	
Thoracic Vertebrae		
	neural arches to each other	
	neural arches to centrum	
Lumbar Vertebrae		
	neural arches to each other	
	neural arches to centrum	
Cranium		
	spheno-occipital synchondrosis	
Occipital		
	lateral part to squama	
	basilar part to lateral part	

ADULT SKELETON RECORDING FORM: ANTERIOR VIEW

Series/Burial/Skeleton_____

Observer/Date_____

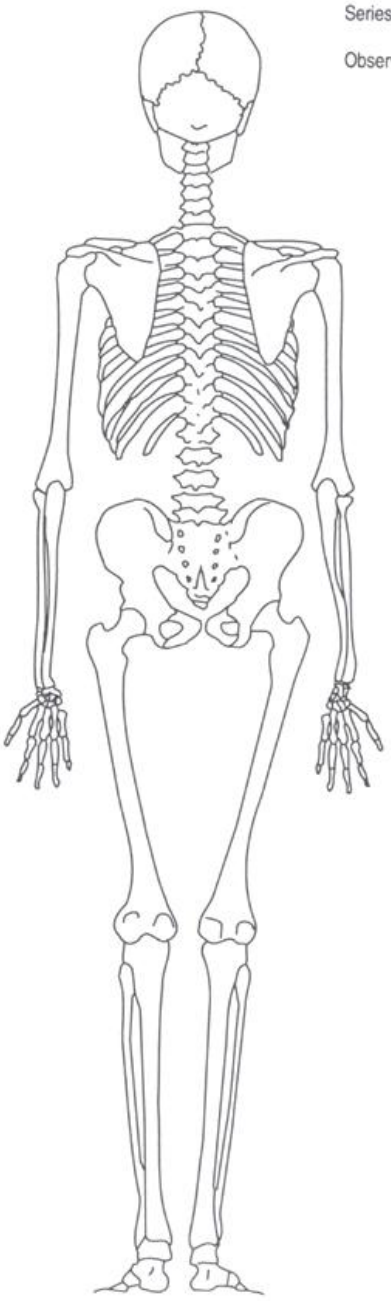


CHAPTER 2: Attachment 3a

ADULT SKELETON RECORDING FORM: POSTERIOR VIEW

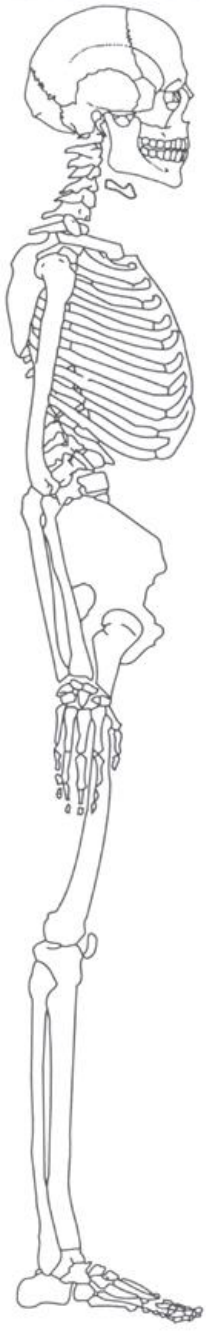
Series/Burial/Skeleton_____

Observer/Date_____



Attachment 3b: CHAPTER 2

ADULT SKELETON RECORDING FORM: RIGHT LATERAL VIEW

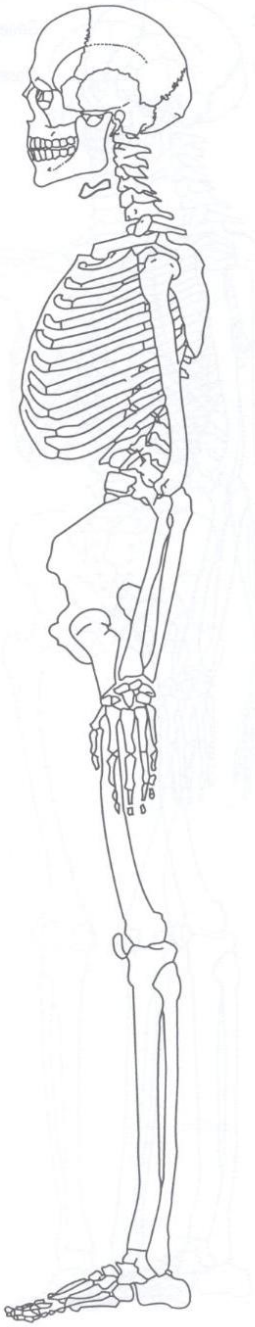


Series/Burial/Skeleton_____

Observer/Date_____

CHAPTER 2: Attachment 4a

ADULT SKELETON RECORDING FORM: LEFT LATERAL VIEW



Series/Burial/Skeleton_____

Observer/Date_____

Attachment 4b: CHAPTER 2

ADULT SEX/AGE RECORDING FORM

Site Name/Number _____/_____ Observer _____

Feature/Burial Number _____/_____ Date _____

Burial/Skeleton Number _____/_____

Present Location of Collection _____

SEX

Pelvis	L	R	Skull	L	M	R
Ventral Arc (1-3)	____	____	Nuchal Crest (1-5)	____	____	____
Subpubic Concavity (1-3)	____	____	Mastoid Process (1-5)	____	____	____
Ischiopubic Ramus Ridge (1-3)	____	____	Supraorbital Margin (1-5)	____	____	____
Greater Sciatic Notch (1-5)	____	____	Glabella (1-5)	____	____	____
Preauricular Sulcus (0-4)	____	____	Mental Eminence (1-5)	____	____	____

Estimated Sex, Pelvis (0-5) _____ Estimated Sex, Skull (0-5) _____

Comments:

Series/Burial/Skeleton_____

Observer/Date _____

AGE

Pubic Symphysis L R

Todd (1-10) ____ ____

Suchey-Brooks (1-6) ____ ____

Auricular Surface (1-8) L ____ R ____

Suture Closure (blank = unobservable; 0 = open; 1 = minimal; 2 = significant; 3 = complete)

External Cranial Vault

1. Midlambdoid ____
2. Lambda ____
3. Obelion ____
4. Anterior Sagittal ____
5. Bregma ____
6. Midcoronal ____
7. Pterion ____
8. Sphenofrontal ____
9. Inferior Sphenotemporal ____
10. Superior Sphenotemporal ____

Palate

11. Incisive ____
12. Anterior Median Palatine ____
13. Posterior Median Palatine ____
14. Transverse Palatine ____

Internal Cranial Vault

15. Sagittal ____
16. Left Lambdoid ____
17. Left Coronal ____

Estimated Age: Young Adult (20-35 years) _____

Middle Adult (35-50 years) _____

Old Adult (50+ years) _____

Comments:

IMMATURE REMAINS RECORDING FORM: BONE UNION AND EPIPHYSEAL CLOSURE

Site Name/Number _____/_____ Observer _____

Feature/Burial Number _____/_____ Date _____

Burial/Skeleton Number _____/_____

Present Location of Collection _____

Stage of Union: blank = unobservable; 0 = open; 1 = partial union; 2 = complete union

EPIPHYSEAL FUSION

Bone	Epiphysis	Stage of Union	
		L	R
Cervical Vertebrae	superior		
	inferior		
Thoracic Vertebrae	superior		
	inferior		
Lumbar Vertebrae	superior		
	inferior		
Scapula	coracoid		
	acromion		
Clavicle	sternal		
Humerus	head		
	distal		
	medial epicondyle		
Radius	proximal		
	distal		
Ulna	proximal		
	distal		
Os Coxae	iliac crest		
	ischial tuberosity		
Femur	head		
	greater trochanter		
	lesser trochanter		
	distal		
Tibia	proximal		
	distal		
Fibula	proximal		
	distal		

PRIMARY OSSIFICATION CENTERS

Bone	Area of Union	Extent
Os Coxae	ilium-pubis	
	ischium-pubis	
	ischium-ilium	
Sacral Segments	1-2	
	2-3	
	3-4	
	4-5	
Cervical Vertebrae		
	neural arches to each other	
	neural arches to centrum	
Thoracic Vertebrae		
	neural arches to each other	
	neural arches to centrum	
Lumbar Vertebrae		
	neural arches to each other	
	neural arches to centrum	
Cranium		
	spheno-occipital synchondrosis	
Occipital		
	lateral part to squama	
	basilar part to lateral part	

Series/Burial/Skeleton_____
Observer/Date _____

Estimate of chronological age based on postcranial maturation

Fetal	_____
b-5	_____
5-10	_____
10-15	_____
15-20	_____
20+	_____

Comments:_____

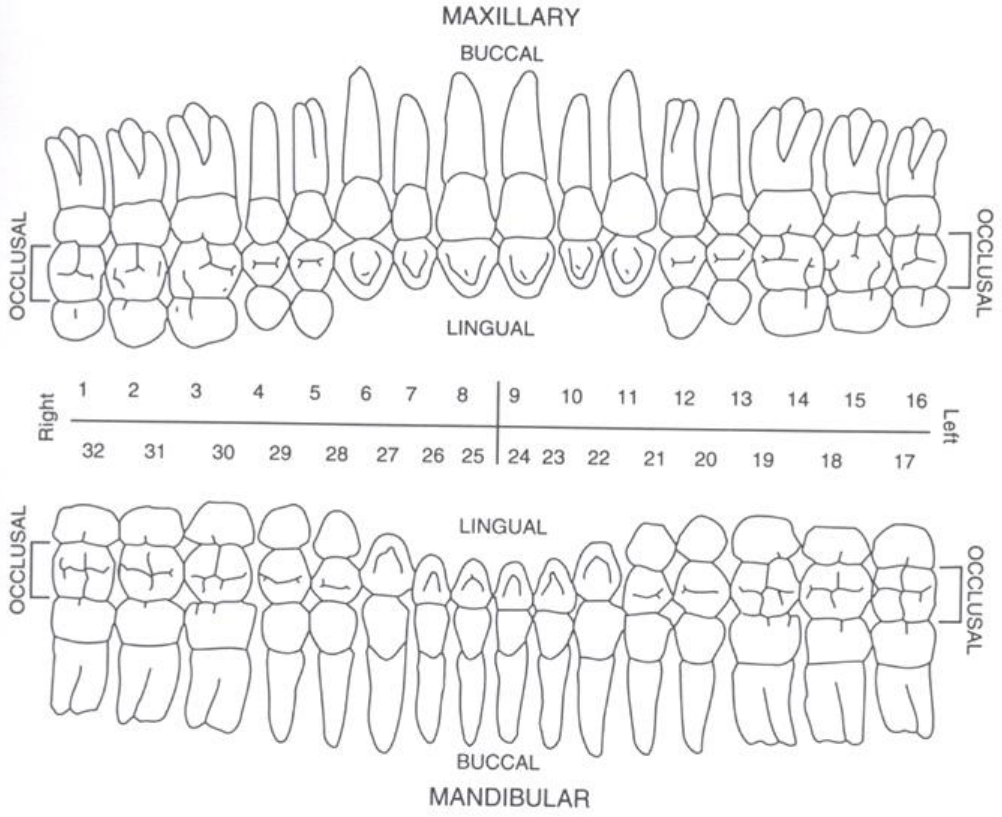
DENTAL INVENTORY
VISUAL RECORDING FORM: PERMANENT DENTITION

Site Name/Number _____/_____ Observer _____

Feature/Burial Number _____/_____ Date _____

Burial/Skeleton Number _____/_____

Present Location of Collection _____



DENTAL INVENTORY
VISUAL RECORDING FORM: DECIDUOUS DENTITION

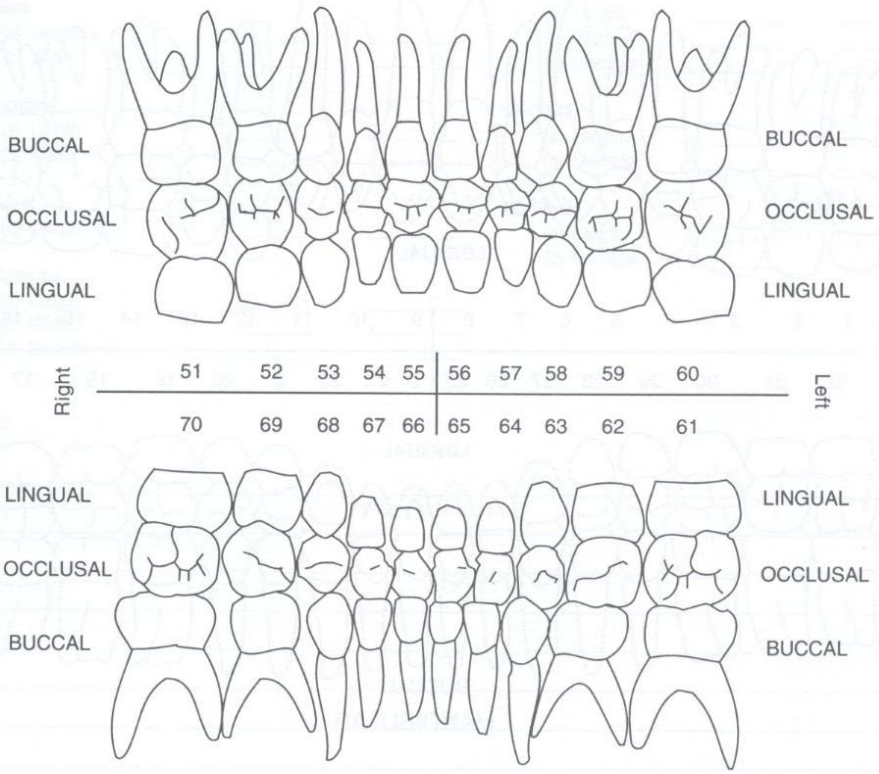
Site Name/Number _____/_____ Observer _____

Feature/Burial Number _____/_____ Date _____

Burial/Skeleton Number _____/_____

Present Location of Collection _____

MAXILLARY



MANDIBULAR

SUPERNUMERARY TEETH AND ABSCESSES
VISUAL RECORDING FORM: MANDIBULAR DENTITION

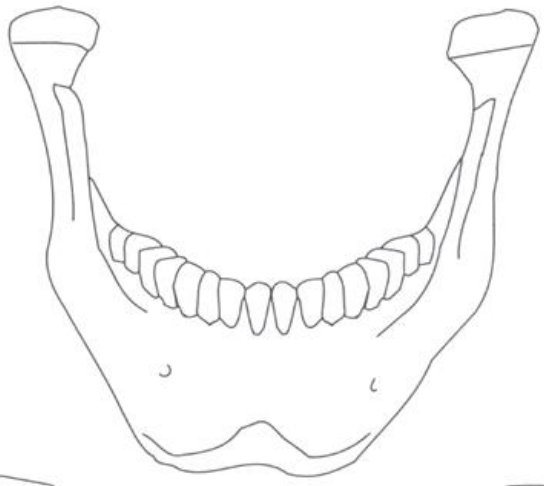
Site Name/Number _____/_____ Observer _____

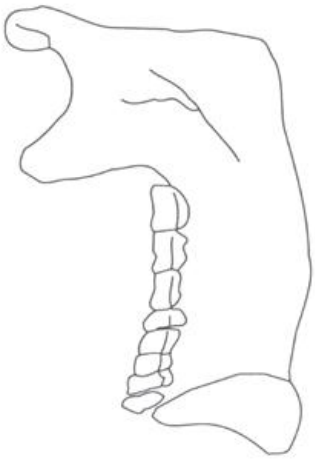
Feature/Burial Number _____/_____ Date _____

Burial/Skeleton Number _____/_____

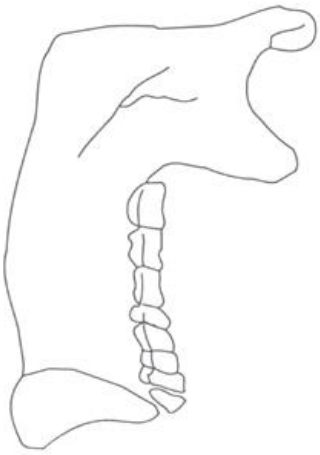
Present Location of Collection _____

Frontal (Labial)/Buccal View





Right Lingual View



Left Lingual View

Attachment 15b: CHAPTER 5

Series/Burial/Skeleton_____

Observer/Date_____

	Tooth	Presence	Development	Wear /Total		Caries			Abscess	Calculus/Affected	
Mandibular Left	17 M_3	___	___	___	___	___	___	___	___	___	___
	18 M_2	___	___	___	___	___	___	___	___	___	___
	19 M_1	___	___	___	___	___	___	___	___	___	___
	20 P_2	___	___	___	___	___	___	___	___	___	___
	21 P_1	___	___	___	___	___	___	___	___	___	___
	22 C	___	___	___	___	___	___	___	___	___	___
	23 I_2	___	___	___	___	___	___	___	___	___	___
	24 I_1	___	___	___	___	___	___	___	___	___	___
Mandibular Right	25 I_1	___	___	___	___	___	___	___	___	___	___
	26 I_2	___	___	___	___	___	___	___	___	___	___
	27 C	___	___	___	___	___	___	___	___	___	___
	28 P_1	___	___	___	___	___	___	___	___	___	___
	29 P_2	___	___	___	___	___	___	___	___	___	___
	30 M_1	___	___	___	___	___	___	___	___	___	___
	31 M_2	___	___	___	___	___	___	___	___	___	___
	32 M_3	___	___	___	___	___	___	___	___	___	___

Estimated dental age (juveniles only)_____

Supernumerary Teeth:	Position between teeth	Location (1 - 4)	Position between teeth	Location (1 - 4)	Position between teeth	Location (1 - 4)
	___/___	___	___/___	___	___/___	___
	___/___	___	___/___	___	___/___	___

Comments:

_____

_____

_____

_____

_____

_____

Attachment 16: CHAPTER 5

TAPHONOMY RECORDING FORM I: BURNED BONE

Site Name/Number _____/_____ Observer _____

Feature/Burial Number _____/_____ Date _____

Burial/Skeleton Number _____/_____

Present Location of Collection _____

List bones individually or in fragment clusters. Bone should be reported as **T**an, **B**lack (including dark brown), or **W**hite (including blue-gray). If more than one color appears on a single bone, list all appropriate colors and percentage of bone(s) affected. If reporting poorly preserved or highly fragmented materials, weights may be substituted for percentages. Surface texture should be reported as **L** (Longitudinally Split); **T** (Longitudinal and Transverse Checking); or **C** (Curved Cracks). Indicate presence by recording appropriate initials. Similarly, report the presence of deformed (warped) bone as **Y** (Present) or **N** (Not Present). The presence of surfaces shielded through articulation or by dense soft tissues should also be recorded as **Y** (Present) or **N** (Not Present) and described in the space provided.

Bone(s)	Color % Affected	Surface Texture	Warped?	Shielded Surfaces?

CRANIAL AND POSTCRANIAL MEASUREMENT RECORDING FORM: ADULT REMAINS

Site Name/Number _____/_____ Observer _____

Feature/Burial Number _____/_____ Date _____

Burial/Skeleton Number _____/_____

Present Location of Collection _____

Record all measurements to the nearest millimeter; in the case of bilateral measurements, take measurement on the left side. If right side is substituted, place an (R) next to the the measurement.
If bones are fragmented, measurements should not be taken, but dimensions should be estimated for minor erosion or reconstruction; identify these with an asterisk"*"

Cranial Measurements

1. Maximum Cranial Length: _____
2. Maximum Cranial Breadth: _____
3. Bizygomatic Diameter: _____
4. Basion-Bregma Height: _____
5. Cranial Base Length: _____
6. Basion-Prosthion Length: _____
7. Maxillo-Alveolar Breadth: _____
8. Maxillo-Alveolar Length: _____
9. Biauricular Breadth: _____
10. Upper Facial Height: _____
11. Minimum Frontal Breadth: _____
12. Upper Facial Breadth: _____
13. Nasal Height: _____
14. Nasal Breadth: _____
15. Orbital Breadth: _____
16. Orbital Height: _____
17. Biorbital Breadth: _____
18. Interorbital Breadth: _____
19. Frontal Chord: _____
20. Parietal Chord: _____
21. Occipital Chord: _____
22. Foramen Magnum Length: _____
23. Foramen Magnum Breadth: _____
24. Mastoid Length: _____
25. Chin Height_____
26. Height of the Mandibular Body: _____
27. Breadth of the Mandibular Body:_____
28. Bigonial Width: _____
29. Bicondylar Breadth: _____
30. Minimum Ramus Breadth: _____
31. Maximum Ramus Breadth: _____
32. Maximum Ramus Height: _____
33. Mandibular Length: _____
34. Mandibular Angle: _____

TAPHONOMY RECORDING FORM II:
WEATHERING, DISCOLORATION, POLISH, CUTMARKS, GNAWING, and OTHER CULTURAL MODIFICATIONS

Site Name/Number _____/_____ Observer _____

Feature/Burial Number _____/_____ Date _____

Burial/Skeleton Number _____/_____

Present Location of Collection _____

This form is to be used in recording the following modifications: discoloration due to contact with metals, polish, cutmarks, other forms of cultural modifications, and rodent/carnivore gnawing. The following should be recorded. In every example, the nature of the modification should also be described in the space allocated.

Weathering: 1) Bone identification, 2) photographs of representative samples, 3) degree of weathering (use Behrensmeyer system provided in Table 1 for coding degree of weathering).

Discoloration: 1) Bone identification, 2) location (append drawing and photograph), 3) color of discolored bone and "normal" adjacent bone (use appropriate Munsell Chart(s)).

Polish: 1) Bone identification, 2) location (append drawing and photograph).

Cutmarks: 1) Bone identification, 2) location (append drawing and photograph), 3) number of cuts, 4) average cut length, 5) range of cut lengths, 6) sketch and cast (optional but recommended) of representative cut(s).

Evidence of Rodent and Carnivore Gnawing: 1) Bone identification,2) location (append drawing and photograph), 3) number of paired grooves or incisions. Evidence of rodent and carnivore gnawing should be recorded separately.

Other Forms of Cultural Modification Including the Creation of Artifacts: 1) Bone identification, 2) shape (append drawing and photograph).

Type of Bone Alteration	Location of Modification	# of Photographs/ # of Drawings	Additional Descriptive Information

PALEOPATHOLOGY RECORDING FORM I

SHAPE, SIZE, BONE LOSS, FORMATION, FRACTURES, AND POROTIC HYPEROSTOSIS

Site Name/Number _____/_____ Observer _____

Feature/Burial Number _____/_____ Date _____

Burial/Skeleton Number _____/_____

Present Location of Collection _____

1.0 SHAPE

Bone_____	Bone_____	Bone_____	Bone_____	Bone_____	Bone_____
Side_____	Side_____	Side_____	Side_____	Side_____	Side_____
Bone_____	Bone_____	Bone_____	Bone_____	Bone_____	Bone_____
Side_____	Side_____	Side_____	Side_____	Side_____	Side_____
Obs1_____	Obs1_____	Obs1_____	Obs1_____	Obs1_____	Obs1_____
Obs2_____	Obs2_____	Obs2_____	Obs2_____	Obs2_____	Obs2_____

2.0 SIZE

Bone_____	Bone_____	Bone_____	Bone_____	Bone_____	Bone_____
Side_____	Side_____	Side_____	Side_____	Side_____	Side_____
Obs_____	Obs_____	Obs_____	Obs_____	Obs_____	Obs_____

3.0 BONE LOSS

Bone____	Bone____	Bone____	Bone____	Bone____	Bone____
Side_____	Side_____	Side_____	Side_____	Side_____	Side_____
Section_____	Section_____	Section_____	Section_____	Section_____	Section_____
Aspect_____	Aspect_____	Aspect_____	Aspect_____	Aspect_____	Aspect_____
Obs1_____	Obs1_____	Obs1_____	Obs1_____	Obs1_____	Obs1_____
Obs2_____	Obs2_____	Obs2_____	Obs2_____	Obs2_____	Obs2_____
Obs3_____	Obs3_____	Obs3_____	Obs3_____	Obs3_____	Obs3_____
Obs4_____	Obs4_____	Obs4_____	Obs4_____	Obs4_____	Obs4_____
Obs5_____	Obs5_____	Obs5_____	Obs5_____	Obs5_____	Obs5_____
Obs6_____	Obs6_____	Obs6_____	Obs6_____	Obs6_____	Obs6_____
Obs7_____	Obs7_____	Obs7_____	Obs7_____	Obs7_____	Obs7_____
Obs8_____	Obs8_____	Obs8_____	Obs8_____	Obs8_____	Obs8_____

4.0 FORMATION

Bone____	Bone____	Bone____	Bone____	Bone____	Bone____
Side_____	Side_____	Side_____	Side_____	Side_____	Side_____
Section_____	Section_____	Section_____	Section_____	Section_____	Section_____
Aspect_____	Aspect_____	Aspect_____	Aspect_____	Aspect_____	Aspect_____
Obs1_____	Obs1_____	Obs1_____	Obs1_____	Obs1_____	Obs1_____
Obs2_____	Obs2_____	Obs2_____	Obs2_____	Obs2_____	Obs2_____
Obs3_____	Obs3_____	Obs3_____	Obs3_____	Obs3_____	Obs3_____
Obs4_____	Obs4_____	Obs4_____	Obs4_____	Obs4_____	Obs4_____
Obs5_____	Obs5_____	Obs5_____	Obs5_____	Obs5_____	Obs5_____
Obs6_____	Obs6_____	Obs6_____	Obs6_____	Obs6_____	Obs6_____

Series/Burial/Skeleton_____

Observer/Date_____

5.0 FRACTURES

Bone____	Bone____	Bone____	Bone____	Bone____	Bone____
Side____	Side____	Side____	Side____	Side____	Side____
Section____	Section____	Section____	Section____	Section____	Section____
Obs1____	Obs1____	Obs1____	Obs1____	Obs1____	Obs1____
Obs2____	Obs2____	Obs2____	Obs2____	Obs2____	Obs2____
Obs3____	Obs3____	Obs3____	Obs3____	Obs3____	Obs3____
Obs4____	Obs4____	Obs4____	Obs4____	Obs4____	Obs4____
Obs5____	Obs5____	Obs5____	Obs5____	Obs5____	Obs5____
Obs6____	Obs6____	Obs6____	Obs6____	Obs6____	Obs6____
Obs7____	Obs7____	Obs7____	Obs7____	Obs7____	Obs7____
Obs8____	Obs8____	Obs8____	Obs8____	Obs8____	Obs8____
Obs9____	Obs9____	Obs9____	Obs9____	Obs9____	Obs9____
Obs10____	Obs10____	Obs10____	Obs10____	Obs10____	Obs10____
Obs11____	Obs11____	Obs11____	Obs11____	Obs11____	Obs11____

6.0 POROTIC HYPEROSTOSIS

Bone____	Bone____	Bone____	Bone____	Bone____	Bone____
Side____	Side____	Side____	Side____	Side____	Side____
Obs1____	Obs1____	Obs1____	Obs1____	Obs1____	Obs1____
Obs2____	Obs2____	Obs2____	Obs2____	Obs2____	Obs2____
Obs3____	Obs3____	Obs3____	Obs3____	Obs3____	Obs3____

Comments:

PALEOPATHOLOGY RECORDING FORM II
VERTEBRAL PATHOLOGY, ARTHRITIS, AND MISCELLANEOUS

Site Name/Number _____/_____ Observer _____

Feature/Burial Number _____/_____ Date _____

Burial/Skeleton Number _____/_____

Present Location of Collection _____

7.0 VERTEBRAL PATHOLOGY

Bone____	Bone____	Bone____	Bone____	Bone____	Bone____
Side____	Side____	Side____	Side____	Side____	Side____
Aspect____	Aspect____	Aspect____	Aspect____	Aspect____	Aspect____
Bone____	Bone____	Bone____	Bone____	Bone____	Bone____
Side____	Side____	Side____	Side____	Side____	Side____
Aspect____	Aspect____	Aspect____	Aspect____	Aspect____	Aspect____
Obs1____	Obs1____	Obs1____	Obs1____	Obs1____	Obs1____
Obs2____	Obs2____	Obs2____	Obs2____	Obs2____	Obs2____
Obs3____	Obs3____	Obs3____	Obs3____	Obs3____	Obs3____

8.0 ARTHRITIS

Bone____	Bone____	Bone____	Bone____	Bone____	Bone____
Side____	Side____	Side____	Side____	Side____	Side____
Section/	Section/	Section/	Section/	Section/	Section/
Aspect____	Aspect____	Aspect____	Aspect____	Aspect____	Aspect____
Bone____	Bone____	Bone____	Bone____	Bone____	Bone____
Side____	Side____	Side____	Side____	Side____	Side____
Section/	Section/	Section/	Section/	Section/	Section/
Aspect____	Aspect____	Aspect____	Aspect____	Aspect____	Aspect____
Obs1____	Obs1____	Obs1____	Obs1____	Obs1____	Obs1____
Obs2____	Obs2____	Obs2____	Obs2____	Obs2____	Obs2____
Obs3____	Obs3____	Obs3____	Obs3____	Obs3____	Obs3____
Obs4____	Obs4____	Obs4____	Obs4____	Obs4____	Obs4____
Obs5____	Obs5____	Obs5____	Obs5____	Obs5____	Obs5____
Obs6____	Obs6____	Obs6____	Obs6____	Obs6____	Obs6____
Obs7____	Obs7____	Obs7____	Obs7____	Obs7____	Obs7____
Obs8____	Obs8____	Obs8____	Obs8____	Obs8____	Obs8____
Obs9____	Obs9____	Obs9____	Obs9____	Obs9____	Obs9____

MISCELLANEOUS

Bone____	Bone____	Bone____	Bone____	Bone____	Bone____
Side____	Side____	Side____	Side____	Side____	Side____
Obs____	Obs____	Obs____	Obs____	Obs____	Obs____
Bone____	Bone____	Bone____	Bone____	Bone____	Bone____
Side____	Side____	Side____	Side____	Side____	Side____
Obs____	Obs____	Obs____	Obs____	Obs____	Obs____

Appendix III: Supplementary photographic and radiographic images

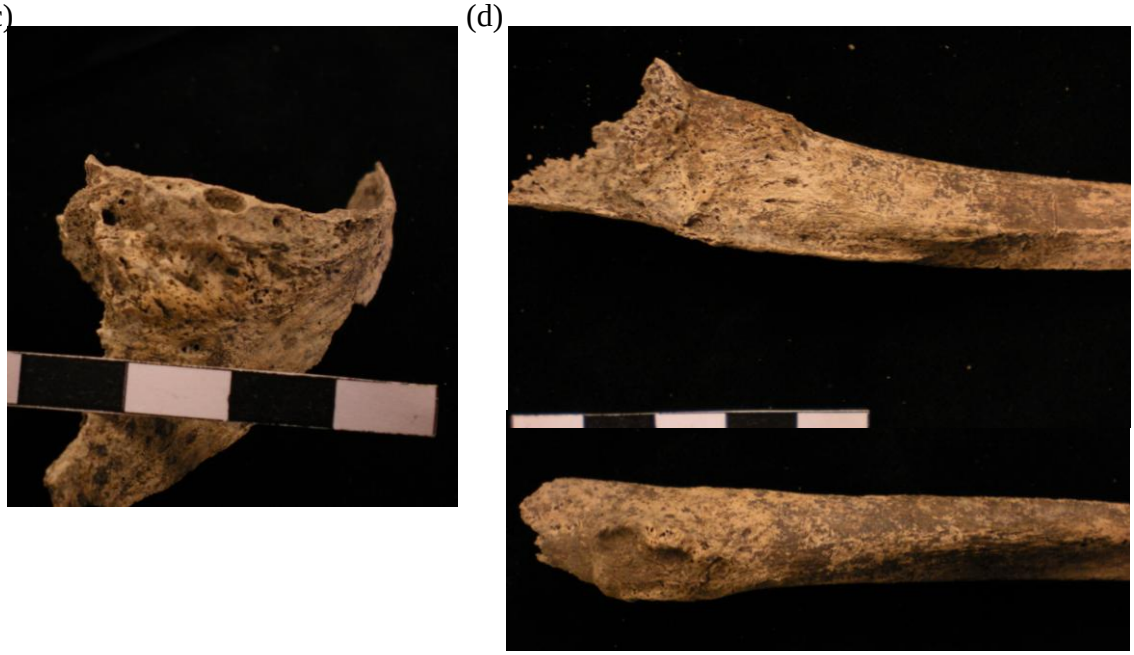
Individual burials:

Burial 20

(a) (b)

Figure 3: Superior view of mandible showing antemortem tooth loss of left PM2 and M1, antemortem occlusal destruction of right M1, postmortem loss of left and right I1, and calculus along lingual surfaces of left I2 and C (a); radiograph of mandible demonstrating completed resorption along left torus (b); reactive bone and lipping along acetabulum margin (c); and bone formation along right ulnar tuberosity and right radial tuberosity, a result of articular joint wear (d)

(c) (d)



Burial 26

(a)

(b)

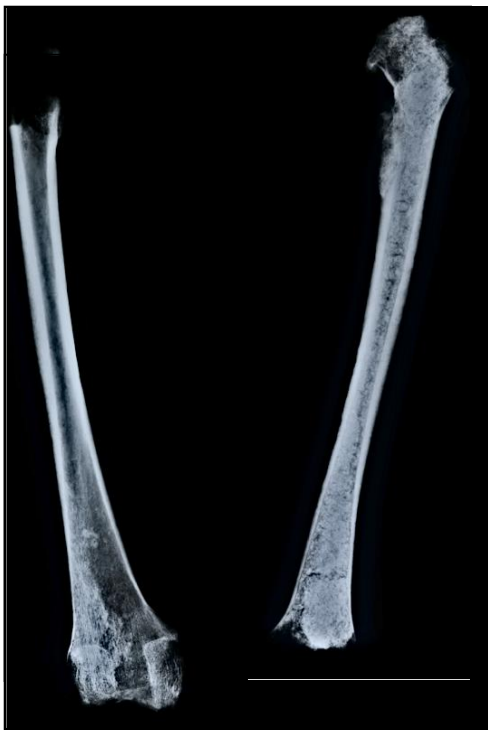


Figure 4: Posterior view of left femur indicating hyperostosis of the gluteal tuberosity and compression of healing femoral neck and head (a); radiograph comparing cortical thicknesses and shapes of left and right femora (b)

(c)

(d)

Figure 5: Reshaping of the acetabulum, thickened posterior border and thinned superior border, resulting from altered weight distribution on right leg (c), subsequent changes visible in right femur with extensive remodeling of the femoral head (d)

Burial 46

(a)  (b) 

Figure 6: Unfused iliac spine (a) and ischial tuberosity (b); bony growth along right 1st rib angle (c); and bone remodeling of proximal articular surface of 1st metacarpal suggestive of healed fracture

(c)  (d) 

Burial 13

(a) (b)

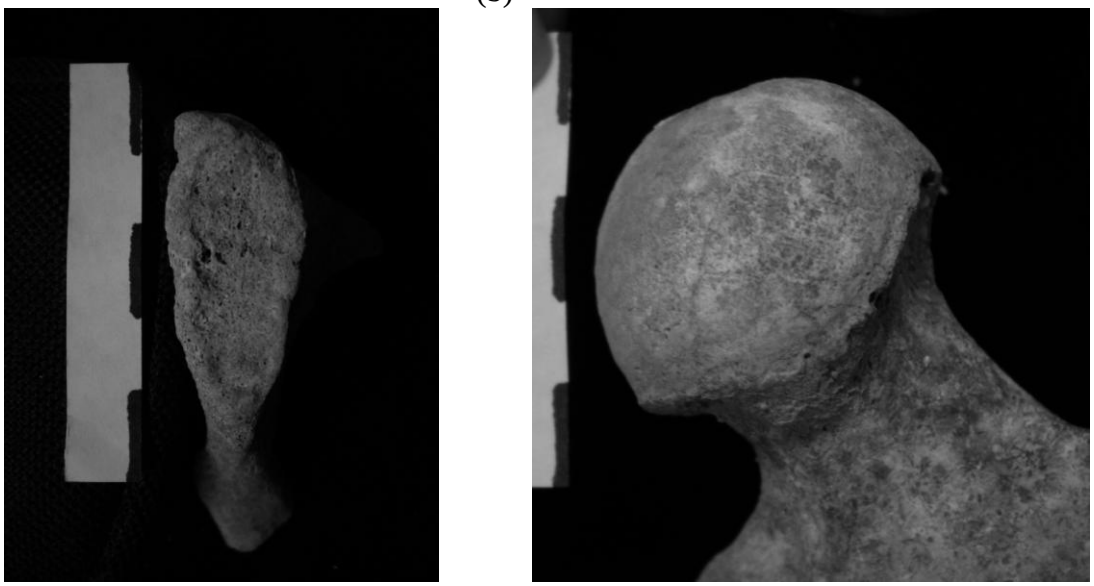


Figure 7: Preservation of pubis and ischiopubic ramus indicates female individual and pubic symphysis allows for age determination (a); slight lipping and increased femoral head area connoting increased movement at hip joint (b)

Burial 290

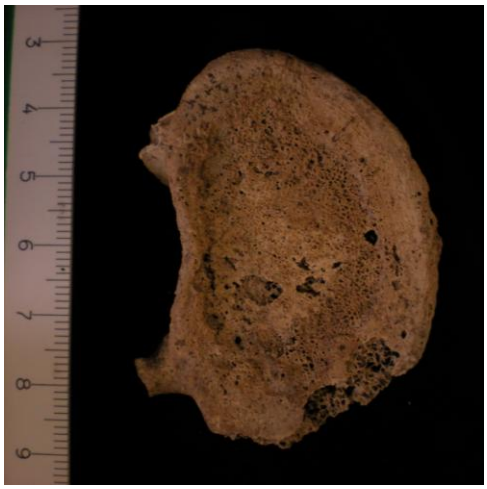
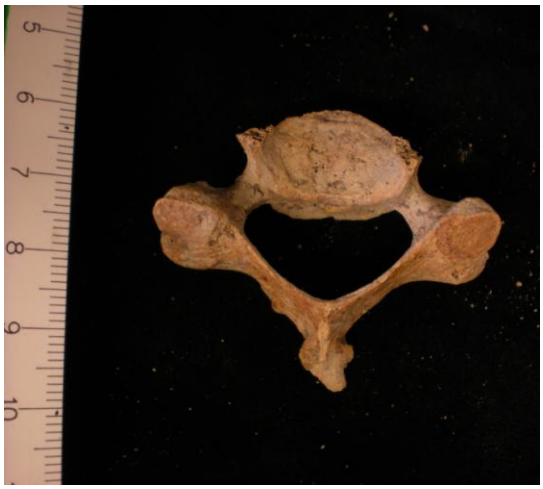
Figure 8: Extensive dental wear on C and PM1 occlusal surfaces. Abscess below right M1

Commingled

Burial 1

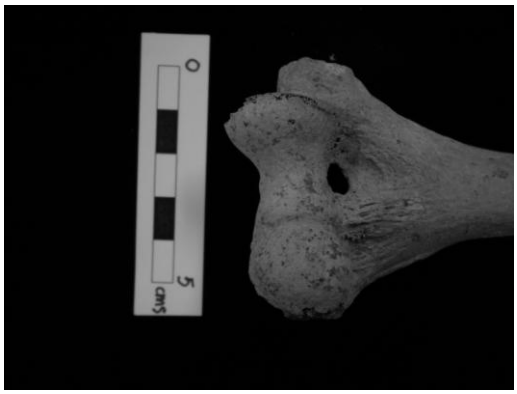
(a)  (b) 

Figure 9: Osteophytosis visible in lumbar vertebrae of individual (a) and (b); deterioration of vertebral body demonstrating Schmorl's nodes in another individual (c); and vertebral body compression in cervical vertebra (d)

(c)  (d) 

(a)

(b)



(c)

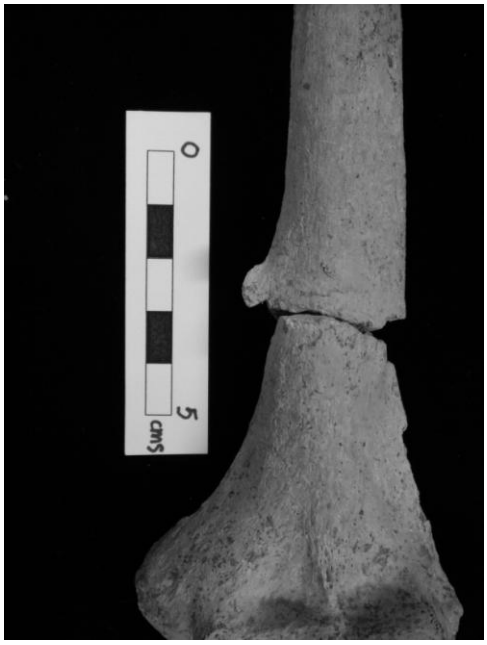


Figure 10: Alveolar resorption of the left mandibular M1 and M2 in individual 1.5. Bone remodeling incomplete at death (a); pierced olecranon fossa of left humerus, indicating hyperextension of elbow joint (b); bony spur along left humeral shaft as a result of trauma or heritable trait (c)

Burial 2

(a)

Figure 11: Infant 2.4 with reactive bone formation along the cruciform eminence, a manifestation of possible infection or inflammation consistent with growth (a); infant with unfused occipital squama and basilar portion (b); infant 2.5 left mandibular body with C, PM1, and M1 deciduous teeth and visible tooth crypt (c); incomplete right greater wing on infant 2.5 sphenoid (d)

(b)

(c)

(d)

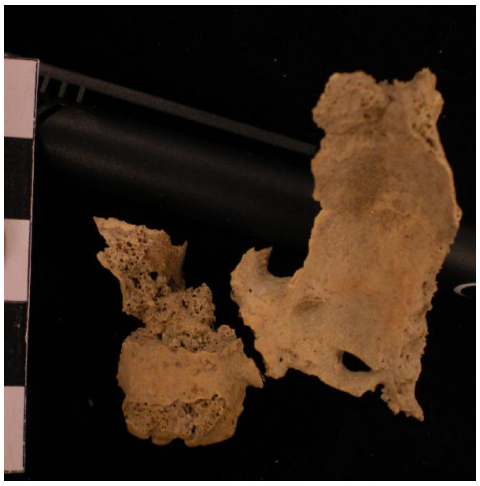


Figure 12: Anterior view of cranial vault (a) with significant pitting (b) and vascularized channels (c) along the parietal in individual 2.3

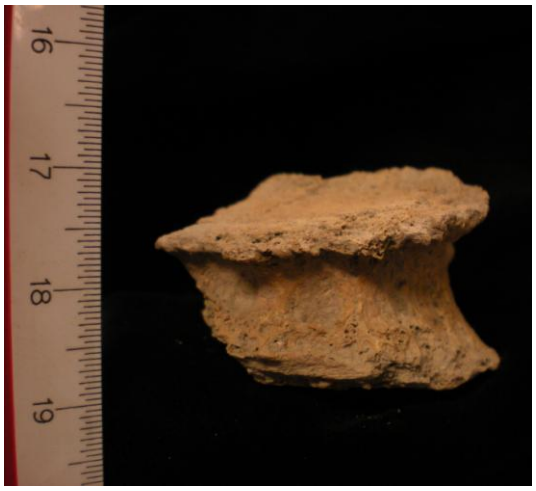
(a)

(b)

(c)

(a)

(b)

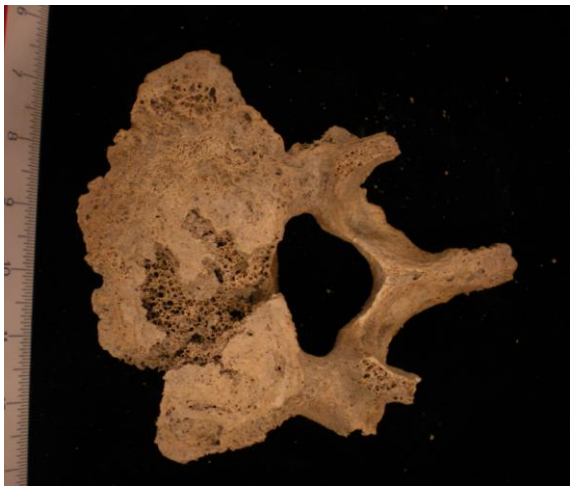


(c)

Figure 13: Vertebral column with early degeneration of centra (a); later arthritic effects of osteophytosis and vertebral body compression (b) and (c); Schmorl's nodes (d); and exotoses on lumbar (e)

(d)

(e)



Burial 304

(a)

(b)

(c)

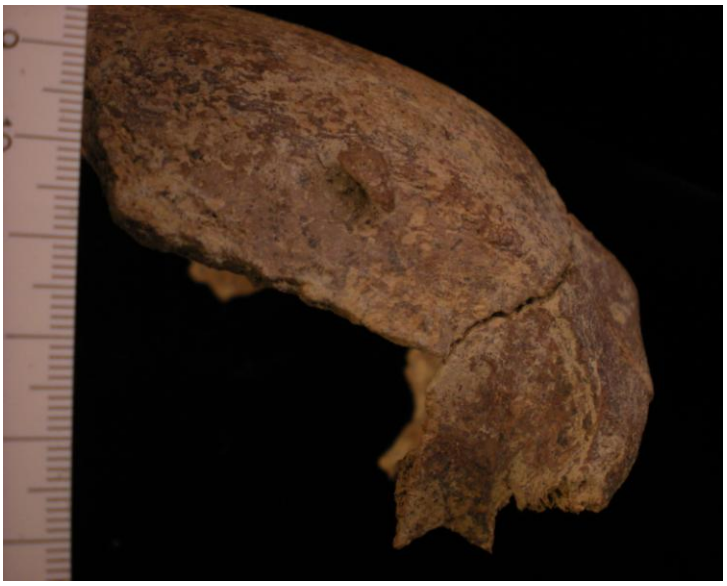


Figure 14: Reshaped lesser trochanter on right femur, likely result of increased movement and articulation at the hip joint (a); bone formation, obscuring posterior head-neck border (b); bony projection below temporal line in 304.1 (c); "melted" appearance of thoracic bodies from spinal arthritis (d)

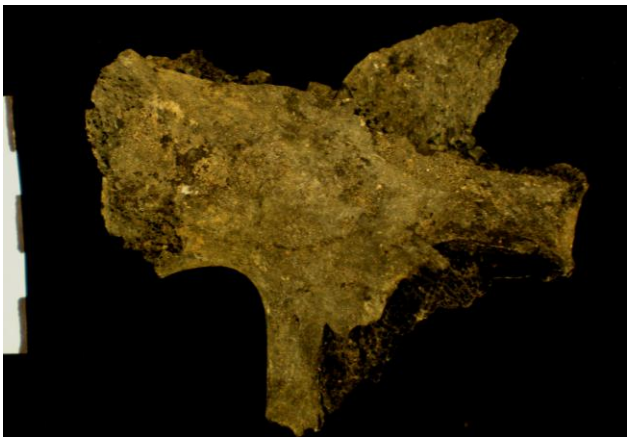
(d)

Cremation

Burial 4

Figure 15: Blackened, chalky appearance of ilium (a) and light gray external vertebral surfaces (b) demonstrate a cremation at lower heat and short duration

(a)



(b)

Burial 16

(a)

(b)

Figure 16: Curved transverse cracks indicative of flesh burned from the bone (a); the effects of high temperature and time on radius from cremation (b)

Appendix IV: Intermingled with skeletal remains

Figure 17: Rusted iron (a) found encrusted to posterior-distal end of right femur (b) of individual 26; evidence of bone discoloration from metal (potentially copper or bronze) exposure on femoral neck (c) and medial epicondyle of individual 13

(a)

(b)

(c)

Figure 18: Four astragaloi found with individual 26 (a); grave stele (ca. 420 BCE) unearthed near the Sacred Way depicting young man holding a strigil like that found in burial 4 (b)

(a)

(b)

420 BC. "P797/I417." Athens: Hellenic Ministry of Culture Archaeological Receipts Fund.