Life in the Florida Everglades: Bioarchaeology of the Miami One Site

by

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A thesis submitted in partial fulfillment of the requirements for the degree of
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Date of Approval:
April 7, 2010

Keywords: mortuary practice, paleodemography, paleopathology, physical anthropology, South Florida

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Dedication

For my parents, Damaris Gonzalez and Alberto R. Echazabal, whose profound love and support give me strength.  Los amo.
Acknowledgements

I would like to express my gratitude to the faculty and staff of the University of South Florida Anthropology Department. I would like to thank my advisor, Erin H. Kimmerle, for her guidance and support, and my committee members, Nancy White and Robert Tykot, for their editorial advice throughout this process. The study of the Miami One skeletal collection was made possible by Robert S. Carr and the Archaeological and Historical Conservancy, Inc. Funding for my studies was provided by the Diverse Student Success Fellowship. Rod Hale, from the USF Graduate School, provided endless encouragement and was instrumental in ensuring my continued financial support through the fellowship. Funding for lab supplies and materials that I used in the new Bioarchaeology Lab in the USF Anthropology Department was provided in part by Griffin Award Committee of the Florida Archaeological Council, Inc.

In addition, I gratefully acknowledge the invaluable contributions of several individuals to my success. Matt and Liotta Dowdy donated their time and resources to provide me with radiographs necessary for this study. Tom Hyre gave up much of his free time to provide me with excellent editorial advice, much needed humor and cheerful cyber-company during many long work nights. Kimmerle’s biological anthropology students were a great source of moral support, academic resources and necessary diversion. Finally, I would like to express my eternal gratitude to my parents, family and friends, who never cease to encourage me and are always there to celebrate my victories and stand by me during my trials. They are my light and my shelter.
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ABSTRACT

The bioarchaeology of prehistoric south Florida has been an area of archaeological interest for the last century because of the interplay between ancient populations and the unique environment of the Everglades. The purpose of this study is to analyze the pathology, demography and mortuary practice of the ancient Southeast Florida aboriginal population at Miami One to assess the similarity of Miami One to other south Florida populations during the prehistoric period. The Miami One site (8DA11) is one of many related sites located along the shore of the Miami River. It was continuously occupied from the Late Archaic (ca.1000 B.C.) through the Glades II period (1000 A.D.). Archaeological material associated with the Glades III period (ca. A.D. 1200) was also present. A large quantity of human remains was recovered and half of this collection is being temporarily housed at the University of South Florida. The burials were secondary and commingled in nature, having been recovered from solution holes which served as natural ossuaries. A total of forty-nine adults and fourteen juveniles are reported. Nineteen cases of osteoarthritis related to age and injury are described. Thirty-two cases of infection are described, including periostitis, osteomyelitis, and a possible treponemal infection. Seven cases of trauma are also present. Radiographic evidence demonstrates a low frequency of metabolic disruptions
in the population. Dental pathology consists mostly of severe attrition, abscessing, calculus and very few caries, all consistent with a hunter-gatherer subsistence pattern. Mortuary data, including demography, pathology, type of burial, burial location and burial artifacts, are compared to that of five other contemporaneous sites and an earlier site associated with the Glades culture in southeast Florida. The data gathered in this study are consistent with those of the six additional sites, indicating that the local culture is indeed part of the larger Glades culture assigned to southeast Florida and that these groups are culturally heterogeneous.
Chapter 1

Introduction

The archaeological culture area of south Florida, whose boundaries were defined by Goggin (1947:119), has been of interest to scholars, including archaeologists, for well over a century (e.g. Goggin 1947; McNicoll 1941; Milanich 1994, 1995). This interest is due in part to the unique environment to which the regional population adapted very efficiently. Osteological research regarding the lifestyle of the local populations has increased in the last several years as more archaeological projects and reports have resulted in publications (e.g. Isçan 1983; Carr et al. 1984; Carr and Ricisak 2000; Isçan et al. 1993, Iscan et al. 1995). The Late Archaic (2000 to 500 B.C.) and Glades (500 B.C. to A.D. 1600) periods are represented by a series of related sites along the Miami River and farther inland into the Everglades (Figure 1.1). Miami One (8DA11) is located on the Miami River and has yielded hundreds of skeletal remains along with some archaeological material.

The focus of this study is on the human remains from the Miami One site, which were found in solution holes serving as natural ossuaries. These remains are being temporarily housed at the Anthropology Department of the University of South Florida. This study consists of analysis of the paleodemography and paleopathology of the population represented by these remains, spanning roughly from the Late Archaic to the Glades II (2000 B.C. to A.D. 1200) period. The information gathered is compared to data
Figure 1.1. Florida environments during the Glades period and today (adapted from Felmley 1991: 17).
from other contemporaneous archaeological sites in the area, as well as an earlier site, to assess a change through time in subsistence patterns and evident pathologies. The comparative sites are Santa Maria (DA2132), the Icon-Brickell Parcel (DA98), Brickell Bluff (DA1082), Flagami South (DA1053), Margate-Blount (BD41) and Windover (BR246). The information gathered is also used to discuss burial practice. Demography, pathology, type of burial, body position and grave inclusions are taken into account in discussing whether an individual’s status can be discerned. This study is conducted under an environmental framework in which the local environment and available resources play a central role in cultural adaptation. Successful adaptation in this study is discussed in terms of the skeletal remains rather than technology.

The following chapter is an introduction to the Glades population and their descendants, the Tequesta, as well as their natural environment. Chapter two discusses environmental archaeology and previous bioarchaeological research in Florida. Chapter three presents the materials and methods used in this study, followed by an overview of the lab protocol and the variables used for analysis: paleodemography, paleopathology and mortuary practice. Chapters four and five present the results and discussion of the demographic and pathologic and mortuary findings.

*Southeast Florida Environment and Culture during the Glades Period*

The people of southeast Florida were known by the Spaniards as the Tequesta during the Contact-period. The Tequesta and their pre-Contact ancestors are collectively referred to as the Glades population. This group is defined by their occupation of the Everglades and the area proximal to the Miami River (Figure 1.1). The archaeological
material associated with the Tequesta and their ancestors is known as the Glades culture (Milanich 1995). In the following sections, I introduce the evolution of the local environment during prehistoric times and present a review of the Glades people and their culture as evidenced by the archaeological record.

**South Florida and the Everglades**

The area referred to as “south Florida” is difficult to define. In fact, Griffin (2002:1) begins his book on the archaeology of the Everglades by stating that many sources fail to define it successfully, and even those that do vary greatly among one another, though they all include the Everglades region in its entirety. Most definitions are based on ecology, topology and climate, but there is no consensus. This study uses Goggin’s definition of the “Glades area” as “the southern tip of the state south of Boca Grande Pass on the west coast, and below Fort Pierce on the east coast [which] comprises all of tropical Florida, and the local culture reflects this environmental influence” (Goggin 1947:119; see Figure 1.2).

The environment in south Florida has changed considerably over the last several millennia, well before human habitation. Between 19,000 and 14,000 B.C., sea levels were low and the coastline retreated as much as 130 m from modern-day shores. The southern Florida peninsula would have been arid and dry. The Holocene brought about a rapid sea level rise between 12,000 and 5,000 B.C., after which time the increase became more gradual. This rise was most likely associated with a rise in temperatures starting 15,000 years ago (Milliman and Emery 1968:1123).

According to Milanich, archaeological evidence indicates that Florida was inhabited prior to 12,000 years ago (10,000 years B.C.) at the start of the Paleo-Indian
Figure 1.2. South Florida populations (adapted from Griffin 2002:163).
Period. He states that the end of the Ice Age brought about changes in climate which were favorable to a rapid increase in the human population (Milanich 1994:33). During the Middle Holocene, the climate in south Florida became moister and similar to current conditions (Milanich 1994:63; Widmer 1988:165). With the formation of Lake Okeechobee around 3,500 B.C. and other inland sources of freshwater, rainfall increased, giving way to the development of wetland vegetation in the Everglades and ultimately, freshwater and brackish water peats (Widmer 1988:165). However, the coastline did not become suitable for human occupation beyond seasonal procurement until about 700 B.C., during the Late Archaic, when the rise of sea level slowed down and the coastal environment began to resemble current conditions. Archaeological evidence for this is largely obscured by the rising sea level and modern developments (Milanich 1994:298; Widmer 1988:187-188, 213-214).

According to Schwadron (2006), the Florida Glades is the largest archeological region in south Florida. It encompasses the Everglades, the Big Cypress Swamp, located on the west, and Ten Thousand Islands, located to the south and including the Keys (Figure 1.1). Southeast Florida is largely shaped by the Everglades, a subtropical wetland 1.5 million acres in size, which covers the bottom half of the Florida peninsula (Schwadron 2006). This marshland is very environmentally diverse (Milanich 1994) with nine distinct ecosystems and a large estuary system, which serves as a nursery for a variety of marine species and provides protection against hurricanes (NPS 2007). Annual precipitation ranges from 113 to 138 cm with a wet season from April to October (Griffin 2002: 3-4). According to Griffin, fires would have been common during the dry season, both naturally occurring, as evidenced by charcoal deposits in the peat, and as a result of
human activity. However, fire is important in this kind of environment to maintain the
local flora (Griffin 2002:26). Griffin goes on to state that hurricanes and tropical
cyclones would have also been as common in prehistoric times as they are today (Griffin
2002:24-26).

Storm surges can potentially cause more damage than wind and water alone,
physically changing the landscape and altering salinity levels in the marshland, which can
affect food and water sources. Freezes were less common but would have provided a
temporary spike in available food as fish died from low water temperature (Griffin 2002:
23).

The Everglades Population

Researchers (e.g. Pepe and Jester 1995; Russo & Heide 2002:80) suggest that
regions east and south of Lake Okeechobee were populated by two different groups: the
Coastal Archaic which utilized fiber-tempered pottery and the aceramic Glades Archaic
located inland in the Everglades. The Everglades were extensively occupied by
prehistoric and Contact-period populations. Within the swamp, there are pockets of
higher ground in the form of palm tree islands, which are the location of many
archaeological sites dating back to the Late Archaic and possibly earlier (Milanich 1994,
1995; NSP 2007). These sites were inhabited by the ancestors of the Contact-period (ca.
A.D. 1400) people whom the Spanish explorers knew as the Tequesta during the
sixteenth century. The Tequesta settled on the banks of the Miami River (Figure 1.2).
Goggin (1950:13) refers to them as a dominant group in south Florida along with the
Calusa. McNicoll (1941:11) states that the “Tequesta was the term sometimes used to
refer to all East Coast Caloosas” but was most appropriately used to describe the Biscayne population whose chief was related to the Calusa chief.

According to Widmer (1988:191), population growth in south Florida probably occurred at a rate of 1.0%, and doubled about every seventy years. Griffin (2002:55) states that the limited carrying capacity of the local resources may have been a reason why the Tequesta (and their ancestors) did not develop a large population. McNicoll (1941:17) surmises that “the population of the whole peninsula probably never exceeded 10,000.” Settlement patterns, resource procurement and social organization during the Glades Periods (500 B.C. to A.D. 1600) were heavily influenced by the climatic change, which gave rise to a brackish water environment as well as more abundant freshwater sources. This environmental change came around 1,000 B.C. when it completely reshaped cultural adaptation into what Goggin referred to as the “Glades Tradition” (Goggin 1949; Widmer 1988:213-214). According to Goggin (1952), the Glades people lived in small groups of about twenty to thirty people. Subsistence was nonagricultural and based on tropical plants, including roots and fruits, marine and estuarine animals, small terrestrial animals and fowl (Milanich 1995:29-30; Griffin 2002:165; Goggin 1952). Goggin points out the close relationship between the Glades people and their environment, as procurement was seasonally specific. He also states that diet was quite varied and heavily depended on a wide range of marine resources ranging from shellfish, which he surmises were “systematically [tested]…to determine [which] were suited for food,” to sharks and whales (Goggin 1949:28-29).

Milanich (1995:53) states that archaeological evidence places the Glades culture throughout the southern portion of Florida, except on the Lake Okeechobee Basin on the
north and the territory of the Calusa to the west. Evidence of Tequesta culture localizes them in the Miami-Dade area, with the main village on the Miami River. According to Widmer (1988:223), there is no evidence that the socio-political organization of the Glades people was as complex as that of the Calusa, a coastal chiefdom that occupied the southwester portion of the Florida peninsula from Charlotte Harbor southward and who were first encountered by Ponce de Leon in 1513. The Tequesta did not control any other southeast groups such as the Ais, Guacata, Hobe, Jeaga, Santaluces and the Matecumbe of the Florida Keys, which the Spanish also referred to as Los Martires (Table 1.1). In fact, the Tequesta were likely subject to the Calusa with whom they may have maintained tenuous relationships through marriage (Milanich 1995:52-62, Widmer 1988:5).

The Glades Period

It is important to contextualize the Miami One site and its population within the Glades area. The chronology of the Glades periods and a brief description of the Glades culture are discussed in the following sections. The chronological sequence in the Glades area (Table 1.2) was based by Goggin on the sequence at Upper Matecumbe Key, where he worked alongside Frank Sommer (Goggin 1947:120; Griffin 2002:136). According to Griffin (2002:329-331), the Glades I period began about A.D. 500 to 750 and the Glades II period began about A.D. 750 and ended around A.D. 1200. The Glades III period is defined by both pottery and European contact and extends from A.D. 1200 to about A.D. 1750 (Griffin 2002:332; Carr 1990:251). Sites, seasonal and permanent, are largely marked by the presence of shell middens along coastal and estuarine environments (McGoun 1993; Milanich 1995:30).
Table 1.1. Summary of central and south Florida Contact-period cultures and their geographic locations.

<table>
<thead>
<tr>
<th>Population</th>
<th>Reference</th>
<th>Geographic Location</th>
<th>Archaeological Complex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ais</td>
<td>Milanich 1995</td>
<td>Brevard, Indian River and St. Lucie Counties</td>
<td>Indian River (variant of St. John’s)</td>
</tr>
<tr>
<td>Calusa</td>
<td>Widner 1988</td>
<td>From Charlotte Harbor to the southern tip of the peninsula</td>
<td>Caloosahatchee</td>
</tr>
<tr>
<td>Guacata</td>
<td>Milanich 1995</td>
<td>Lake Okeechobee Basin</td>
<td>Belle Glades</td>
</tr>
<tr>
<td>Jaega</td>
<td>Wheeler 1992</td>
<td>East Okeechobee; mostly in modern day Palm Beach County</td>
<td>Riviera</td>
</tr>
<tr>
<td>Hobe (Jobe)</td>
<td>Milanich 1995</td>
<td>Martin County</td>
<td>Unknown</td>
</tr>
<tr>
<td>Matecumbes (Key Indians)</td>
<td>Milanich 1995</td>
<td>Florida Keys (Los Martires)</td>
<td>Matecumbe</td>
</tr>
<tr>
<td>Santaluces</td>
<td>Milanich 1995</td>
<td>Near Port St. Lucie in St. Lucie County</td>
<td>Unknown</td>
</tr>
<tr>
<td>Viscaynos</td>
<td>Milanich 1995</td>
<td>May have been same as Tequesta</td>
<td>Unknown</td>
</tr>
</tbody>
</table>
Table 1.2. Archaeological periods in south Florida based on radiocarbon dating (adapted from Goggin 1947; Griffin 2002; Milanich 1994; Widmer 1988).

<table>
<thead>
<tr>
<th>Dates</th>
<th>Glades Period</th>
<th>Subperiods</th>
<th>Central Gulf Coast</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.D. 1600 -1750</td>
<td>Glades III</td>
<td>Glades IIIc</td>
<td>Safety Harbor</td>
</tr>
<tr>
<td>A.D. 1400-1600</td>
<td>Glades III</td>
<td>Glades IIIb</td>
<td></td>
</tr>
<tr>
<td>A.D. 1200-1400</td>
<td>Glades IIIa</td>
<td></td>
<td>Weeden Island II</td>
</tr>
<tr>
<td>A.D. 1100-1200</td>
<td>Glades II</td>
<td>IIC</td>
<td>Weeden Island I</td>
</tr>
<tr>
<td>A.D. 900-1100</td>
<td>Glades II</td>
<td>IIb</td>
<td></td>
</tr>
<tr>
<td>A.D. 750-900</td>
<td>Glades II</td>
<td>IIA</td>
<td></td>
</tr>
<tr>
<td>A.D. 500-750</td>
<td>Glades I</td>
<td>I late</td>
<td>Pre-Weeden Island</td>
</tr>
<tr>
<td>500 B.C.-A.D. 500</td>
<td>Glades I</td>
<td>I early</td>
<td></td>
</tr>
<tr>
<td>2000 -500 B.C.</td>
<td>Archaic</td>
<td>Late</td>
<td></td>
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</tbody>
</table>
The Material Culture of the Glades People

The following section is a general description of the material culture associated with the Glades periods. The material culture reviewed here includes pottery, shell and bone tools as well as wooden artifacts. Researchers use the form, function and design of these artifacts to establish their cultural association and chronology.

The chronology of the Glades periods was defined based largely on ceramic temper and decoration styles. Decorations were linear or curvilinear incised, tooled and pinched (Goggin 1947:120; Griffin 2002; McGoun 1993). According to Goggin (1947:120), during the Glades I period, the Glades Plain pottery was grit-tempered and undecorated. This grit-tempered pottery begins to exhibit incised designs during the Glades II period. At this time, Belle Glades, another pottery type, was also found mostly in the north and the west coast. Pottery decoration largely disappears in the Glades III period except in the lower east coast, where Surfside Incised, Glades Tooled and Biscayne Check-Stamped are found (Goggin 1947: 120).

Limestone and sandstone were common raw materials for stone tools (Milanich 1994:301) and were used for such tools as hammerstones and grinding slabs (Griffin 2002:117-121). Chert and flint were not found locally; therefore their presence is most likely due to trade (Milanich 1994:300-301). Chert points were possibly traded from the Tampa Bay area, along with stone celts and flint knives (Griffin 2002:118).

Griffin (2002:93-117) and Milanich (1994:302) describe the use of bone and shell. Shell tools were widely used in place of stone (Milanich 1994: 302), such as an abundant number of dippers made of *Busycon* shell, as well as receptacles, spoons, picks, hammers, adzes, celts and knives made from *Busycon, Strombus* and other species.
Perforated shells were used as net sinkers. Shell was also used in the construction of features such as embankments, canals and enclosures. Bones from various terrestrial mammals and marine species were fashioned into a number of tools such as chisels, awls, hooks and points. Sharks teeth were modified to be used as tools. Personal adornments consisted of shell beads as well as shell, bone and stone pendants and gorgets. Perforated fish vertebrae, fish, bear and porpoise teeth and bone pins were also used. During the Glades II period, bone ornaments were undecorated or incised. During the Glades III period, bone and shell decoration become more common in addition to the use of wood. Portable art and ceremonial artifacts in the form of animal and anthropomorphic figurines and carved or painted wood and stone tablets also became part of the material culture of the Glades people (Griffin 2002:121-122; Milanich 1994:304-308).

External Cultural Influence

Several aspects of the material culture indicate that the Glades people were influenced by other southeastern cultures. According to Goggin (1947:120) and McGoun (1993) some tools may suggest a growing trade network between the east and west coast of the peninsula. McGoun (1993) also states that the pottery design patterns of the east coast and west coast become similar during the Glades II period, suggesting increasing contact. Goggin states that shell tools, including the use of whole *Busycon*, began in the west coast and were later adopted in the east coast. Luer (1995: 301) also reported on a platform pipe found at the site of Ortona in Glades County which “resembles a Hopewell-style platform pipe and probably dates to the Hopewell horizon.
(ca. AD 1-350) [which] falls within the Glades I period.” Luer states that many aspects of ceremony such as the platform pipes were shared by southeast and midwest populations. The Midwestern mound-building culture known as Hopewell developed an exchange pattern that reached its peak in the period between 1 and 400 A.D. (Brown 1977:172). The site of Ortona is located on the northern, inland border of the Glades area. It is closer to the Belle Glades area on the Lake Okeechobee basin and just southwest of Fort Center. However, Luer reports that a Hopewell-style platform pipe was also found at the site of Hialeah #2, in the Miami-Dade area. This platform pipe was briefly described by McLellan (1984). As part of the discussion in his chapter on the Glades ceremonial complex, Goggin (1947:120-121) states that secondary burial mounds with grave goods may be a result of contact with various cultures in central, Gulf and northwest Florida.

**Habitation Sites and Subsistence Patterns**

Milanich (1994) tells us that shell and earth middens were common along the coast throughout the Glades periods, and perhaps as early as the Archaic period, and were probably used for a very long time. Many of these middens were located in places where freshwater rivers met the Atlantic Ocean, such as near the mouth of the Miami River, a prime occupational location. Some sites also contain constructions made from shells such as ramps and embankments. Milanich (1994:308-309) points out that there are places in which dark earth middens are more common than shell middens, such as within the Everglades National Park. Middens in south Florida can represent either permanent villages or seasonal occupation sites, such as those on Pine Island, in Calusa territory.
There is sufficient evidence that the Tequesta constructed large structures, which may have included houses (Griffin 2002; 293). An example of a large structure is the famed Miami Circle in Dade County (Carr & Ricisak 2000). Furthermore, Luer talks about “lengthy aboriginal canals in southern Florida, all apparently dug to facilitate canoe travel” found in the areas of Pine Island, Lake Okeechobee and Ten Thousand Islands (Luer 1989:89). These canals, he argued, were common in south Florida and more than facilitating travel, they would have contributed to the distribution of goods, including tribute. They also would have stimulated contact among regional groups.

Subsistence was largely based on various species of freshwater and marine fish, shellfish, sharks, sea turtles, mammals and lizards (McGoun 1993; Milanich 1994; 1995:29-30). The remains of several shark species such as bull shark, tiger shark, lemon shark and Atlantic sharpnose shark were reported by Wing and Loucks (1982) among many other marine species in the Granada site. Because of the large number of marine species found and the relatively small percentage of mammal, reptilian and avian species, these authors concluded that fishing was “clearly the predominant economic activity” (Wing and Loucks 1982:278). Edible plant species included saw palmetto, cabbage palm, mastic, yucca, prickly pear, sea grapes, hogplum and cocoplum, along with the sprouts of mangrove and acorns. According to Griffin, beginning during this period until European contact, subsistence patterns were stable and unchanged, evidencing a successful adaptation to the environment.
Ceremonial and Mortuary Practice

According to Goggin, mortuary evidence during the Glades II period consists of supine primary burials with no grave goods. Secondary burials and burial mounds with some grave goods are not seen until the Glades III period. Goggin indicates that burial mounds may have been the result of increase contact with other cultures such as Weeden Island II, Fort Walton and Safety Harbor (Goggin 1947:120-121). Burial mounds began to appear as early as 3000 years B.C., during the Archaic period, in the Southeast and evolved into various forms during the Woodland period (100 B.C. to 900 A.D.) (Dávila Cabrera 2005:88) which corresponded with the Glades I period in south Florida. Few burial artifacts were recovered from Miami One and none are dated to any specific cultural period. However, most burials were secondary and dated earlier than the Glades III period. Flagami South (DA1053) and Margate-Blount (BD41) also contain secondary burial and were occupied prior to the Glades III period (Işcan et al. 1995; Işcan 1983). The site of Brickell Bluff (DA1082) is dated to the Late Archaic and contains a mound (Işcan et al. 1993).

Felmley (1991) conducted a study of burial practices in the Southeast which included forty burials in Miami-Dade and Broward Counties. Felmely (1991:69) concluded that primary, both extended and flexed, and secondary burials were present during the Late Archaic Period, but secondary burials increased drastically (from 33% to 60%) during Glades periods probably as a result of an increased use of charnel houses. This contradicts Goggin’s earlier conclusions. She further states that there is no differential treatment based on sex or age. She also contradicts Goggin’s conclusion that burial goods were absent during the Late Archaic and early Glades Periods. She further
states that grave goods were more commonly found in primary extended burials during the Glades I period (Felmley 1991:85). It is important to note that preservation plays a role in the potential absence of grave goods made of perishable material such as wood.

Felmley concludes that there is a possible emergence of status difference during the Late Archaic and Early Glades period as evidenced by the presence of formal cemeteries and the inclusion of goods in child graves. Furthermore, Felmley speculates there was an increase in the political power of the chief based on his or her religious and ceremonial influence during the same time (Felmley 1991:85-86).

During the Glades II and II periods, Felmley notes the beginning of use of constructed sand mounds near habitation sites as well as discrete cemeteries within habitation middens. Primary and secondary burials are still present and, in some cases, they appear to be concurrent (Felmley 1991:86). She speculates that the high density of burial sites along the coast might be indicative of the development of “local or regional centers” and “the site present at the mouth of the Miami River clearly functioned as the seat of the regional Tequesta chief in the late prehistoric period” (Felmley 1991:87).

Other aspects of ceremonial life are described by McNicoll (1941) through the ethnographic accounts of missionaries who also describe aspects of daily life and the process of Christianization. It is important to note that these historical accounts were based on observations of a descendant population of the Glades people and can therefore not be said to be accurate portrayals of the Glades people prior to contact. One account offered by a Quaker describes a celebration in which the scalps of conquered enemies were perched on poles around which the Tequesta danced for three days and nights. Further descriptions indicate a religion of sun and moon worship. McNicoll also
indicates that there may have been some idol worship, as evidenced by an interaction between the Calusa chief Carlos and the missionaries in which he refused to remove some idols. McNicoll describes a ceremonial black drink, made from the boiled leaves of the *caseena* plant which is part of a nighttime ceremony. This ceremony included ritualistic dance in which men and women appear to have prescribed roles. He also described “peculiar customs of removing the bones of the cacique to be kept as an object of veneration; in the coffin of these relics they also put the bones of a seacow’s head” (McNicoll 1941:18-20). The practice of dismembering the caciques, placing them in a box and carrying them back to the cacique’s house to be venerated by the rest of the town is also noted by Parks (1982).

Another aspect of Tequesta culture noted by McNicoll (1941) and Parks (1982) based on ethnographies is the presence of human sacrifice. Parks (1982) cites ethnographies from Spanish priests pointing specifically to the sacrifice of children whenever someone of importance, such as a chief, died. There is currently no archaeological evidence to support that this practice occurred among the ancestors of the Tequesta prior to contact.
Chapter 2

Environmental Archaeology

The Everglades provide a unique opportunity to study how the environment influenced the cultural adaptations of prehistoric south Florida populations. İşcan and co-workers (1995:54) have stated that the Glades tradition “is typified by their material culture and subsistence patterns as influenced by the natural environment.” İşcan (1983:163) also offers the opinion that “any theoretical development on the biology of the prehistoric Indians and their adaptation to their environment can only be possible when the descriptive biology of the population is known.” Environmental archaeology is an interdisciplinary study of the geographical space occupied by prehistoric populations as well as their interaction with the environment. This interdisciplinary approach involves archaeology, cultural anthropology, ecology, geology and geomorphology (Reitz et al. 1996; Smyntyna 2003; Trigger 1971). Reitz and co-workers (1996) state that the central focus of environmental archaeology lies within taphonomic and methodological issues. Concepts relating to behavior and culture are also included in this framework. These concepts include issues such as health, diet, settlement patterns, subsistence patterns and economic development. The primary goal of environmental archaeology is not classification but interpretation. Reitz and co-workers (1996:4) further subdivide environmental archaeology into four subfields: earth sciences (Scudder 1996; Stein 1996), archaeobotany (Cooke et al. 1996; King and King 1996; Pearsall 1996), zooarchaeology (DeFrance et al. 1996; Neusius 1996; Zeder et al. 1996), and
bioarchaeology (Larsen et al. 1996). However, Albarella (2001:4) states that there is still a division, which must be addressed, between archaeologists who study material culture and those who study biological samples and geological issues. Albarella (2001:10) further states that environmental archaeology was a “consequence of the separation of the cultural and natural world in archaeology.”

The study of environmental archaeology and the development of its theoretical backbone have been largely carried out within the study of prehistoric hunter-gatherer groups (Smyntyna 2003; Trigger 1971). Coastal environments and the subsistence patterns and adaptation of coastal populations have been discussed more thoroughly in the last decade (Byrd 1996; Russo and Quitmyer 1996; Sanger 1996; Walker 2000). A history of archaeological theory is briefly presented here to understand how environmental archaeology evolved and why it is relevant to the present study.

Trigger (1971:321) states that prehistoric culture studies began with the idea that societies developed in a fixed sequence of stages, a concept known as unilineal evolution. According to Smyntyna (2003:44-45), unilineal evolution was based on the assumption that the geographical environment in which a culture thrived at a particular time limited the people’s behavior to a predictable and strict pattern which fit into a predefined cultural stage. This view was held by some researchers even to the middle of the 20th century, when Meggers (1954) discussed the limits that environment places on how far a culture can develop. Meggers states that “environment is an important conditioner of culture” (Meggers 1954:801). The same author also states that subsistence is largely dependent on the physical environment in which a culture develops and therefore subsistence, “appears also to be largely responsible for the level of development attained
by the culture it supports” (Meggers 1954:822). This interdependence between subsistence, environment and cultural development led the author to conclude that “the level to which a culture can develop is dependent upon the agricultural potentiality of the environment it occupies (Meggers 1954:822). Meggers states that in areas with no agricultural potential, such as swamps, subsistence is derived from hunting, fishing and gathering by highly nomadic groups. This type of subsistence pattern has “a very definitely limiting effect on the culture, keeping it on a simple level that permits the satisfaction of basic needs and little more” (Meggers 1954:806). Meggers’ description of subsistence in the swamp would apply to the Glades people of south Florida.

By the end of the 19th century, however, archaeologists began to turn their interest to diffusion in an effort to study how artifact classes originated and how each technology spread (Trigger 1971:321). One approach to diffusion was strictly geographical and only investigated population distribution (e.g. Sabloff and Willey 1967; Willey 1953). Another approach, emerging during the 1920s, centered on economy and sparked an interest in the availability of resources and how they were exploited by different populations. This economic approach, with borrowed ecological concepts, encouraged the empirical study of archaeological sites by studying the remains of plants and animals (Trigger 1971:322; King and King 1996; Neusius 1996). However, Trigger (1971:322) recognized the growing concern stated by some scholars that this approach was limited to discerning subsistence and that it would be difficult to make inferences about the culture. This concern is voiced by Hawkes (1954:161) when he states that it would be difficult to understand the mind of a people from their material culture,
meaning that he doubted that archaeological studies of material culture could provide insight into implicit ideological systems.

Archaeologists turned to Marxist theory where economy is at the center of social and ideological structures. Therefore, by studying artifact assemblages to understand economic structures, archaeologists infer the socio-political and ideological components of a culture (Trigger 1971:323). The study of artifact assemblages as a basis for making inferences about culture and cultural adaptation is central characteristic of the processualism of New Archaeology, a heavily methodological school of thought which arose during the mid-20th century (Binford 1962, 1983). The processual approach to archaeology was functionalist and sought general laws to explain how culture works. The study of ancient environments and subsistence patterns were central to the pursuits of New Archaeology. The need to study the natural environment in which ancient cultures developed and the processes of site formation led archaeologists to work closely with scientists in biological and physical fields, making processual archaeology a multidisciplinary approach. An example of the increasing importance of methodology and empiricism in processual archaeology can be seen in Hirshberg and Hirshberg’s (1957) critique of Meggers’ conclusions about the environmental limitations of cultural development. They argue that the lack of measurable variables in Meggers’ work prevents the testing of her conclusion and therefore, her law of environmental limitation of culture can not be empirically accepted.

The interest in economic structures and the relationship between populations and their environment, brought about by New Archaeology and Marxist theory, gave rise in the middle of the 20th century to a methodological approach known as environmental
archaeology (Trigger 1971, Smyntyna 2003:47). Dean and Doyel (2006:1) begin their volume by stating “just how much influence environmental factors actually have on culture, and vise versa, must be ascertained empirically.” Economic anthropology and environmental archaeology are often used in tandem to discuss natural environment and subsistence strategies (Sandweiss 1996; Wagner 1996). The study of prehistoric natural environments, including climate and topography along with the flora and fauna, became a focus in the 1960s (Smyntyna 2003:47, i.e. Cooke et al. 1996; DeFrance et al. 1996; King and King 1996; Neusius 1996; Pearsall 1996; Zeder et al. 1996). Smyntyna states that by the 1970s, archaeologists had explored the connection between environmental change, subsistence strategies, biological (morphological), and material adaptations (Hutchinson 2004; Larsen 2001; Larsen et al. 1996). Soafer (2001:126) discusses the dynamic relationship between environmental archaeology and osteoarchaeology, the archaeological study of human remains, and states that they are mutually dependent. As part of the study of subsistence strategy, there was also a growing interest in understanding procurement strategies for raw materials, especially flint, as a way to understand mobility, settlement patterns and economic development (Smyntyna 2003:50). Procurement strategies for raw materials and other resources were the focus of processual archaeology during the 1960s (Neusius 1996; Sobolik 1996).

Adaptation to the environment is a central issue in environmental archaeology discussed in all of the studies presented in this text. Smyntyna (2003) attributes the study of territory and adaptation to middle-range theory, an approach that sprang from processual archaeology when Binford studied living cultures to gain insight about human behavior in past environments (Binford 2009: 20-21). Adaptation is defined by
Smyntyna as “the process of acclimating to living conditions” (Smyntyna 2003:51). This is similar to Hawkes (1954:157) who indirectly defined adaptation as the creation of an assemblage of artifacts that fulfill a specific purpose and are “normally followed by another kind of evolution, toward an ever more efficient realization of such a purpose.” Hawkes (1954:157) in turn defined “efficiency” as “efficient for the general survival of a human group in its physical environment at whatever period.” Adaptation can refer to the collective behavior of a society within an environment and with other social groups as well as the individual behavior of the members of a group (Trigger 1971). Binford (1962:218) states that culture is the “extra-somatic means” by which humans adapt to their “total environment both physical and social.” Culture became an adaptive agent and cultural change was linked to needs arising from changing environmental conditions (Trigger 1971; Smyntyna 2003). Binford (1962:218) explains the close relationship between adaptation and environment when he states that “technology [consists of] tools and social relationships which articulate the organism with the physical environment” and therefore, technology must be viewed as “closely related to the nature of the environment.” In the case of Miami One, the local population successfully exploited terrestrial and marine resources in an estuary over an extended period time. This subsistence pattern led to specific cultural adaptations to the Everglades environment.

Critique of the Ecological Approach

Winterhalder (1980) critiques the terms and concepts used in the ecological approach. He agrees that environmental factors affect human evolution and adaptation but states that the problem lies within the descriptions of ecological features and the
presentation of the environment in which cultures develop as static. Another problem with the ecological approach is that anthropological writing traditionally lacks descriptions of environments that can be aligned to environmental archaeology theory because they lack the ecological history that gave rise to adaptations (Winterhalder 1980:136). He also states that in the 1970s, as environmental archaeology was growing, some scholars ignored the environmental aspect of culture ecology.

The first, and perhaps most basic, of Winterhalder’s critiques (Winterhalder 1980:138) is the potential mismatch of particular adaptations to their contemporaneous environments. Environments are ever-changing. Adaptations are responses to changes in environments but they do not happen at the same rate. These adaptive behaviors are based on information gained from observations of past environments and transmitted over generations. Changing behavioral patterns is a process that may not match the rate of environmental change, especially in instances in which this latter change happens quickly or unpredictably, such as in the case of cataclysmic events. Attempted adaptations can in fact fail to maintain or improve survival of a group; this is a key element of Hawkes’ (1954) definition. Cultural adaptations are certainly more flexible and occur more rapidly than genetic adaptations but Winterhalder warns against overestimating this flexibility. There is also the possibility of missing part of the “adaptive processes” in a dynamic environment that cannot be accurately and completely perceived and reconstructed by the anthropologist (Winterhalder 1980:139). Overuse of diffusionism or migration to explain drastic changes in assemblages is another potential problem in the application of the ecological approach. Winterhalder (1980:139) asserts that rapid changes in environment which are not necessarily cataclysmic in nature are
possible, and populations may be capable of successfully adapting just as quickly by drastically changing their technological assemblages. He also critiques the use of typologies to describe the environment without studying the process of change; a practice which obscures the relationship between populations and their environment and therefore, their adaptive process to that environment (Winterhalder 1980:139). Finally, as a means to counteract these problems, Winterhalder (1980:142-163) defines a series of terms and concepts such as social ethology, hazard research, evolutionary ecology, evolutionary (population) biology, spatial heterogeneity concepts and temporal variability concepts in an attempt to provide tools for environmental descriptions that are more appropriate to theory in the study of populations and cultural adaptation. Winterhalder’s critique of the ecological approach is important because it focuses on considerations that are necessary for the useful application of the environmental archaeology framework on bioarchaeological research.

According to Trigger (1971:332) the most notable contribution archaeology can make, via an ecological approach, is to expose the interaction between cultural variables such as economic and social structures, in specific natural environments. Environmental archaeology is a useful theoretical framework for studying the ecological relationship between people and the environments to which they have adapted. A multidisciplinary approach allows archaeologists to use theory and methodology from a wide variety of fields that are highly relevant to this relationship study. Cultures do not develop and evolve outside of their environments. Environmental factors and change are at the core of cultural and biological adaptation. Ecology substantially influences adaptive processes and therefore, it can not be ignored or under-represented in archaeological studies. The
environmental influence on the cultural adaptation of the Miami One population, as well as the rest of the Glades people, is evident in their archaeological and osteological record.

*Environmental Archaeology in Ancient Florida*

Environmental archaeology research has been used around the world to study people’s ability to use culture as a means of adapting to very different environments (for example, Haberle 1991; Moody et al. 1996; Sleight 1965; Woollett 2007). A wide variety of topics are covered in these studies, including subsistence strategies, resource procurement and diet. For instance, Marquardt (1996) has extensively studied environmental archaeology in the Calusa territory of southwest Florida. He argues how he uses the multidisciplinary approach provided by environmental archaeology to make four major discoveries. The four discoveries discussed by Marquardt are that the estuarine environment to which the local culture adapted formed 4000 years earlier than previously thought; fish, instead of shellfish, were the dietary staple of the population; the coastline has been inhabited year-round since ancient times; and sea-level fluctuations were more complex in ancient times than previously thought. All of these discoveries were made by taking into consideration concepts such as subsistence strategies, procurement and statistical analysis of biomass as well as drawing from other fields such as geology, zoology and ecology for a true multidisciplinary approach. Russo and Quitmyer (1996) also discuss seasonality and marine resource procurement in southwest Florida during the Middle and Late Archaic periods. Russo and Quitmyer conclude that marine resource procurement strategies previously thought to have been seasonal were actually year-round strategies and groups who participated in these strategies occupied
coastal sites throughout the year. They further conclude that the year-round exploitation of marine and estuarine resources allowed coastal populations in southwest Florida to remain permanently located at the coast during the Middle and Late Archaic periods. This early sedentism contrasts the previous notion that Florida populations did not become sedentary until the introduction of agriculture (Russo and Quitmyer 1996).

Larsen (2001) summarizes much of the bioarchaeological research conducted in contact-era Florida resulting from the La Florida Bioarchaeological Project, of which he has been a lead researcher since the 1980s. The initial goal of this collaborative project was to examine the effect of contact and missionization on a population off the coast of Georgia. However, the project developed into an examination of the effects of colonization in different Florida populations and a comparison to pre-contact populations (Larsen 2001:xv). Topics include skeletal analysis of health, diet, lifeway, mortuary practice and eventual extinction of mission populations. Within this volume, Walker (2001:277) states that generally the shift from a hunting-gatherer based subsistence to agriculture brought about an increase in infectious disease, including endemic syphilis. However, the shift seems to have had no effect on iron levels in the diet (Walker 2001:278). Schultz and co-workers (Schultz et al. 2001:222) contradict Walker’s statement on iron levels in the diet by stating that Contact-period populations suffered from both infection and malnutrition. Activity-related changes were noted by Larsen and co-workers (2001:75) who discussed the behavioral changes that accompanied the dietary shift to maize. Larsen and co-workers state that men and women were forced to perform hard physical labor for the Spanish and these new activity patterns are evident in Contact-period skeletal samples. Worth (2001:15) states that the most significant biological
consequence of missionization in Spanish Florida was the extinction of all missionized native populations; however Ruff and Larsen (2001:141) state that missionization did not affect all populations equally.

Hutchinson (2004:7) bases his study of the “peninsula Florida Gulf coast population” largely on the Palmer population of Sarasota County because “with more than 400 human burials, it is the largest systematically excavated coastal mortuary site in the southeastern United States.” The Palmer site is a Late Archaic shell midden dated between 2150 and 1400 B.C. (Russo and Quitmyer 1996). The population’s diet was also reconstructed to gather subsistence data. Hutchinson begins by asserting coastal populations in Florida have relied on marine resources, as well as plants and terrestrial animals, since the Early Archaic period in 8,000 B.C. This subsistence strategy was successful until at least 1,600 A.D. (Hutchinson 2004: 42). Hutchinson further states that, prior to start of agriculture in Florida, Florida Gulf coast populations exhibited the same aspects of complexity as Mississippian cultures. These aspects include warfare, social stratification, large settlements and mound complexes (Hutchinson 2004:42). An osteological study of the Palmer collection showed a low frequency of caries but a high frequency of dental chipping, premortem tooth loss, hypoplasias and porotic hyperostosis. Only six percent of the population showed signs of periosteal reaction to infection; however thirteen members of the population showed signs of possible treponemal infection. Eleven percent of adults suffered from osteoarthritis and four percent of the population showed long bone fractures, which often healed improperly. Last, Hutchinson (2004:92) compares his findings at the Palmer site to those of other Florida populations. Hutchinson concludes that there is a low frequency of caries in
prehistoric Florida but caries increase after European contact and the introduction of maize. He also states that enamel hypoplasias increase over time, likely as a result of the dependence on maize (Hutchinson 2004:143). Hutchinson argues that prehistoric coastal populations suffered from a higher incidence of porotic hyperostosis than inland populations. Osteoarthritis was higher for prehistoric Gulf coast populations than inland populations; however, post-contact inland populations suffered a high incidence of osteoarthritis likely resulting from physical labor performed at Spanish missions (Hutchinson 2004:144). The incidence of infection increased after missionization (Hutchinson 2004:145).

Ashley Gelman (2005) completed a preliminary bioarchaeological report on a portion of the Miami One (DA11) collection in 2005. According to her findings, there were several primary and secondary burials of adults and juveniles. One of the reported burial methods was of vertical stones placed in circles into which human remains were placed. It is unclear whether the remains in these circles constituted primary burials or commingled secondary burials. At least four primary burials were found in feature 164, a natural solution hole that served as an ossuary. There was no apparent difference between the mortuary practice of adults versus those of children, or of males versus females.
Chapter 3

Materials and Methods

This chapter provides a description of the sample from Miami One (8DA11) and six additional sites used as comparative sample for demography, pathology and burial practices in southeastern Florida (Table 3.1). Four of the sites, Santa Maria (8DA2132), Icon-Brickell Parcel (8DA98), Brickell Bluff (8DA1082) and Flagami South (8DA1053) are within 20 kilometers of the Miami One site and have been dated to between the Late Archaic and Glades periods. The Icon-Brickell Parcel is now considered a component of Brickell Point (8DA12) thus both sites are considered together. Margate-Blount (8BD41) is about 35 miles north but provides information relevant to the Glades population and culture. Windover (8BR246) is an Early to Middle Archaic site about 200 miles north and is included as a comparative sample to discuss changes in subsistence over time. The second part of the chapter describes the data collection process as well as the methods for analysis used in this study.

Miami One (8DA11)

A pre-Columbian site known as Miami One (8DA11), located in downtown Miami, was excavated by New South Associates in conjunction with the Archaeological and Historical Conservancy, Inc. between 2003 and 2007 (Figures 3.1 and 3.2). All the archaeological material and skeletal remains recovered from the site were housed at the Archaeological and Historical Conservancy, Inc. laboratory, from which USF obtained
Table 3.1. Summary of burial data from Miami One and comparative sites.

<table>
<thead>
<tr>
<th>Site</th>
<th>Site Number</th>
<th>Time Period</th>
<th>Years</th>
<th>MNI</th>
<th>Sex</th>
<th>Age</th>
<th>Pathology</th>
<th>Burial Type</th>
<th>Burial Artifacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Santa Maria</td>
<td>DA2132</td>
<td>Late Archaic</td>
<td>1000 B.C.-A.D. 780</td>
<td>6</td>
<td>2 F, 1 M, 4 UID</td>
<td>6 A</td>
<td>Periodontitis, osteomyelitis, DJD</td>
<td>Solution holes/Primary</td>
<td>Limestone slabs placed on top, shark’s tooth, bone beads, shell celt</td>
</tr>
<tr>
<td>Icon-Brickell Parcel</td>
<td>DA98 (DA12)</td>
<td>Glades I, II &amp; III</td>
<td>1-1750 A.D.</td>
<td>12</td>
<td>3 M, 3 F, 6 UID</td>
<td>9 A, 3 J</td>
<td>OA, periostitis, periodontitis, healed fracture, caries, LEH</td>
<td>Solution holes, graves/Primary, Secondary</td>
<td>Partially articulated shark vertebrae</td>
</tr>
<tr>
<td>Brickell Bluff</td>
<td>DA1082</td>
<td>Late Archaic</td>
<td>2000-500 B.C.</td>
<td>4</td>
<td>1 M, 1 F, 2 UID</td>
<td>3 A, 1 J</td>
<td>Cribra orbitalia, hypoplasias</td>
<td>Shallow graves/Secondary, Bundle</td>
<td>None reported</td>
</tr>
<tr>
<td>Flagami South</td>
<td>DA1053</td>
<td>Late Archaic-Glades II</td>
<td>1500 B.C.-A.D. 1200</td>
<td>16</td>
<td>2 M, 4 F, 10 UID</td>
<td>10 A, 4 J</td>
<td>Little periodontitis, fractures, periostitis, DJD</td>
<td>Unknown/Secondary, Bundle</td>
<td>Three shell artifacts</td>
</tr>
<tr>
<td>Margate-Blount</td>
<td>BD41</td>
<td>Late Archaic, Glades I, II &amp; III</td>
<td>2000 B.C.-A.D. 1750</td>
<td>49</td>
<td>20 M, 22 F, 7 UID</td>
<td>42 A, 8 J</td>
<td>OA, DJD, periostitis, osteitis, healed fracture</td>
<td>Mound/Primary, Secondary</td>
<td>Wooden artifacts and limestone slabs</td>
</tr>
<tr>
<td>Windover</td>
<td>BR246</td>
<td>Early to Middle Archaic</td>
<td>6500-5500 B.C.</td>
<td>168</td>
<td>47 M, 47 F, 7 UID</td>
<td>101 A, 67 J</td>
<td>None reported, except for a case of perimortem trauma</td>
<td>Mortuary Pond/Primary</td>
<td>Bone and antler artifacts and wood, shell and stone tools</td>
</tr>
</tbody>
</table>

1Osteoarthritis  
2Degenerative Joint Disease
Figure 3.2. Feature 164 (adapted from figure 3.1)
them during the fall of 2007 to be temporarily held in the USF Anthropology Department while we conducted further osteological study. The focus of the present study is on the skeletal remains from feature 164.

Feature 164 was preliminarily analyzed by Ashley Gelman (2005), but excavation of the feature had not been completed; therefore, her analysis does not include all the remains in the feature. Her report included other features not presented in this study. The present study is a more complete analysis of all the remains extracted from feature 164, including the ones analyzed by Gelman. All of the human remains from feature 164 were heavily fragmented and commingled. Some remains were still encased in the soil matrix at the time of this study and most others were wrapped in foil paper by the excavators to preserve their integrity. Some of the bones were clean and had preliminary analysis notes written by an unidentified person on the bags. The field notes included location information and preliminary field identification of elements, side and any possible pathology. All skeletal remains showed some degree of root damage, soil staining and extreme weathering. Most of them have mold present.

The site of Miami one was occupied from the Late Archaic (ca. 1000 B.C.) to the Glades II (ca. A.D. 1000). Contact-period artifacts have been recovered but are not discussed in this study. The site yielded a number of interments, both primary and secondary, as well as information about pathology, demography and mortuary practice. The interments were made in natural solution holes where the limestone dissolved and the resulting cavities were filled with red sand which blew across the Atlantic Ocean. These solution holes were labeled as features during the excavation. Each feature was subdivided into arbitrary excavation units in order to remove the remains in an organized
fashion. No other type of feature was labeled at the time of this study. The rest of the site consists of hard limestone covered in a relatively thin layer of sand. The area also served as an occupation site complete with hearths and shell middens.

The archaeological report of the entire site was not available at the time of the present study. The only bioarchaeological report available at the time of the present study was completed in 2005 by Ashley Gelman and pertained only to the remains excavated thus far. Gelman (2005: 2-3) describes feature 164 as “a small ravine located in the southeast corner of parcel D” with burial methods that included “circles of vertical stones within which human remains are interred.” Gelman’s report discussed six numbered features, including feature 164. Her report revealed primary and secondary (ossuary) burials of adults and juveniles. At least four primary individual burials were also reported. According to Gelman, the small number of primary interments suggests a differential treatment of potentially important members of the community; however, there is little information to this end as chronology and exact location of the burials is unclear. Grave artifacts, such as a ritual stone pipe and a carved bone canoe, were also recovered from the large ossuaries at the site, as was a complete canine burial (Gelman 2005:1). However, these were not part of the collection on loan to USF; therefore, they were not analyzed for this study. Two undecorated pottery sherds were found among the skeletal remains in the collection but there are no notes indicating whether or not they were associated with the remains.

The level of fragmentation precluded an assessment of stature; however, adults are robust, with thick muscle attachments (Gelman 2005:4). Gelman reported a minimum number of individuals (MNI) of n=124; including eighty-six adults (n=86) and
thirty-eight juveniles. Gelman stated that based on the present study and future studies, the final MNI for the entire site is estimated to be over five hundred individuals. Due to the level of fragmentation, there is the potential for significant under-representation.

Preliminary pathology observations by Gelman (2005) show a low frequency of nutritional deficiencies, with no examples of porotic hyperostosis or cribra orbitalia. The lack of such pathologies indicates that the population at the site had a sufficiently healthy diet. Faunal remains identified as fish, manatee, conch, turtle and deer were part of this diet (Gelman 2005:4). Though some periodontal disease is present, the frequencies of enamel hypoplasias and caries are low. Osteoarthritis and periostisis are common (Gelman 2005:4). Unusual pathologies found in the Miami One remains include an osteochondroma located on an adult femur, an auditory exostosis on another adult, and several instances of bone remodeling resulting from infection in long bones, including a case of possible treponemal infection. A healed fracture was observed on an adult fibula (Gelman 2005:4-5).

The present study concentrates on the human skeletal remains of feature 164, which includes sub-feature 500 and is the largest burial feature at the site. Sub-feature 500 was verbally described to me by one of the excavators as being a small depression at the bottom of feature 164 into which bones may have naturally percolated from all levels of feature 164. Therefore, sub-feature 500 will be considered an inseparable portion of feature 164, thus only this latter feature designation will be used. Feature 164 was used for the present study because it contains the densest concentration of commingled skeletal remains reported at the site and presumably, the largest cross section of the population. Gelman’s (2005:3) preliminary inventory of this feature reported twenty-eight adults and
fourteen juveniles. These figures included three males, one female, two adults over 45 years of age, one young adult between 20 and 30 years of age, and a juvenile with an age estimation between perinate and 9 years ± 12 mo. However, excavations had not been completed at the time of Gelman’s report. The present study will encompass all the skeletal remains extracted from feature 164, and offer a complete inventory, demographic profile and discussion of pathologies.

Previous Archaeological Research: Comparative Sample

The following section reviews the data from six sites used in this study as a comparative sample (Figure 3.3). Santa Maria (8DA2132), Icon-Brickell Parcel (8DA98), Brickell Bluff (8DA1082) and Flagami South (8DA1053) are archaeological sites with human remains in the vicinity of the Miami One site. The Icon-Brickell Parcel and Brickell Point (8DA12) are considered together. Margate-Blount (8BD41) is about 35 miles north but provides a great deal of information relevant to the Glades population and culture. Windover (8BR246), dated to between the Early and Middle Archaic, is about 200 miles north and is included to discuss changes in subsistence over time.

Santa Maria (8DA2132)

The site of Santa Maria (8DA2132), as described by Carr, Işcan and Johnson (1984) is a Late Archaic cemetery located 2.5 km south of the Miami River. It was a habitation site with a midden and a cluster of graves about fifty meters west where burials were placed into naturally-occurring solution holes and then intentionally
Figure 3.3. Location of Archaic and Glades sites in south Florida from which comparative skeletal remains are described (adapted from İşcan 1993:278).
covered with limestone slabs. Four burials and one burial feature, containing six individuals, were placed in naturally occurring solution holes with limestone slabs placed on top. They were primary in nature. The radiocarbon dates from bone, soil and shell samples placed the site between 1,000 B.C. and A.D. 780. The six individuals were described as adults.

There were two females, one male and four individuals whose sex was not estimated. The first burial described was that of an individual represented only by both femora and an unspecified number of metatarsals. Sex and age were not estimated. This individual was buried in a prone position. The second burial described was that of an individual buried in a primary and partially flexed position. Two bone beads and an unmodified shark’s tooth were associated with the burial. A partial skull and unspecified number postcranial bones from this burial were analyzed. The individual was estimated to be a female between 25 and 30 years of age. The age was based on dental attrition and cranial suture closure. The third burial described was primary and contained two individuals. One individual was represented only by a cranium estimated to be that of a male between 30 and 35 years of age, based on dental attrition and cranial suture closure. The face bones and mandible were missing. The second individual was estimated to be a female based on cranial and post cranial features. The age was estimated at between 30 to 35 years based on dental attrition and cranial suture closure. This individual was represented by a partially complete skull and a complete mandible. The postcranial remains consisted of a partially preserved upper body. The lower body was destroyed by construction equipment. The cranium of the male individual was found on the lower chest portion of the female individual. The only grave artifact associated with this burial was a
flat limestone rock which may have been a pendant. It was extremely degraded and located 20 cm north of the female cranium. The fourth burial described contained only one individual identified by maxillary molars and unidentified bone fragments. The age was estimated between 25 and 30 years based on molar size and degree of dental attrition. No burial artifacts were associated with this burial. The last burial was labeled feature R and it consisted of a single individual whose age and sex were not estimated. This individual was represented by a tibia and fragments of foot bones. The rest of the bones were destroyed by construction equipment. The only associated burial artifact was a shell celt or scraper.

Aside from moderate to severe dental attrition, the pathologies observed included periodontitis, infection and severe arthritis. Periodontitis was common. One individual exemplified this because bone resorption was observed on the alveolar process around all the teeth, with an average distance of 5 mm from the cemento-enamel junction. One individual had a small groove between a second and third molar, attributed to the use of a toothpick-like implement to remove food particles. One individual exhibited periostitis associated with osteomyelitis on the femora, the tibiae, the left ulna and the frontal bone. All had evidence of involucra and multiple cloacae but there was no sequestra observed. The male skull, found with a female individual, exhibited what the authors concluded to be sharp force trauma in the form of a cut about 12 cm long between the squamosal and sagittal sutures of the right parietal bone. The authors saw no signs of healing around the trauma and thus concluded that the trauma was perimortem. No caries or nutritional deficiencies were reported. Tunnels or incomplete tunnels mostly observed on some cranial bones are not associated with any pathology or cultural practice and thus may be
attributed to root damage or insect activity (Carr et al. 1984:182-184). An interesting characteristic of all the burials is that the cervical vertebrae were absent. The only complete burial, a female, was missing both feet, but the investigators thought it unlikely that the absence was due to preservation. These two characteristics may be part of a burial practice (Carr et al. 1984:186-187).

Brickell Point (8DA12) and the Miami Circle and Icon-Brickell Parcel (8DA98)

Excavation of the Brickell Point site (8DA12) began in 1998. The site dates from the Glades I (500 B.C.-A.D. 740) to the Glades II (A.D. 740-1200) periods. The Miami Circle, evidence of a large circular structure of ancient origin, is located within the site. Several midden-filled circular and oval-shaped holes found in the limestone were debated to be either natural formations or post-holes for an aboriginal structure (Carr and Ricisak 2000:261); however, unlike the post-holes, the natural solution holes were irregularly shaped (Carr and Ricisak 2000:278). As more of the site was uncovered and dozens more of these holes found, it became evident that some were arranged in a circular pattern about 11.5 m in diameter. This pattern became known as the Miami Circle. Similar patterns were uncovered at the Santa Maria Site (DA2132) (Carr and Ricisak 2000:261). According to Carr and Ricisak, the Miami Circle is most likely the remnant of a prehistoric structure akin to those found in sites across the Southeast. However, the post-holes found across the Southeast were not cut into limestone but rather made in soil. There are about 200 holes within the circle and many more outside of it but no clear associations between these holes and the ones in the circle have been established. Pottery was mostly undecorated, but decorations associated with the Glades area were also found
at the site. These Glades area pottery types included Key Largo Incised, Fort Drum Incised and St. Johns Check Stamped. Samples of Deptford Linear Stamped were also found at the site (Carr and Ricisak 2000:276). Given the almost complete lack of Glades III ceramics, the researchers concluded that there was no activity at the site during the Glades III. Lithic artifacts, including chert flakes, were abundant. The articulated remains of a shark, a dolphin cranium and the carapace of an adult sea turtle were found within the circle but radiocarbon dating showed that they were interred between A.D. 1,330 and 1,680 (Carr and Ricisak 2000:278-281; Elgart 2006:179).

The site of Icon-Brickell Parcel (8DA98) is located south of the Miami Circle Park, west of Biscayne Bay, east of Brickell Avenue and north of Brickell Park in the city of Miami. It is now included with the Brickell Point Site (Carr et al. 2008:5-6). Therefore, remains found in both sites are considered together in this study (Table 3.2). Many non-local ceramics and artifacts were found at the site, most of which originated in northern Florida. Skeletal elements were found throughout the site, including an atlas (C1) and an axis (C2) found within the Circle (Elgart and Carr 2006:241). A total of twelve individuals were found, including nine adults and three juveniles. Two of the burials were possibly primary and the rest were labeled secondary because of their commingled nature (Table 3.2). Among the adults, there were three males, three females, one possible female and two individuals of undetermined sex. Pathologies observed included one adult ulna with osteoarthritis, three vertebrae with osteophytes, six cases of infection, one case of periodontitis, one possible case of porotic hyperostosis, three instances of caries and eighteen instances of linear enamel hypoplasias (LEH). The possible case of porotic
Table 3.2. Icon-Brickell Parcel mortuary summary (Carr et al. 2008)

<table>
<thead>
<tr>
<th>Feature/Unit/Field Specimen Num.</th>
<th>MNI</th>
<th>Sex</th>
<th>Age</th>
<th>Pathology</th>
<th>Burial Type</th>
<th>Grave Artifacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>F. 234 U. 53</td>
<td>2</td>
<td>Not known</td>
<td>Not known</td>
<td>None</td>
<td>Secondary, cranial burial</td>
<td>None</td>
</tr>
<tr>
<td>FS 515</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. 275 U. 66 &amp; 62</td>
<td>1</td>
<td>Not known</td>
<td>Not known</td>
<td>None</td>
<td>Secondary, post-cranial only</td>
<td>None</td>
</tr>
<tr>
<td>FS 568, 570</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. 297 U. 72</td>
<td>1</td>
<td>Not known</td>
<td>Not known</td>
<td>None</td>
<td>Secondary</td>
<td>None</td>
</tr>
<tr>
<td>FS 650</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. 396 U. 74, 75, 168 FS 973, 997, 998, 1027, 1090, 1400, 1417</td>
<td>1</td>
<td>Not known</td>
<td>16-22</td>
<td>None</td>
<td>Primary (?), may have been disturbed</td>
<td>Articulated shark vertebrae may not be associated</td>
</tr>
<tr>
<td>F. 389, 439 U. 82</td>
<td>1</td>
<td>M</td>
<td>Young</td>
<td>None</td>
<td>Secondary</td>
<td>Two articulated groups of shark vertebrae</td>
</tr>
<tr>
<td>FS 954, 1182, 1269</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. 324, 338 U. 84, 85 FS 715, 741, 917</td>
<td>1</td>
<td>Not known</td>
<td>Perinatal</td>
<td>None</td>
<td>Secondary</td>
<td>None</td>
</tr>
<tr>
<td>F. 324, 338 U. 84, 85 FS 715, 741, 917</td>
<td>1</td>
<td>Not known</td>
<td>10 years ± 24 mo.</td>
<td>None</td>
<td>Secondary-same as above</td>
<td>None</td>
</tr>
<tr>
<td>F. 324, 338 U. 84, 85 FS 715, 741, 917</td>
<td>1</td>
<td>F</td>
<td>Young</td>
<td>None</td>
<td>Secondary-same as above</td>
<td>None</td>
</tr>
<tr>
<td>U. 90 FS 1848, 1850, 1856, 1857</td>
<td>1</td>
<td>M</td>
<td>Adult</td>
<td>Schmorl's node on lumbar</td>
<td>Unknown-no cranium</td>
<td>None</td>
</tr>
<tr>
<td>U. 91, 92 FS 1530, 1531, 1534, 1547, 1561, 1581, 1582, 1617, 1655-1657, 1725, 1731, 1736, 1736, 1740, 1753, 1754</td>
<td>1</td>
<td>F</td>
<td>Adult</td>
<td>None</td>
<td>Secondary</td>
<td>None</td>
</tr>
<tr>
<td>Feature/Unit/Field Specimen Num.</td>
<td>MNI</td>
<td>Sex</td>
<td>Age</td>
<td>Pathology</td>
<td>Burial Type</td>
<td>Grave Artifacts</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-----</td>
<td>----------</td>
<td>-----</td>
<td>-------------------</td>
<td>------------------------</td>
<td>------------------------------------------------------</td>
</tr>
<tr>
<td>F. 281 U. 98</td>
<td>2</td>
<td>Not known</td>
<td>Adult</td>
<td>None</td>
<td>Primary, no cranium</td>
<td>None</td>
</tr>
<tr>
<td>FS 591, 647, 662</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. 306, U. 115</td>
<td>1</td>
<td>F</td>
<td>Adult</td>
<td>None</td>
<td>Secondary</td>
<td>Partially articulated shark vertebrae, large limestone rocks</td>
</tr>
<tr>
<td>FS 670, 689, 720</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U. 118, 119</td>
<td>1</td>
<td>F</td>
<td>Adult</td>
<td>None</td>
<td>Secondary (?)</td>
<td>None</td>
</tr>
<tr>
<td>FS 1525, 1533, 1536, 1544, 1549,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1550, 1554, 1641, 1642, 1779</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. 355 U. 122</td>
<td>1</td>
<td>M</td>
<td>Adult</td>
<td>State I Porotic</td>
<td>Secondary-Cranial</td>
<td>None</td>
</tr>
<tr>
<td>FS 840, 859, 871, 893, 989</td>
<td></td>
<td></td>
<td></td>
<td>Hyperostosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U. 124</td>
<td>1</td>
<td>Not known</td>
<td>Adult</td>
<td>None</td>
<td>Secondary</td>
<td>None</td>
</tr>
<tr>
<td>FS 769, 770, 787, 788, 801, 828,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>953</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. 438 U. 175</td>
<td>1</td>
<td>Not known</td>
<td>Not known</td>
<td>None</td>
<td>Secondary</td>
<td>None</td>
</tr>
<tr>
<td>FS 1174, 1175, 1209</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. 480 U. 180</td>
<td>2</td>
<td>Not known</td>
<td>Not known</td>
<td>None</td>
<td>Secondary (?)</td>
<td>None</td>
</tr>
<tr>
<td>FS 1410, 1427, 1431, 1442, 1482,</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1489-1494</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
hyperostosis is unconfirmed as no radiographic analysis is reported. The eighteen instances of LEH represent at least four individuals. There are a number of partially articulated shark vertebrae throughout the site, some of which are in association with the burials perhaps as offerings.

Brickell Bluff (8DA1082)

The site of Brickell Bluff (8DA1082) as described by Işcan et al. (1993) is a Late Archaic cemetery and midden about 5 km south of the Miami river. Radiocarbon dates indicate a chronology of about 2,000 to 500 B.C. The cemetery consisted of secondary bundle burials. Four individuals were studied from this site: one adult was between 20 and 24 years of age, one adult was between 35 and 40, one adult was over 50, and one juvenile was between 5 and 7. Age estimations were based on occlusal wear of the molars. Sex estimations were only possible for two individuals: one male and one female. The male was estimated to be about 172.3 cm tall. This estimation was based on a humeral fragment and is, therefore, subject to error. No grave artifacts were found in association. The remains were heavily fragmented and it was impossible to assess whether they were buried at the same time. Though one parietal fragment was thinned and possibly a result of nutritional deficiency, radiographic examination did not show evidence of radial striation. One instance of cribra orbitalia was described, which is also possibly associated with nutritional deficiency or parasite infection. No abscessing or caries were found, suggestive of a hunger-gatherer society, but three instances of hypoplasias were described. Four incisors were shovel-shaped and one exhibited double shoveling on both lingual and labial aspects. Dental wear was not explicitly described
but it was used to estimate age at death. This suggests that dental wear was prevalent and to various degrees (Işcan et al. 1993:279).

Flagami South (8DA1053)

The site of Flagami South (8DA1053) as described by Işcan, Kessel and Carr (1995) is a Late Archaic (1500-500 B.C.) through Glades II (A.D. 750-1200) cemetery with a nearby midden. The site was originally dated as Glades I (500 B.C.-A.D. 750) to Glades III but shell tools found in an interment and submitted to radiocarbon testing yielded a much earlier date. However, radiocarbon dates obtained from shells are known to be unreliable. Işcan, Kessel and Carr (1995:56) state that “the absence of stratified soil in south Florida for dating leaves the burden on artifact typology and radiocarbon dating as the primary indicator of temporal association.” Unlike the previous two sites, this cemetery is located 16 km from the coast. The bones were heavily fragmented. The burning on the bones was attributed to peat fires in the early twentieth century after the area was drained. The MNI was sixteen, including two males and four females. Sex could not be estimated for ten of the individuals. Age estimations were possible for 14 individuals: three infants, one juvenile and ten adults, two of whom were over 50 years of age. One adult’s stature was estimated to be 174.7 ± 4.6 cm. All maxillary central incisors were shoveled shaped. Dental attrition was severe. There was one instance of caries and one instance of hypoplasia. Pathologies reported were three cases of periostitis, one case of arthritis, two cases of degenerative joint disease, one case of a healed fracture, one case of periodontitis and one case of alveolar resorption. The burials were described as secondary bundle burials. Toothwear resulted from “sandy shellfish or
gritty roots” and the low incidence of caries was consistent with “a cultural expression of a hunting and gathering life style with its diet of shellfish” (İşcan et al. 1995:57). According to the authors, pathologies were “few and minor.” Their findings were consistent with “a small pre-contact population with the expected low stresses of their life style” (İşcan et al. 1995:58).

Margate-Blount Site (8BD41)

The Margate-Blount (8BD41) site, as described by İşcan (1983) and Williams (1983) is a habitation and burial mound site dating from the Glades Periods through Contact. It is also considered a ceremonial complex. Primary and secondary burials were found. Most of them were recovered from a mound in the southern section of the site. Mortuary practice was described by Williams (1983). Wooden artifacts were found associated with three of the burials. The forty-nine individuals were described as being typical of the area. The demography was reported as follows: twenty males, twenty-two females, seven individuals of undetermined sex, and eight individuals under 20 years of age. Males and females were almost equally represented, but there was an underrepresentation of juveniles, with only 16.3% (8/49) of the population aged as less than twenty years old (İşcan 1983:156). Periodontal disease was not severe, and caries were only found in one individual. Calculus and attrition were moderate to severe. One individual exhibited osteoarthritis, including osteophytosis; a healed fracture on the distal epiphysis of the right ulna; periostitis on the distal end of the left humerus, the ulnar shaft and both femoral shafts; and degenerative joint disease on the temporomandibular junction, articular surfaces of the cervical vertebrae, the distal epiphysis of the right ulna,
radii, and elbow joints. The periostitis was not considered severe. One left tibia showed signs of possible treponemal infection. The anterior portion of the tibia was saber-shaped, a term used to describe a bowing of the long bone (Isçan 1983:157). Isçan (1983:163) states that the population appears to have been very similar to other prehistoric Florida groups, though somewhat more robust and shorter.

Windover (8BR246)

Windover (8BR246) is an important Early Archaic mortuary pond located in Brevard County. Doran (2002:2) describes it as “a shallow pond underlain by intact peat into which burials were placed during the Early and Middle Archaic time.” It was discovered in 1982 during a development project which included drainage. The burials began to take place around 6,000 B.C. The environment within the peat is stable, anaerobic and with a neutral pH, which led to excellent preservation. The peat also protected the skeletons from scavenger and root damage. It is unclear whether the burials were placed in the pond while the peat was covered in water or seasonally, at a time when the peat was exposed (Doran 2002:8-10). Burials were placed in shallow pits and away from the tree edge. It is possible that stakes visible above the water were used to anchor and mark burial sites within the pond.

The MNI for the site is 168 individuals. There were 101 adults and 67 juveniles. Among the adults, forty-seven were males, forty-seven were females and seven were of undetermined sex. Out of the 168 individuals, 58 were found out of context due construction at the site. The remaining individuals were found in situ. Of these 110 individuals found in situ, 70 were adults and 40 were juveniles. Of the seventy adults,
thirty were female and forty were male (Dickel 2002:75). Osteological analysis was not completed at the time of this study. Age and sex do not appear to be contributing factors in the pattern or distribution of graves. Grave good included bone and antler artifacts, wood artifacts and rarely, stone and shell tools. It is unclear whether ground fish bones found near some pelvises were food offerings or ingested food. Age and sex did not appear to be contributing factors for the inclusion of artifacts in the graves; however, there are classes of artifacts which appear to have specific age and sex associations. For instance, bone tools were mostly associated with males while unmodified bones were mostly found with female burials. Lithics were rare and associated only with males and juveniles. Some juveniles were found with artifacts they were unlikely to have used in life. This was the case of a young child found with a stone pestle.

Burials were primary and flexed. Some burials were found commingled and partially articulated. Burials are not suspected to have been secondary because many were still partially articulated or found with some adherent brain tissue. The commingled nature of some remains is likely due to displacement after burial. Fifty-eight (n=58) burials were completely articulated. Ninety-five percent (95.0% or 55/58) of these articulated burials were flexed. Only five percent (5.0% or 3/58) were extended. These burials were of two males and one female. Of the two males, one suffered a traumatic death, with a perimortem puncture on the pelvis and an embedded projectile point. The head and first cervical vertebra were missing from this individual. The authors believe that these body parts were removed prior to burial (Dickel 2005:75). All flexed burials were on their side. Sixty-four percent (63.7% or 37/58) of these were placed on their left side with the head facing north. Burials tended to be in clusters marked by a wooden
stake and branches in the shape of an inverted cone were placed over the burials, presumably to protect them from scavengers. Dickel (2002:78) believes that the stakes marked clusters occupied by clans or families rather than individuals. 

Life expectancy for females was lower than for males between the ages of fifteen and sixty-five and greatest survivorship for the population appeared to be between the ages of twenty and thirty. Life expectancy at the site was relatively high (Doran 2002). Subsistence at the site during the Early Archaic was based primarily on “abundant and diverse riverine, pond and marsh resources coupled with the utilization of large and small terrestrial resources” (Doran 2002: 10). There is little or no evidence to suggest that marine resources were exploited until the Middle Archaic, probably as a response to population growth. The combination of marine, freshwater and terrestrial resources was successfully exploited in south Florida until the time of European contact (Doran 2002:10).

Data Collection for the Miami One Research

The present study focuses on all the skeletal remains extracted from feature 164, including those preliminarily analyzed by Ashley Gelman, and contains a more extensive analysis of demography and pathology than that provided by Gelman at the time of her report. During data collection for this study, the bones were brushed to remove any adherent soil. Teeth and bones exhibiting pathology were washed and dried prior to analysis. Skeletal remains were inventoried and analyzed using the USF Forensic and Bioarchaeology Lab Protocol (Kimmerle 2007), which includes data collection forms. Since most of the burials were commingled, commingled remains forms were used for
most field specimen numbers. Each case was inventoried and data was collected to the exactitude possible, including age, sex, taphonomy and pathology based on the standards of data collection presented by Kimmerle (2007) and outlined by Buikstra and Ubelaker (1994). The minimum number of individuals form was included in cases where the presence of more than one individual was established by the present study. Field specimen numbers were filed with all inventory forms along with a protocol sheet, a taphonomy form and, whenever applicable, pathology, dental metrics, adult sex, adult age and juvenile forms. Once inventoried, fragments exhibiting pathology were photographed and radiographed. After notes on each field specimen were completed, the remains were placed back in their original bags and boxes.

As part of this study, a demographic profile was constructed based on the sex and age of all individuals complete enough to allow such estimation using Buikstra and Ubelaker (1994), Brooks and Suchey (1990), Isçan et al. (1984, 1985), Meindl and Lovejoy (1985) and Meindl et al. (1985). The severely fragmented nature of the remains prevented the use of specific age ranges; therefore, age cohorts were used instead. Individuals were classified as adults or juveniles. Age ranges were estimated whenever possible, such as in cases of complete or almost complete juvenile remains, using size scales based on Baker (2005) and information from Buikstra and Ubelaker (1994), Stewart (1979) and Ubelaker (1999). Pathology was reported in the form of differential diagnoses based on Ortner (2003) as well as Mann and Murphy (1990), which include anthroscopic observations, photographs and radiographs. All observations were recorded in the appropriate forms and included in each case file.
Paleodemography

For the purpose of this study, the most common elements (MCE) present was used to determine the demography of feature 164. It is important to note that the use of arbitrary units in secondary commingled burials, such as in the case of excavation of Miami One, makes it difficult to assess the number of units in which all of the skeletal remains of one individual may be found. The remains of any single individual may be spread across a large space, making the identification of complete individuals impossible. The lack of clear stratigraphy exacerbates this problem. Therefore, the use of MCE for the entire feature, along with sex and age estimations whenever possible, results in a more accurate demographic estimate.

Age ranges consist of adult versus juveniles except in cases where age can be further defined by the use of other features such as cranial sutures and epiphyseal union (Table 3.3). Size, morphology, cranial sutures, dentition, epiphyseal union and length of bone are the defining characteristic distinguishing juveniles from adults (Baker 2005). Adult age estimations are based on cranial sutures (Meindl & Lovejoy 1985), and pubic symphysis (Meindl et al. 1985, Brooks and Suchey 1990). The present collection, however, only allows for the use of some cranial sutures, dental attrition and epiphyseal union.

Sex in adults was estimated based on various morphological traits. In the absence of complete skeletons, the pelvis has the most helpful features in estimating sex. Cranial and post-cranial traits described by Buikstra and Ubelaker (1994), Krogman (1962) and Phenice (1969) were used to estimate sex in the adults of the present study. Features on the skull, such as the size of the mastoid process, the sharpness of the supraorbital
Table 3.3. Discrete age ranges and their corresponding categories.

<table>
<thead>
<tr>
<th>Discrete Age Ranges</th>
<th>Age Categories</th>
<th>Traits for Age Estimation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>Juvenile</td>
<td>Size, morphology, cranial sutures, dentition, length of bones</td>
</tr>
<tr>
<td>6-10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11-20</td>
<td>Middle Adult</td>
<td>Cranial sutures, dental attrition, ribs, pubis</td>
</tr>
<tr>
<td>20-35</td>
<td>Young Adult</td>
<td></td>
</tr>
<tr>
<td>35-50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50+</td>
<td>Old Adult</td>
<td></td>
</tr>
</tbody>
</table>

margin, the prominence of the glabella and the nuchal lines and the degree of openness of the gonial angle, are used for estimating sex according to Buikstra and Ubelaker (1994), France (1998) and Krogman (1962). Attributing sex to juvenile remains is unreliable because most traits develop during puberty and thus tend to be subtle in younger individuals; therefore, sex estimations are indeterminate for this group.

**Paleopathology**

Once demography is established, paleopathology is studied to analyze the population’s morbidity and health characteristics. According to Chamberlain (2006:13), the type of pathology seen in a population is directly related to their demography. Some diseases are specific to certain age groups and might differ among the sexes while others, such as infectious disease, are directly dependent on population size and density. Pathology related to malnutrition, whether widespread or confined to a certain group, provides evidence of decreasing resources or differential access to them. The timing of
such nutritional insults can provide evidence of seasonal changes if such insults appear to occur concurrently across a vast number of the population. For the purpose of this study, pathological definitions are based on those in Mann and Murphy (1990), Aufderheide and Rodríguez-Martín (1998) and Ortner (2003). The pathological conditions considered in this study are caries attrition, periodontitis (or abscessing), hypoplasias, porotic hyperostosis, Harris lines, osteoarthritis (OA), periostitis and osteomyelitis. Trauma, in the form of fractures, is also considered (Table 3.4). Caries, attrition, periodontitis and hypoplasias are dental pathologies.

**Dental Pathology**

Caries are defined by Aufderheide and Rodríguez-Martín (1998:402) and Ortner (2003:590) as a demineralization of the enamel due to acid-producing bacterial activity on the crown or roots. It is also described as infectious and transmissible. Ortner warns against confusing normal fissures and pits on the crown surface with caries. Attrition is a destruction of the enamel, exposing the secondary dentin. If secondary dentin is not formed fast enough and the attrition reaches the pulp cavity, infection may occur (Ortner 2003:604). Periodontitis, as it affects bone, is described as a localized or general resorption of the alveolar process, associated with abscessing and tooth loss (Aufderheide and Rodríguez-Martín 1998:401; Ortner 2003:593-594). Periodontitis can be associated with advanced caries or severe attrition. Hypoplasias are a disruption of enamel formation due to infectious disease and metabolic as well as endocrine disorders. The disruption of enamel formation causes permanent hypoplastic lines across teeth (Aufderheide and Rodríguez-Martín 1998:405; Ortner 2003:595). Aufderheide and
<table>
<thead>
<tr>
<th>Disease Category</th>
<th>Pathology Variables</th>
<th>Observable Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metabolic/ Nutritional</td>
<td>Caries</td>
<td>Demineralization of the tooth enamel creating funnel-shaped lytic lesions</td>
</tr>
<tr>
<td></td>
<td>Attrition</td>
<td>Secondary dentin exposure across occlusal surface of teeth</td>
</tr>
<tr>
<td></td>
<td>Periodontitis (Abscessing)</td>
<td>Severe resorption of alveolar process which results in an abnormal amount of space between the alveolar process and the cementoenamel junction of a tooth</td>
</tr>
<tr>
<td></td>
<td>Hypoplasias</td>
<td>Transverse hypoplastic lines, fine pores on the enamel</td>
</tr>
<tr>
<td></td>
<td>Porotic Hyperostosis</td>
<td>Only visible in radiographs, expanded diplőe</td>
</tr>
<tr>
<td></td>
<td>Harris Lines</td>
<td>Transverse lines at the ends of long bones, evident radiographically</td>
</tr>
<tr>
<td>Trauma or Age-related Osteoarthritis</td>
<td>Osteoarthritis</td>
<td>Osteophytes, lipping, eburnation and porosity; resulting from old age or trauma</td>
</tr>
<tr>
<td>Infectious</td>
<td>Periostitis</td>
<td>Peripheral bone inflammation involving layers of bone with an irregular surface, woven bone with a porous-like surface</td>
</tr>
<tr>
<td></td>
<td>Osteomyelitis</td>
<td>Periosteal bone deposition around a cortical defect, may include sclerotic response and a sequestrum, involucrum and cloacae</td>
</tr>
<tr>
<td>Ante-mortem Trauma</td>
<td>Fracture</td>
<td>Partial or complete discontinuity of a bone (pre- or perimortem), bony callus, improper healing (angulation, overlap), myositis ossificans traumatica</td>
</tr>
</tbody>
</table>
Rodríguez-Martín (1998:405) indicates that for the defect to occur, the stress to which the individual is subject to must be severe enough for energy to be diverted from the ameloblastic process. Ortner states that for the defect to be visible in adult dentition, the insult must occur before the individual reaches the age of six and enamel production for the permanent dentition ceases.

**Metabolic and Nutritional Disorders**

Porotic hyperostosis is a general term used to describe “a porous enlargement of bone tissue” (Ortner 2003:55). Though the term is usually used in direct association with anemia, Ortner warns against this usage without radiographic evidence to support the association. Porotic hyperostosis resulting from anemia produces a “raylike arrangement of the abnormal bone” only evident in radiographs (Ortner 2003:55). Aufderheide and Rodríguez-Martín (1998:522) describe Harris lines as “transverse lines of radiodensity at the ends of long bones.” The authors describe the process of formation as a decrease in the rate of cartilage cell division in the growth plates of long bones during a period of metabolic stress. The process of mineralization continues despite the slower rate of cell division. This causes segments of increased mineralization that can be observed radiographically. Nutritional deficiency is an example of a metabolic insult that may result in Harris lines.

**Degenerative Joint Disease and Osteoarthritis**

Aufderheide and Rodríguez-Martín (1998:93-96) describe degenerative joint disease (DJD) and Ortner (2003:546-547) describes osteoarthritis (OA) using very similar
terms. Both conditions consist of a break down of cartilage in the joints resulting in bone contact. This bone contact can lead to sclerosis or reactive bone formation. Eburnation is a reactive bone formation of the subchondral bone. Primary osteoarthritis results from biomechanical stress or trauma and is associated with advanced age. Secondary arthritis occurs earlier in life as a result of other pathological conditions. Mann and Murphy (1990:18-20) group the two conditions together and add that they result in synovial lining ossified as outgrowths known as osteophytes. A breakdown of the margins around the joints and macroporosity, especially on vertebral bodies, are also commonly observed in cases of degenerative joint disease and osteoarthritis.

**Infectious Disease**

Periostitis is described by Ortner (2003:206) as a periosteal bone reaction as a result of pathology. Ortner notes that such pathology is not restricted to infection. During this periosteal bone reaction, woven bone is created and later remodeled into lamellar bone. The surface of the bone may appear porous due to irregular orientation of collagen fibers or increase vascularity in the area. Ortner (2003:208) further states that periostitis can be a condition by itself or the result of a separate condition, such as syphilis. Since many diseases may result in periostitis, diagnosis of specific pathologies in archaeological contexts is very difficult. Osteomyelitis results from an introduction of infection into the bone marrow, usually from pyogenic bacteria, resulting in inflammation of bone (periostitis) and bone marrow (Aufderheide and Rodríguez-Martín 1998:172; Ortner 2003:181). Ortner also states that other infectious agents such as fungi and viruses can also result in osteomyelitis. Acute hematogenous osteomyelitis is the result
of infection somewhere else in the body, transmitted by blood. Acute osteomyelitis is the result of direct contact with the bacteria such as through traumatic injury (Aufderheide and Rodríguez-Martín 1998:172). Radiographs are helpful in the diagnosis of osteomyelitis.

**Trauma**

Ortner (2003:120) describes a fracture as “any traumatic event that results in the partial or complete discontinuity of a bone.” Abnormal stress must be applied to a bone in order to cause a fracture. Fracture classifications include tension, compression, twisting, bending and shearing. Tension fractures result from too much tension being applied to the bone from a tendon. Compression fractures result from a sudden impaction of excessive force. Twisting fractures happen as a result of twisting the bone in a spiral motion at one end while the other is stationary. Bending fractures are the most common and happen as a result of falls or blows. Shearing fractures occur when opposing forces are applied in different planes (Ortner 2003:120-124). A fracture can be complete, in which it discontinues the bone entirely, or incomplete, in which the break does not completely separate the bone. The healing process begins immediately with the formation of a blood clot and then the formation of a fibrous callus about a week after the break. This callus unites the broken ends of the bones, both internally and externally, and provides visual evidence that a fracture occurred and healed (Ortner 2003:126-127). Fractures that do not heal properly will show angulation, in which the two ends of the bones reattach at an unnatural angle, or overlap, in which they two ends reattach side-by-side. Necrosis of the bone tissue may also occur. In some cases, muscle tissue in the
vicinity of the fracture is damaged and bone is produced directly within it. The bone formation from the muscle can attach to the bone shaft or remain separate. This condition is known as *myositis ossificans traumatica* (Ortner 2003:133-134).

*Mortuary Variability*

The mortuary variables discussed in this study include the type, position and location of burials; the associated burial artifacts; and the exclusion of skeletal elements. Demographic differences in the distribution of burials and the inclusion of artifacts are also discussed. Primary burials are defined in this study as those in which the individual is interred immediately after death without any modification to the body. Secondary burials are those in which the body is modified prior to burial. In the case of Miami One and the comparative site sample, modification consists of removing flesh from the body either with the use of tools or by exposure to the natural elements. Neither the Miami One site nor the comparative site samples show any evidence of which of these two mechanisms resulted in the removal of the flesh. Burial positions considered in this study are either extended (supine), in which the body is laid out with limbs extended, or flexed, in which the body is placed on its side with knees drawn to the chest. The burials at Miami One and the comparative site sample are located within solution holes serving as natural ossuaries, burial mounds or ground interments. Grave artifacts considered in this study are lithics, shell, bone, wood and plant matter. Faunal remains consist of animal bone, modified and unmodified. Modified bone artifacts include tools, ornaments and weapons. Unmodified faunal remains consist of faunal remains which were part of the middens or animals found directly associated with the burial as possible offerings.
Limestone slabs used at two of the sites to cover graves are included with the lithic artifacts. Wooden stakes found in one site are considered with the wooden artifacts. Plant matter consists of fiber mats and seeds recovered from one site. The deliberate removal of skeletal elements or the interments of only the skull are considered in this study.
Chapter 4

Results

Chapter four is a summary of the results obtained after the inventory and analysis of the Miami One skeletal remains from feature 164. These remains include those which were preliminarily observed by Gelman as well as those with only field observations written by the excavators. The taphonomy section describes post-mortem damage found on all the remains. The demography section lists the number of adult males and females as well as juveniles discerned from the inventory. The pathology section summarizes findings from both radiographs and observations of the types and possible etiologies of pathologies found among the remains. Pathological conditions reported in sites used as a comparative sample were presented in the previous chapter and are reviewed below.

Taphonomy

All of the skeletal remains recovered from Miami One and presented here show evidence or root etching, postmortem and excavation breakage and mold. There are also a few instances of unusual taphonomy. For instance, one group of fragments in unit 220 (FS 1344) is covered in green moss. Moss and mold are indicative of the humid conditions at the site and during storage. Some elements in units 216 (FS 1188), unit 217 (FS 1041) and unit 220 (FS 1089) have been blackened as a result of heat exposure but have not been burned directly (Figure 4.1). A few elements show damage from small crustaceans and insects. One tibia in unit 252 (FS 2964 B2) exhibits small carnivore tooth
Figure 4.1. Bones darkened by heat exposure.
marks. There is one cranial fragment from unit 869 (FS 4014 A1) with what appears to be an artificially drilled, perfectly circular hole and two other similar lesions that do not trespass the diploë. This may be due to infection. Alternately, it is possible that the circular defect was made post-mortem by a dermestid beetle. If this is the case, the other two lesions may be a result of the same insect activity. Mold, moss, root damage, insect activity and scavenger damage are a result of exposure or partial exposure of the remains. Even interred, the conditions of the site allowed for humidity, plants, insects and rodents to have access to the skeletal remains. Several shell and small fish vertebrae and a few unidentified faunal bones were found in conjunction with some of the remains, most often in bags labeled “loose in context.” There is no evidence to indicate whether the presence of these faunal remains were directly associated with the burials or as result of the use of the solution hole to dispose of daily refuse.

Demography

The final count for the minimum number of individuals based on the most common elements (MCE) present is n=63 (Table 4.1). The breakdown is as follows: n=49 adults or 77.8% (49/63) of the population, and n=14 juveniles or 22.2% of the population (14/63) (Table 4.2; Figure 4.2). Sex estimations are as follows: n=26 males and n=20 females; n=27 indeterminate (Table 4.3; Figure 4.3). Minimum number of individuals per unit yielded a higher number of individuals than the MNI established for all of feature 164. This is a result of the difficulty of discerning the number of units in which one single individual may be found due to the commingled nature of the burial and lack of clear stratigraphy, as explained in the previous chapter. The juveniles are divided
Table 4.1. Adult minimum number of individuals for feature 164.

<table>
<thead>
<tr>
<th>Bones</th>
<th>Midline</th>
<th>Left (%)</th>
<th>Right (%)</th>
<th>Unfixed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n)</td>
<td>(n)</td>
<td>(n)</td>
<td>(n)</td>
</tr>
<tr>
<td>Maxilla</td>
<td>0</td>
<td>40.0%</td>
<td>20.0%</td>
<td>40.0%</td>
</tr>
<tr>
<td>Zygomatic</td>
<td>0</td>
<td>73.7%</td>
<td>15.8%</td>
<td>10.5%</td>
</tr>
<tr>
<td>Mandible</td>
<td>0</td>
<td>42.2%</td>
<td>26.6%</td>
<td>31.2%</td>
</tr>
<tr>
<td>Atlas</td>
<td>100.0%</td>
<td>19/19</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Axis</td>
<td>100.0%</td>
<td>8/8</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Manubrium</td>
<td>100.0%</td>
<td>2/2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Clavicle</td>
<td>0</td>
<td>36.4%</td>
<td>19.7%</td>
<td>43.9%</td>
</tr>
<tr>
<td>Scapula</td>
<td>0</td>
<td>25.7%</td>
<td>32.4%</td>
<td>41.9%</td>
</tr>
<tr>
<td>Humerus</td>
<td>0</td>
<td>20.8%</td>
<td>30.8%</td>
<td>48.4%</td>
</tr>
<tr>
<td>Radius</td>
<td>0</td>
<td>30.2%</td>
<td>29.4%</td>
<td>40.5%</td>
</tr>
<tr>
<td>Ulna</td>
<td>0</td>
<td>37.9%</td>
<td>24.3%</td>
<td>37.9%</td>
</tr>
<tr>
<td>Patella</td>
<td>0</td>
<td>50.0%</td>
<td>46.4%</td>
<td>3.6%</td>
</tr>
<tr>
<td>Femur</td>
<td>0</td>
<td>18.6%</td>
<td>14.9%</td>
<td>66.5%</td>
</tr>
<tr>
<td>Tibia</td>
<td>0</td>
<td>20.6%</td>
<td>26.2%</td>
<td>53.3%</td>
</tr>
<tr>
<td>Fibula</td>
<td>0</td>
<td>10.5%</td>
<td>20.2%</td>
<td>69.4%</td>
</tr>
<tr>
<td>Calcaneus</td>
<td>0</td>
<td>42.3%</td>
<td>30.8%</td>
<td>26.9%</td>
</tr>
<tr>
<td>Talus</td>
<td>0</td>
<td>55.9%</td>
<td>23.5%</td>
<td>20.6%</td>
</tr>
</tbody>
</table>

1. Mandibles marked as "midline" (mental eminence) and "Left/Right" were included as "left."
2. Number indicates concluding value of MNI.
Table 4.2 Demography summary of age by unit of feature 164.

<table>
<thead>
<tr>
<th>Unit</th>
<th>MNI</th>
<th>Adults n</th>
<th>Juveniles n</th>
</tr>
</thead>
<tbody>
<tr>
<td>207</td>
<td>1</td>
<td>100.0%</td>
<td>0</td>
</tr>
<tr>
<td>211</td>
<td>4</td>
<td>25.0%</td>
<td>75.0%</td>
</tr>
<tr>
<td>212</td>
<td>8</td>
<td>50.0%</td>
<td>50.0%</td>
</tr>
<tr>
<td>213</td>
<td>8</td>
<td>37.5%</td>
<td>62.5%</td>
</tr>
<tr>
<td>214</td>
<td>2</td>
<td>50.0%</td>
<td>50.0%</td>
</tr>
<tr>
<td>215</td>
<td>4</td>
<td>50.0%</td>
<td>50.0%</td>
</tr>
<tr>
<td>216</td>
<td>21</td>
<td>76.2%</td>
<td>23.8%</td>
</tr>
<tr>
<td>217</td>
<td>13</td>
<td>76.9%</td>
<td>23.1%</td>
</tr>
<tr>
<td>218</td>
<td>1</td>
<td>100.0%</td>
<td>0</td>
</tr>
<tr>
<td>219</td>
<td>7</td>
<td>71.4%</td>
<td>28.6%</td>
</tr>
<tr>
<td>220</td>
<td>8</td>
<td>87.5%</td>
<td>12.5%</td>
</tr>
<tr>
<td>222</td>
<td>7</td>
<td>71.4%</td>
<td>28.6%</td>
</tr>
<tr>
<td>252</td>
<td>4</td>
<td>50.0%</td>
<td>50.0%</td>
</tr>
<tr>
<td>254</td>
<td>5</td>
<td>60.0%</td>
<td>40.0%</td>
</tr>
<tr>
<td>255</td>
<td>2</td>
<td>50.0%</td>
<td>50.0%</td>
</tr>
<tr>
<td>869</td>
<td>6</td>
<td>83.3%</td>
<td>16.7%</td>
</tr>
<tr>
<td>893</td>
<td>4</td>
<td>75.0%</td>
<td>25.0%</td>
</tr>
<tr>
<td>extra</td>
<td>3</td>
<td>100.0%</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>108¹</td>
<td>73¹</td>
<td>35¹</td>
</tr>
</tbody>
</table>

¹ MNI per unit yielded a much higher number of individuals than the MCE method used to establish the MNI for Feature 164
Figure 4.2. Demography summary of age by unit of feature 164.
Table 4.3. Demography summary of adults by unit of feature 164 by sex.

<table>
<thead>
<tr>
<th>Unit</th>
<th>MNI</th>
<th>Males %</th>
<th>Males n</th>
<th>Females %</th>
<th>Females n</th>
<th>Indeterminate %</th>
<th>Indeterminate n</th>
</tr>
</thead>
<tbody>
<tr>
<td>207</td>
<td>1</td>
<td>100.0%</td>
<td>1/1</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
</tr>
<tr>
<td>211</td>
<td>1</td>
<td>0.0%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>100.0%</td>
<td>1/1</td>
</tr>
<tr>
<td>212</td>
<td>4</td>
<td>0.0%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>100.0%</td>
<td>4/4</td>
</tr>
<tr>
<td>213</td>
<td>3</td>
<td>66.3%</td>
<td>2/3</td>
<td>33.3%</td>
<td>1/3</td>
<td>0%</td>
<td>0</td>
</tr>
<tr>
<td>214</td>
<td>1</td>
<td>0.0%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>100.0%</td>
<td>1/1</td>
</tr>
<tr>
<td>215</td>
<td>2</td>
<td>0.0%</td>
<td>0</td>
<td>50.0%</td>
<td>1/2</td>
<td>50.0%</td>
<td>1/2</td>
</tr>
<tr>
<td>216</td>
<td>16</td>
<td>62.5%</td>
<td>10/16</td>
<td>37.5%</td>
<td>6/16</td>
<td>0%</td>
<td>0</td>
</tr>
<tr>
<td>217</td>
<td>10</td>
<td>60.0%</td>
<td>6/10</td>
<td>20.0%</td>
<td>2/10</td>
<td>20.0%</td>
<td>2/10</td>
</tr>
<tr>
<td>218</td>
<td>1</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>100.0%</td>
<td>1/1</td>
</tr>
<tr>
<td>219</td>
<td>5</td>
<td>0.0%</td>
<td>0</td>
<td>20.0%</td>
<td>1/5</td>
<td>80.0%</td>
<td>4/5</td>
</tr>
<tr>
<td>220</td>
<td>7</td>
<td>14.3%</td>
<td>1/7</td>
<td>42.9%</td>
<td>3/7</td>
<td>42.9%</td>
<td>3/7</td>
</tr>
<tr>
<td>222</td>
<td>5</td>
<td>20.0%</td>
<td>1/5</td>
<td>40.0%</td>
<td>2/5</td>
<td>40.0%</td>
<td>2/5</td>
</tr>
<tr>
<td>252</td>
<td>2</td>
<td>0.0%</td>
<td>0</td>
<td>100.0%</td>
<td>2/2</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>254</td>
<td>3</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>100.0%</td>
<td>3/3</td>
</tr>
<tr>
<td>255</td>
<td>1</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>100.0%</td>
<td>1/1</td>
</tr>
<tr>
<td>869</td>
<td>5</td>
<td>60.0%</td>
<td>3/5</td>
<td>20.0%</td>
<td>1/5</td>
<td>20.0%</td>
<td>1/5</td>
</tr>
<tr>
<td>893</td>
<td>3</td>
<td>33.3%</td>
<td>1/3</td>
<td>33.3%</td>
<td>1/3</td>
<td>33.3%</td>
<td>1/3</td>
</tr>
<tr>
<td>extra</td>
<td>3</td>
<td>33.3%</td>
<td>1/3</td>
<td>0.0%</td>
<td>0</td>
<td>66.7%</td>
<td>2/3</td>
</tr>
<tr>
<td>Total</td>
<td>73</td>
<td>26</td>
<td>20</td>
<td>27</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 4.3. Demography summary of adults by unit of feature 164 by sex.
into six cohorts as follows: undetermined, fetal, perinatal, 1-5 years of age, 6-10 years of age and 11-20 years of age (Figure 4.4).

Mandible fragments that comprised only the mental eminence were labeled as “midline” during data collection. For the inventory, midline fragments of mandibles and mandibles that are complete or near complete are listed under the “left” column. There are at least thirty individuals represented by teeth, both loose and in their sockets. A list of units and field specimen numbers with a description of each unit’s contents is included in the appendix.

**Pathology**

Fifty-eight cases (n=58) of pathology, represented by fifty-six bones (n=56) are present (Table 4.4). There were thirty-two bones with infection (n=32), nineteen bones with osteoarthritis (n=19) and seven bones with trauma (n=7). Radiographic evidence did not show any evidence metabolic or nutritional disorders such as iron deficiency or Harris Lines nor did it result in change to the diagnoses determined by direct observations.

**Infectious Disease**

According to Ortner (2003:51), periostosis is a descriptive term for a periosteal bone formation without a specific diagnosis or explanation for how the inflammation occurred. Periostosis is present in nine cases (n=9). Periostitis is a bone inflammation that may result from non-specific infection and affects the outer bone table (Ortner
Figure 4.4 Juvenile Minimum Number of Individuals
Table 4.4. Summary of pathologies.

<table>
<thead>
<tr>
<th>Bone</th>
<th>Total</th>
<th>Infection</th>
<th>Degenerative</th>
<th>Trauma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cervicals</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Carpal</td>
<td>1</td>
<td>0</td>
<td>100.0%</td>
<td>0</td>
</tr>
<tr>
<td>Femora</td>
<td>3</td>
<td>100.0%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Fibulae</td>
<td>6</td>
<td>100.0%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Humeri</td>
<td>2</td>
<td>50.0%</td>
<td>0</td>
<td>50.0%</td>
</tr>
<tr>
<td>LBF</td>
<td>1</td>
<td>100.0%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Lower Arms</td>
<td>1</td>
<td>100.0%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Lower Limbs</td>
<td>2</td>
<td>50.0%</td>
<td>0</td>
<td>50.0%</td>
</tr>
<tr>
<td>Lumbar</td>
<td>1</td>
<td>0</td>
<td>100.0%</td>
<td>0</td>
</tr>
<tr>
<td>Mandibles</td>
<td>2</td>
<td>50.0%</td>
<td>50.0%</td>
<td>0</td>
</tr>
<tr>
<td>Manubrium</td>
<td>1</td>
<td>100.0%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>MC or MT</td>
<td>1</td>
<td>100.0%</td>
<td>0</td>
<td>100.0%</td>
</tr>
<tr>
<td>Metacarpal</td>
<td>1</td>
<td>0</td>
<td>100.0%</td>
<td>0</td>
</tr>
<tr>
<td>Radii</td>
<td>3</td>
<td>33.3%</td>
<td>0</td>
<td>66.6%</td>
</tr>
<tr>
<td>Ribs</td>
<td>5</td>
<td>80.0%</td>
<td>20.0%</td>
<td>0</td>
</tr>
<tr>
<td>Scapula</td>
<td>1</td>
<td>0</td>
<td>100.0%</td>
<td>0</td>
</tr>
<tr>
<td>Skull</td>
<td>4</td>
<td>100.0%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tarsal</td>
<td>1</td>
<td>0</td>
<td>100.0%</td>
<td>0</td>
</tr>
<tr>
<td>Thoracics</td>
<td>2</td>
<td>50.0%</td>
<td>50.0%</td>
<td>0</td>
</tr>
<tr>
<td>Tibiae</td>
<td>8</td>
<td>75.0%</td>
<td>25.0%</td>
<td>12.5%</td>
</tr>
<tr>
<td>Ulnae</td>
<td>8</td>
<td>37.5%</td>
<td>50.0%</td>
<td>12.5%</td>
</tr>
<tr>
<td>Totals</td>
<td>56</td>
<td>32</td>
<td>19</td>
<td>7</td>
</tr>
</tbody>
</table>
The periostitis in fourteen of the cases (n=14) is attributed to osteomyelitis. One case of osteomyelitis also exhibits *myositis ossificans traumatica*. In this case, the trauma which caused the *myositis ossificans traumatica* may have been the entry point for the pyogenic bacteria. A heavily fragmented tibia, possibly a left, with severe osteomyelitis may be indicative of treponemal infection (Figures 4.5 and 4.6). Only one case of periostitis in a fibular shaft (FS 3841 D1) appears to have started healing at the time of death. One case of osteomyelitis in a radial shaft (FS 2983 P2) healed prior to death. The single case of juvenile pathology is a severely deformed distal ulnar shaft (FS 4341 G3) of a child about five years of age exhibiting osteomyelitis possibly resulting from a fracture.

**Degenerative Joint Disease and Osteoarthritis**

The most common pathology encountered was osteoarthritis (OA) to various degrees. Only severe instances were included in the pathology inventory. Cases in which the defect was mild or questionable were noted in the general inventory but not included in the pathology inventory so as to prevent overrepresentation due to possible observation error. Of the nineteen recorded instances (n=19), there were five cervical vertebrae (n=5), four ulnae (n=4) and two tibiae (n=2). There was one case of a juvenile ulna with osteomyelitis and resulting OA (n=1). The cervical vertebrae exhibited destroyed margins, compression of the body, macroporosity and osteophytes, all common features of osteoarthritis of the vertebrae due to advanced age. Two of the vertebrae are consecutive and belong to the same individual. The four ulnae exhibit signs of OA on the
Figure 4.5. Left femur exhibiting possible treponemal infection.

Figure 4.6. Close up of femur exhibiting abnormal bone growth due to possible treponemal infection.
proximal epiphysis only. Both tibiae exhibited deformations on the medial surface of the proximal portion of the shaft. One carpal, a lunate, was severely affected (Figure 4.7) with an area of macroporosity that was clearly defined by a margin of eburnation, or callus. The area of macroporosity is roughly oval in shape and approximately 11.3 mm by 10.2 mm in size. The carpal also has large spicules and macroporosity along the margin. This is likely to be a case of activity-related primary osteoarthritis as opposed to advanced age.

Trauma

There were only seven bones, representing seven different individuals, found to have trauma, including four fractured long bones, two cases of myositis ossificans traumatica, and one fractured metacarpal or metatarsal. There were 874 adult and juvenile long bones identified in this study. The total numbers for each long bone were 181 humeri, 140 radii, 119 ulnae, 183 femora, 121 tibiae and 130 fibulae. The four fractured long bones consisted of one humerus (1/181, 0.55%), one ulna (1/119, 0.84%) and two radii (2/140, 1.4%). Three of the long bones had fractured along the shaft and were misaligned as they healed; they attached side-by-side instead of end-to-end, shortening the length of the limb. One proximal ulna (FS 3888 U1) is highly degraded but appears to have a healed fracture with an associated callus. The metacarpal or metatarsal (FS 3451 B2) also shows signs of infection along with the fracture. There are two cases (n=2) of *myositis ossificans traumatica*: an unsided fibula with an exostosis on the medial shaft (Figure 4.8) and a right tibia with an exostosis on the superior anterior shaft, near the tibial tuberosity (Figure 4.9).
Figure 4.7. Left lunate exhibiting severe osteoarthritis likely activity-related.
Figure 4.8. Unsided fibula exhibiting *myositis ossificans traumatica*.

Figure 4.9. Right tibia exhibiting *myositis ossificans traumatica*.
Dental Pathology

Out of the 187 teeth representing thirty (n=30) individuals, three (n=3) teeth were loose juvenile teeth of unknown association. The MNI was based on duplicate teeth and dental wear patterns. The total number of teeth described was n=187 (Table 4.5). There were 130 mandibular teeth and fifty-seven maxillary teeth. Teeth embedded in the mandibles consisted of 35.8% of the sample (67/187). Teeth exhibiting abscessing consisted of 18.2% of all teeth (34/187). Caries were found in 6.4% of all teeth (12/187) and hypoplasias in 2.1% of all teeth (4/187). The twelve caries were found on the following: maxillary first premolar (1/11, 9.1%) and second premolar (1/16, 16.7%); and mandibular first premolar (1/18, 5.6%), first molar (4/23, 17.4%), second molar (2/25, 8.0%) and third molar (3/15, 20.0%) (Figure 4.11). The hypoplasias were found on mandibular teeth consisting of a canine (1/11, 9.1%), a second premolar (1/22, 4.5%), a first molar (1/23, 4.4%) and a third molar (1/15, 6.7%). Of the four instances of hypoplasias, two were linear enamel hypoplasias (LEH), measureable at 4.2 mm and 3.5 mm. None of the juvenile dentition (n=3) showed any signs of caries or hypoplasias.

Pathology in the Comparative Site Sample

The following section summarizes the pathologies found in Miami One (DA11) in comparison with four other sites: Santa Maria (DA2132), Icon-Brickell Parcel (DA98), Flagami South (DA1053) and Margate-Blount (BD41). Brickell Bluff (DA1082) is not included as the only pathologies reported were one case of cribra orbitalia, one case of porotic hyperostosis and three hypoplasias. A parietal fragment with macroporosity did not exhibit the expanded diplöe in radiographs associated with anemia.
Table 4.5. Dental pathology in Miami One

<table>
<thead>
<tr>
<th>Pathology</th>
<th>Mandibular</th>
<th>Maxillary</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periodontitis</td>
<td>76.5%</td>
<td>23.5%</td>
<td>34</td>
</tr>
<tr>
<td>Caries</td>
<td>83.3%</td>
<td>16.7%</td>
<td>12</td>
</tr>
<tr>
<td>Hypoplasias</td>
<td>100.0%</td>
<td>0%</td>
<td>4</td>
</tr>
</tbody>
</table>

Summary of caries from the Miami One teeth.

Figure 4.10. Summary of caries from the Miami One teeth.
Windover (BR246) was not included as no skeletal analysis was available at the time of this study, though one case of perimortem trauma to a pelvis with an embedded projectile point was reported. Berbesque and Doran (2008:355) reported a slightly higher prevalence of LEH in males than females and stated that this may be due to “sociocultural factor that impacts the male children more than the female children of this population.” No Harris lines were reported at any site. An overview of dental pathologies reported for the above mentioned sites is provided first (Table 4.6), followed by an overview of osteoarthritis, infection, trauma and Harris lines (Table 4.7, Figure 4.11). The pathologies are reported by bone since the cases are not always directly associated with any single individual. These overviews are followed by summaries of infection (Table 4.8), osteoarthritis and degenerative joint disease resulting from advanced age (Table 4.9), and trauma (Table 4.10) by skeletal element and side.

At Santa Maria (DA2132), dental attrition was moderate to severe and periodontitis was common. No caries or hypoplasias were reported. The only case of osteoarthritis (n=1) was reported in one individual exhibiting severe osteophytosis on the left inferior articular facet of the atlas. There were six bones from one individual exhibiting infection associated with osteomyelitis. All six bones were severely affected and had cloacae and involucra. A possible case of trauma was reported on a male cranium with a cut on the right parietal.

At the Icon-Brickell Parcel (DA98), six cases of attrition, three cases of caries, eighteen cases of hypoplasias and one case of periodontitis were reported. The eighteen cases of hypoplasia (n=18) represented at least four individuals. There were four cases of
Table 4.6. Dental pathology from Miami One and comparative sites.

<table>
<thead>
<tr>
<th>Dental Pathology</th>
<th>Miami One (DA11)</th>
<th>Santa Maria (DA2132)</th>
<th>Icon-Brickell (DA12)</th>
<th>Flagami South (DA1053)</th>
<th>Margate-Blount (BD41)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periodontitis</td>
<td>18.2% (34/187)</td>
<td>Common</td>
<td>&lt;1.0% (1/285)</td>
<td>Not reported</td>
<td>n=2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Prominent</td>
</tr>
<tr>
<td>Caries</td>
<td>6.4% (12/187)</td>
<td>0</td>
<td>1.0% (3/285)</td>
<td>Not reported</td>
<td>n=1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Not reported</td>
</tr>
<tr>
<td>Hypoplasias</td>
<td>2.1% (4/187)</td>
<td>None reported</td>
<td>6.3% (18/285)</td>
<td>Not reported</td>
<td>n=1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Not reported</td>
</tr>
<tr>
<td>Attrition</td>
<td>Moderate – Severe</td>
<td>Moderate – Severe</td>
<td>Not reported</td>
<td>Severe</td>
<td>Not reported</td>
</tr>
</tbody>
</table>

Table 4.7. Summary of pathologies for Miami One and comparative sites.

<table>
<thead>
<tr>
<th>Sites</th>
<th>Site Number</th>
<th>MNI</th>
<th>Osteoarthritis</th>
<th>Infection</th>
<th>Trauma</th>
<th>Harris Lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miami One</td>
<td>DA11</td>
<td>63</td>
<td>n=19</td>
<td>n=32</td>
<td>n=7</td>
<td>n=0</td>
</tr>
<tr>
<td>Santa Maria</td>
<td>DA2132</td>
<td>6</td>
<td>n=1</td>
<td>n=6</td>
<td>n=1</td>
<td>Not reported</td>
</tr>
<tr>
<td>Icon-Brickell Parcel</td>
<td>DA98</td>
<td>12</td>
<td>n=4</td>
<td>n=6</td>
<td>n=1</td>
<td>Not reported</td>
</tr>
<tr>
<td>Brickell Bluff</td>
<td>DA1082</td>
<td>4</td>
<td>Not reported</td>
<td>Not reported</td>
<td>Not reported</td>
<td>Not reported</td>
</tr>
<tr>
<td>Flagami South</td>
<td>DA1053</td>
<td>16</td>
<td>n=3</td>
<td>n=3</td>
<td>n=1</td>
<td>Not reported</td>
</tr>
<tr>
<td>Margate-Blount</td>
<td>BD41</td>
<td>49</td>
<td>n=10</td>
<td>n=6</td>
<td>n=1</td>
<td>Not reported</td>
</tr>
<tr>
<td>Windover</td>
<td>BR246</td>
<td>168</td>
<td>Not reported</td>
<td>Not reported</td>
<td>n=1</td>
<td>Not reported</td>
</tr>
</tbody>
</table>
Figure 4.11. Summary of pathologies for Miami One and comparative sites.
4.8. Cases of infection in Miami One and comparative sites.

<table>
<thead>
<tr>
<th>Skeletal Element</th>
<th>Miami One (DA11)</th>
<th>Santa Maria (DA2132)</th>
<th>Icon-Brickell (DA12)</th>
<th>Flagami South (DA1053)</th>
<th>Margate-Blount (BD41)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cranium</td>
<td>n=4 unsided, periostitis</td>
<td>Frontal bone osteomyelitis</td>
<td>None reported</td>
<td>None Reported</td>
<td>None Reported</td>
</tr>
<tr>
<td>Clavicle</td>
<td>None reported</td>
<td>None Reported</td>
<td>None reported</td>
<td>Acromial end, possible periostitis</td>
<td>None Reported</td>
</tr>
<tr>
<td>Vertebrae</td>
<td>n=1 thoracic</td>
<td>None Reported</td>
<td>None reported</td>
<td>None Reported</td>
<td>None Reported</td>
</tr>
<tr>
<td>Humerus</td>
<td>n=1 unsided, periostitis</td>
<td>None Reported</td>
<td>Unspecified long bone, periostitis</td>
<td>None Reported</td>
<td>Left distal end, periostitis</td>
</tr>
<tr>
<td>Ulna</td>
<td>n=1 right, periostitis, n=2 unsided, osteomyelitis</td>
<td>Left osteomyelitis</td>
<td>Unspecified long bone, periostitis</td>
<td>None Reported</td>
<td>Unspecified shaft, periostitis</td>
</tr>
<tr>
<td>Radius</td>
<td>N=1 unsided, osteomyelitis</td>
<td>None Reported</td>
<td>Unspecified long bone, periostitis</td>
<td>None Reported</td>
<td>None Reported</td>
</tr>
<tr>
<td>Femur</td>
<td>n=1 left, possible treponemal, n=1 unsided, osteomyelitis, n=1 unsided, periostitis</td>
<td>Left and right osteomyelitis</td>
<td>Unspecified long bone, periostitis</td>
<td>None Reported</td>
<td>Left and right shafts, periostitis</td>
</tr>
<tr>
<td>Tibia</td>
<td>n=1 left, possible treponemal, n=3 unsided, osteomyelitis, n=1 unsided, periostitis</td>
<td>Left and right osteomyelitis</td>
<td>Unspecified long bone, periostitis</td>
<td>Unsided (n=2) periostitis</td>
<td>n=1 possible treponemal</td>
</tr>
<tr>
<td>Fibula</td>
<td>n=1 right, osteomyelitis, n=1 unsided, osteomyelitis, n=4 unsided, periostitis</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
</tr>
<tr>
<td>Other</td>
<td>Ribs, osteomyelitis and periostitis; n=1 manubrium, periostitis n=1 MC or MT</td>
<td>None reported</td>
<td>2nd or 3rd Metatarsal, unsided, Non-specific infection</td>
<td>None Reported</td>
<td>None Reported</td>
</tr>
</tbody>
</table>
4.9. Cases of osteoarthritis and degenerative joint disease due to advanced age in Miami One and comparative sites.

<table>
<thead>
<tr>
<th>Skeletal Element</th>
<th>Miami One (DA11)</th>
<th>Santa Maria (DA2132)</th>
<th>Icon-Brickell (DA12)</th>
<th>Flagami South (DA1053)</th>
<th>Margate-Blount (BD41)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cranium</td>
<td>n=1 (mandible) right and left TMJ</td>
<td>None Reported</td>
<td>None reported</td>
<td>None reported</td>
<td>n=1 (mandible) right and left TMJ</td>
</tr>
<tr>
<td>Clavicle</td>
<td>None reported</td>
<td>None Reported</td>
<td>None reported</td>
<td>Acromial end</td>
<td>None reported</td>
</tr>
<tr>
<td>Vertebral</td>
<td>n=5 cervical n=1 thoracic n=1 lumbar</td>
<td>n=1 atlas</td>
<td>Three vertebrae n=3</td>
<td>None reported</td>
<td>Cervicals, unspecified articular facets</td>
</tr>
<tr>
<td>Humerus</td>
<td>None reported</td>
<td>None Reported</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
</tr>
<tr>
<td>Ulna</td>
<td>n=1 unsided, proximal end n=2 unsided, both ends N=1 left, proximal</td>
<td>None Reported</td>
<td>Unsided</td>
<td>Unsided, proximal</td>
<td>Right, distal epiphysis</td>
</tr>
<tr>
<td>Radius</td>
<td>None reported</td>
<td>None Reported</td>
<td>None reported</td>
<td>None reported</td>
<td>Left and right distal epiphysis</td>
</tr>
<tr>
<td>Femur</td>
<td>None reported</td>
<td>None Reported</td>
<td>None reported</td>
<td>Unsided, Femoral head</td>
<td>Left and right distal ends</td>
</tr>
<tr>
<td>Tibia</td>
<td>n=1 right N=1 unsided</td>
<td>None Reported</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
</tr>
<tr>
<td>Fibula</td>
<td>None reported</td>
<td>None Reported</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
</tr>
<tr>
<td>Other</td>
<td>n=1 right scapula n=1 unsided rib n=1 lunate (activity) n=1 right 5th metacarpal n=1 right talus</td>
<td>None Reported</td>
<td>None Reported</td>
<td>None Reported</td>
<td>Left sternoclavicular joint; unsided, talocancaneal joint; unsided elbow joint</td>
</tr>
</tbody>
</table>
4.10. Cases of trauma in Miami One and comparative sites.

<table>
<thead>
<tr>
<th>Skeletal Element</th>
<th>Miami One (DA11)</th>
<th>Santa Maria (DA2132)</th>
<th>Icon-Brickell (DA12)</th>
<th>Flagami South (DA1053)</th>
<th>Margate-Blount (BD41)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cranium</td>
<td>None reported</td>
<td>Right parietal</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
</tr>
<tr>
<td>Clavicle</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
</tr>
<tr>
<td>Vertebrae</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
</tr>
<tr>
<td>Humerus</td>
<td>n=1 right, distal improperly healed</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
</tr>
<tr>
<td>Ulna</td>
<td>n=1 right, not healed</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
<td>Right, distal healed</td>
</tr>
<tr>
<td>Radius</td>
<td>n=2 left, healed with overlap</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
</tr>
<tr>
<td>Femur</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
</tr>
<tr>
<td>Tibia</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
</tr>
<tr>
<td>Fibula</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
<td>None reported</td>
</tr>
<tr>
<td>Other</td>
<td>n=2 unsided lower arm bones Myositis ossificans traumatica; n=1 metacarpal or metatarsal</td>
<td>None reported</td>
<td>Unsided metatarsal, healed</td>
<td>Unsided metatarsal, healed</td>
<td>None reported</td>
</tr>
</tbody>
</table>
There were six cases of infection (n=6) reported. The only case of infection discussed was that of a second or third metatarsal that was fracture and subsequently healed; however, the bone appears to have suffered a bacterial infection which may have also healed. The other cases of infection may be periostitis but no skeletal elements were identified. One case of porotic hyperostosis was unconfirmed by radiographic analysis.

The data for Flagami South (8DA1053) indicate severe dental attrition, one case of caries, one case of hypoplasias (n=1) and two cases of periodontitis. There were three cases of osteoarthritis represented by a proximal ulna, the acromial end of an unsided clavicle and an unsided femoral head. The three cases of infection were represented by periostitis on the acromial end of an unsided clavicle and periostitis of two unsided tibiae. The two clavicles represent two different cases. One metatarsal exhibited a healed fracture on the distal end.

At the site of Margate-Blount (BD41), wear was moderate to severe. Only one case of caries was reported. One individual was described as having osteoarthritis throughout the body, degenerative joint disease, osteitis, a healed fracture on the distal epiphysis of the right ulna, and periostitis on the distal end of the left humerus, both ulnar shafts and both femoral shafts. The authors did not specify whether the osteoarthritis and degenerative joint disease are due to advanced age, activity or trauma. However, because the OA and DJD are found throughout the body, it was likely due to advanced age. The periostitis was not considered severe. Another individual at Margate-Blunt (BD41) exhibited a possible case of treponemal infection on a left tibia. This tibia was described as having “saber-shaped anterior crest” (İşcan 1983:157) associated with treponemal
infection. Osteoarthritis (n=4) represented by three vertebrae with osteophytes and one ulna with osteoarthritis.

*Mortuary Practice in the Comparative Site Sample*

Mortuary practice information from Miami One and the comparative site sample provides insight into burial patterns and change of practices over time in south Florida (Table 4.11). The present study did not include burial artifacts found at Miami One, nor did it contain enough information about grave positions or the chronology of burials to discuss mortuary practice in depth. Like Miami One, all the Late Archaic and Glades period sites were burial sites accompanied by a midden. This means that burials were conducted in the vicinity of habitation sites. Margate-Blount, dated from the Late Archaic though the Glades period, was the only site at which a burial mound was observed. The Windover cemetery, an Early to Middle Archaic site classified as a burial pond, is the only wet site considered in this study because of its large size and wealth of burial information. All burials at Windover were primary. Commingled remains are attributed to peat-slides within the pond since many of the remains are still partially articulated, a feature not seen in secondary burials. At the Late Archaic through Glades period sites, secondary bundle burials are most common but primary extended and flexed burials are also observed at three of the six sites. At Santa Maria, the graves were situated in natural solution holes and covered by limestone slabs about 50 m west of the midden. Two bone beads and an unmodified shark’s tooth were found with one of the burials. A flat limestone rock which may have been a pendant was found with another burial. A celt or scarper made from
Table 4.11. Summary of mortuary practice data from Miami One and comparative sites.

<table>
<thead>
<tr>
<th>Site</th>
<th>Site Number</th>
<th>Time Period</th>
<th>Years</th>
<th>MNI</th>
<th>Sex</th>
<th>Age</th>
<th>Burial Type</th>
<th>Burial Artifacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miami One</td>
<td>DA11</td>
<td>Late Archaic, Glades I &amp; II</td>
<td>2000 B.C.-A.D. 1200</td>
<td>63</td>
<td>26 M 20 F</td>
<td>49 A 14 J</td>
<td>Solution holes/Secondary, Bundle</td>
<td>Stone pipe, carved bone canoe</td>
</tr>
<tr>
<td>Santa Maria</td>
<td>DA2132</td>
<td>Late Archaic</td>
<td>1000 B.C.-A.D. 780</td>
<td>6</td>
<td>2 F 1 M 4 UID</td>
<td>6 A</td>
<td>Solution holes/Primary</td>
<td>Limestone slabs placed on top, shark's tooth, bone beads, shell Celt</td>
</tr>
<tr>
<td>Icon-Brickell</td>
<td>DA98 (DA12)</td>
<td>Glades I, II &amp; III</td>
<td>1-1750 A.D.</td>
<td>12</td>
<td>3 M 3 F 6 UID</td>
<td>9 A 3 J</td>
<td>Solution holes, graves/Primary, Secondary</td>
<td>Partially articulated shark vertebrae</td>
</tr>
<tr>
<td>Bluff</td>
<td>DA1082</td>
<td>Late Archaic</td>
<td>2000-500 B.C.</td>
<td>4</td>
<td>1 M 1 F 2 UID</td>
<td>3 A 1 J</td>
<td>Shallow graves/Secondary, Bundle</td>
<td>None reported</td>
</tr>
<tr>
<td>Flagami South</td>
<td>DA1053</td>
<td>Late Archaic-Glades II</td>
<td>1500 B.C.-A.D. 1200</td>
<td>16</td>
<td>2 M 4 F 10 UID</td>
<td>10 A 4 J</td>
<td>Unknown/Secondary, Bundle</td>
<td>Three shell artifacts</td>
</tr>
<tr>
<td>Margate-Blount</td>
<td>BD41</td>
<td>Late Archaic, Glades I, II &amp; III</td>
<td>2000 B.C.-A.D. 1750</td>
<td>49</td>
<td>20 M 22 F 7 UID</td>
<td>42 A 8 J</td>
<td>Mound/Primary, Secondary</td>
<td>Wooden artifacts and limestone slabs</td>
</tr>
<tr>
<td>Windover</td>
<td>BR246</td>
<td>Early to Middle Archaic</td>
<td>6500-5500 B.C.</td>
<td>168</td>
<td>47 M 47 F 7 UID</td>
<td>101 A 67 J</td>
<td>Mortuary Pond/Primary</td>
<td>Bone and antler artifacts and wood, shell and stone tools</td>
</tr>
</tbody>
</table>
shell was found with a third burial. All burials were missing the cervical vertebrae. One female was missing both feet but excavators did not believe this was due to preservation. At the Brickell-Point Parcel, there are a number of partially articulated shark vertebrae throughout the site. Some of these articulated shark burials are in association with the human burials, perhaps as offerings. One human burial may have been associated with limestone slabs. There are three secondary cranium-only burials and one primary burial with a missing cranium. Brickell Bluff was a mortuary site with an associated midden. Bundle burials were interred in shallow graves. No grave artifacts were reported. At Flagami South, individuals were interred in bundle burials. Three shell artifacts were found in associating with the burials but there is no information about the nature of the artifacts or the individuals with whom they were associated. At Margate-Blount, three primary and sixteen secondary burials were found within a mound adjacent to a habitation area. At least one burial was flexed. Three of the burials were associated with wooden remains. One of these wooden remains was a paddle found on top of a primary burial. Two burials were found with limestone slabs placed atop. One juvenile burial was found at the feet of a primary extended burial. The ribs and vertebrae of this juvenile were arranged in a circle around the cranium. The left scapula, left clavicle and an unsided pelvic bone were placed underneath the cranium and the long bones were placed beside it. Many shell, bone and lithic artifacts were recovered from the mound but none in clear association with any burials.

At the mortuary pond of Windover, primary, flexed burials were placed in shallow pits within the pond’s peat layer; however, it is unclear whether burials occurred
while the peat was covered with water or during seasons in which the peat was exposed. Wooden stakes were used to anchor the burials. Many burials were wrapped in fiber mats, a practice most commonly encountered in juvenile burials. There appears to be no correlation between the sex and age of an individual and the number of associated burial artifacts; however, certain types of artifacts, such as tools, are associated with age and sex. For instance, most types of bone tools were mostly associated with males. Unmodified bones and bone adornments were mostly found with female burials. Lithics were rare and associated only with males and juveniles. Some juveniles were found with artifacts they could not have used in life. For instance, a young child was found with a stone pestle. As table 4.11 shows, there are some similarities and differences, which will be discussed in the following chapter, between the Miami One data and those for the other sites.
Chapter 5

Discussion

Prehistoric human life in south Florida was somewhat arduous but not austere. The Glades people had a variety of resources within their reach to provide for a healthy diet. At Miami One, pathologies were present but evidence suggests that relatively few individuals were substantially incapacitated. Osteoarthritis appears to have been mostly associated with advanced age as opposed to injury, though activity may have been a considerable cause since the population was very physically active. Infection was widespread, but few cases were considered severe. Among all the cases of infection, only two were likely related to treponemal infection. There were few cases of trauma reported across sites and most of them healed prior to death; however, treatment for broken bones appears to have been lacking, leading to infection and possibly death in a few cases. Pathologies associated with malnutrition were few.

Miami One (DA11)

According to the inventory of Miami One human skeletal remains presented in the previous section, 12.6% (63/500) of the expected population of the site was buried within feature 164. From the minimum number of individuals estimated in the present study, adults comprise 77.8% (49/63) and juveniles comprise about 22.2% (14/63). The number of juveniles may be underestimated due to the poor preservation of juvenile remains. Sex estimation indicates that the population was close to a 1 to 1 ratio. The minimum number
of individuals for feature 164 was established using the minimum count of elements (MCE). Preliminary pathology observations by Gelman (2005) show a low frequency of nutritional deficiencies, with no examples of porotic hyperostosis or cribra orbitalia. Her observations were consistent with the findings of my study. Gelman states that faunal remains identified as fish, manatee, conch turtle and deer indicated a healthy diet, which is consistent with the low incidence of nutritional insults. Though some periodontal disease is present, the frequencies of enamel hypoplasias and caries are low. According to Gelman (2005:4), the most common forms of pathology are dental wear, osteoarthritis and periostitis. Other examples of unusual pathologies in the Miami One remains reported by Gelman (2005:4-5) were an osteochondroma located on an adult femur, an auditory exostosis on an adult and several instances of bone remodeling resulting from infection in long bones, including a case of possible treponemal infection. A healed fracture was found on an adult fibula (Gelman 2005:4-5). The present study found evidence of infection, including treponemal infection, osteoarthritis and trauma.

The commingled nature of the site and the artificial boundaries created by arbitrary excavation units prevent an accurate count of individuals whose remains were spread among multiple units or the number of units in which any single individual may be represented by scattered remains. It is also difficult to establish the number of individuals who lived at the site during any given time period. However, the data clearly show that the site was continuously used over an extended amount of time. The minimum number of individuals indicates that the population was consistent with that of other area sites. Miami One, together with nearby sites, was home to a considerably large population and constituted a cultural center for the Glades people in the bay area.
Infectious Disease

Evidence of infection was present in thirty-two cases, one of which was a juvenile. This juvenile case comprises 3.1 percent (1/32) of recorded infections and 7.1 percent (1/14) of the total juvenile population. This fragment was a highly deformed distal ulna. Among the adults, eighteen of the nineteen cases were active at the time of death. Only one instance of infection was healed by the time death occurred. One had only begun the healing process; therefore, infection may have often led to death. There were two instances of infection resulting from fractures.

Osteomyelitis is caused by pus-producing bacteria and manifests itself as an inflammation of bone and bone marrow. It can often affect the outer surface of the bone thereby triggering periostitis as well (Ortner 2003:55). The most common form of the disease, acute hematogenous osteomyelitis, is indirect contamination from somewhere else in the body and involving pyogenic bacteria, whereas the second most common, acute osteomyelitis, is from direct contamination at the site of trauma (Aufderheide and Rodríguez-Martín 1998:172; Ortner 2003:181). Osteitis is only evident radiographically in one possible case of treponemal infection. There were fourteen cases of osteomyelitis reported in this study. Some cases of osteomyelitis are accompanied by specific features such as “snail tracks” and cloacae, both of which are related to pus and pus discharge (Mann and Murphy 1990: 117-118). Cloacae are evident in at least one case at the Miami One sample and “snail tracks” are observable in all cases. One case of osteomyelitis was also accompanied by *myositis ossificans traumatica* and will be further discussed in the trauma section. Osteomyelitis was reported in six bones at Santa Maria, all belonging to one individual. All six bones had cloacae, indicating a severe case of
infection. Aside from Miami One, periostitis was at the Icon-Brickell Parcel, Flagami South and Margate-Blount. The severity of the condition was only reported for Margate-Blount, where all ten cases were bones belonging to one individual and the condition was not considered severe by the author. The other sites did not specify severity or number of individuals affected but it was clear that periostitis is more common than osteomyelitis at Miami One and all comparative sites.

There was only one reported case of osteomyelitis in feature 164 possibly associated with treponemal infection, representing at least one member of the population (1.6%) of the adult population. This was the case of a left tibia represented by several fragments. The tibia shows a considerable degree of bowing and very active infection. Ortner (2003:275) states that this bowing usually begins prior to the age of fifteen and is similar to “saber tibia” resulting from congenital syphilis. Radiographically, some osteitis was evident especially at the midshaft.

There are four types of treponemal infection. According to Ortner (2003:274), these infections are caused by treponeme bacteria which affect mostly the bone and can be found worldwide but specific syndromes, with the exception of syphilis, tend to be geographically bound. Pinta (*Treponema carateum*) is most commonly seen in parts of Central and South America and is the only form that does not affect the bone. Yaws (*Treponema pertenue*) is endemic and seen in juveniles, but lesions are very rare. The symptoms can be confused with those of endemic syphilis (bejel). Endemic syphilis is considered to be intermediate between yaws and venereal syphilis. It is not always lethal. Venereal syphilis (*Treponema pallidum*) is the only type that is transmitted sexually and can be passed on from mother to child after the 16th week of pregnancy (congenital
syphilis). This form of syphilis affects bone to a larger degree than yaws; however, it is still rare and only occurs years after the initial infection, during the tertiary stage (Mann and Murphy 1990:143-145; Aufderheide and Rodríguez-Martin 1998:157). The type of treponemal infection involved here is uncertain, but pinta can be safely ruled out as it is the only one that does not leave osteological evidence. Treponemal infection is known to affect the cranium, however no instances were observed in the skeletal remains of feature 164. This pathology is also reported at Margate-Blount, where another tibia is described as “saber-shaped.” None of the other comparative sites report any cases of treponemal infection; therefore, this pathology was likely not common in south Florida.

Degenerative Joint Disease and Osteoarthritis

In the present study, osteoarthritis (OA) due to age is the most common pathology. It involves bone remodeling and affects individuals starting at thirty to thirty-five years of age. Larson (1997) states, in a 1992 study of North American native populations, that no clear association was established between the levels of osteoarthritis in hunter-gathers versus agriculturalists, but Ortner (2003) asserts that stress due to a demanding physical lifestyle is a major factor in the prevalence of the condition. Osteoarthritis of the joints is known as degenerative joint disease (DJD). Only nineteen cases of OA and DJD were included in the pathology inventory of feature 164, but mild cases were seen mostly in vertebrae, which is consistent with Mann and Murphy’s (1990) assertion that in cases of OA, the spine is often affected. In the case of the left lunate, eburnation is also present as a clearly defined margin around an area of macroporosity. Mann and Murphy (1990:19) describe eburnation as “a callus rich in blood vessels...
followed by an extensive remodeling producing thick polish bone” which is preceded by
subchondral bone being exposed. The osteophytes seen along the margins of the lunate
and many of the vertebrae are ossified cartilage. However, the severity of the defect in
the lunate may be indicative of OA resulting from repeated activity rather than age.

A few of the affected bones show evidence of occupational stress, such as the
lunate described above. It is often difficult to differentiate between osteoarthritis
resulting from advanced age and cases resulting from injury and other causes especially
when the individual in question is not present as a complete skeleton. In cases of
advanced age, the defect would be widespread, whereas injury would restrict the defect to
the location of the insult (Mann & Murphy 1990: 18-19). The severity of OA in an
individual as well as the location may impede normal function and the individual may
require assistance for daily activities; however, the individual would not have been
entirely incapacitated. There was only one case of possible OA which may have resulted
from injury. This was the case of a juvenile ulna exhibiting a deformity consistent with
osteomyelitis.

In the comparative site sample, OA was reported at the sites of Santa Maria
(DA2132), the Icon-Brickell Parcel (DA98), Flagami South (DA1053) and Margate-
Blount (BD41). At Santa Maria, the only case reported was an atlas severely affected by
osteoophytosis. At Icon-Brickell, three of the four cases were vertebrae that exhibited
osteoophytes. The fourth case was an unsided ulna. The three cases reported at Flagami
South were on joints (DJD). At Margate-Blount, there were ten reported cases of OA but
they ere all from a single individual exhibiting the pathology throughout the body. The
mandible was affected at both temporomandibular junctions. The neck vertebrae and
sternoclavicular joint in the chest were also affected. Both arms exhibited OA on the
distal end of three of the four lower arm bones, at the wrists. One of the elbow joints was
also listed. The distal ends of both femora were also affected, at the ankle, as well as
joint between the talus and the calcaneus in one foot. The widespread nature of the OA
in this individual is an indication that it is due to advanced age. It is possible that this
individual’s movements may have been impaired, especially at the neck and hands. Few
individuals in the comparative sample and none in the Miami One sample were found
complete enough for such an assessment. However, the locations of most of these insults
and the fact that they are unaccompanied by trauma are indicative of age. Osteoarthritis
appears to have been relatively common in the south Florida population, largely as a
result of age. The number of cases reported from each site indicate that the lifestyle not
overly stressful as to result in many cases of trauma or trauma-related osteoarthritis.

Trauma

There were seven cases of trauma. Out of the seven recorded cases, six were on
long bones and three were set improperly. The six long bones affected were a right
humerus, a right ulna, two left radii and two unsided lower arm bones. The three long
bones that healed improperly are the right humerus and the left radii. The seventh case of
trauma, on a metacarpal or a metatarsal, also exhibits signs of infection. The juvenile
distal ulna exhibiting infection mentioned earlier may have also resulted from a fracture.
There is no evidence to suggest that these injuries were treated in any special way, as
with a splint, to prevent infection or misalignment while healing. One of the misaligned
fractures is a left radius in which the proximal and distal halves attached side by side with
an overlap of 31 mm, thereby noticeably decreasing the length of the limb. The other left radius had a similar condition with an overlap of 20 mm. There are two cases of *myositis ossificans traumatica*, which Mann and Murphy (1990:113) describe as resulting from injury and leading to the ossification of muscle, tendons or ligaments and Aufderheide & Rodriguez Martin (1998:26) state that occasionally the cause is a “crushing injury of muscle against bone.” They also state that the most common bones are affected are femur, shoulder and pelvis (Rodriguez Martin 1998:26). This is not the case with the two affected bones in this collection. It is most common on the posterior femur and tibia, though the two cases in this study were superior anterior tibia and the midshaft of a radius or ulna. The tibia also exhibited signs of osteomyelitis. No cases of *myositis ossificans traumatica* were reported at any other site.

Each site from the comparative sample, except for Brickell Bluff, reported at least one case of trauma. At Santa Maria, a possible case of sharp-force trauma was reported on a right parietal. At the Icon-Brickell Parcel and Flagami South, the trauma reported consisted of two healed metatarsals. At Margate-Blount, a healed fracture on the distal right ulna was reported. This fracture was observed on an individual with severe osteoarthritis and mild periostitis throughout the body. A pelvic bone with an embedded projectile point that may have led to death was reported at Windover. It appears that trauma was also not common in south Florida. However, the lack of treatment often resulted in bones resetting improperly, possible infection and possible osteoarthritis.
Dental Pathology

The type of food consumed by the Glades people is evidenced by the incidence of caries and attrition. How sufficiently nutritious their diet was is evidenced by the incidence of hypoplasias, Harris lines and cribra orbitalia, all of which are associated with nutritional deficiency. Caries are a result of acid-producing bacteria associated with starchy diets. They are more common among agricultural societies; therefore, they are not expected to be present in high numbers among the Glades people. There were twelve cases of caries reported at Miami One. The percentage of caries (6.4%) was higher than that of the Icon Brickell Parcel (1.0%), where only three caries were reported. There were no caries found at Santa Maria and Brickell Bluff. Only one case of caries was reported at both, Flagami South and Margate-Blount. Severe attrition is indicative of a gritty diet and was reported at Miami One, Santa Maria and Flagami South. The Icon-Brickell Parcel and Margate-Blount have no reports on the severity of attrition. Periodontitis, which is associated with both caries and attrition, was observed in thirty-four cases (18.2%) at Miami One. The data from the site of Santa Maria does not report a number of cases but periodontitis is described by the researchers as “common.” The incidence of periodontitis was very low at the Icon-Brickell Parcel, where only one case was reported (<1%). Only two cases were reported at Flagami South. A number of cases are not available from the Margate-Blount site but periodontitis was not described as severe by the authors.

Four cases of hypoplasias and no evidence of porotic hyperostosis or cribra orbitalia were reported at Miami One. This indicates that the population had few nutritional deficiencies. These data are consistent with Gelman’s (2005) preliminary
inventory and assessment that the population consumed a sufficient diet and suffered from few nutritional deficiencies. Hypoplasias were observed in two percent (2.1%) of the Miami One teeth analyzed in the study. The Icon-Brickell Parcel reported eighteen cases of linear enamel hypoplasias (6.3%) representing at least four individuals. Flagami South reported one case of hypoplasia. No cases were reported at Santa Maria, Margate Blount or Brickell Bluff. At Windover, a higher incidence of hypoplasias as reported for males, which was attributed to a possible sociocultural factor. To analyze possible nutritional deficiencies further, the distal epiphyses of several long bones were radiographed. These radiographs show no signs of Harris lines. Harris lines were not reported at any site in the comparative sample. The data on the incidence of hypoplasias, Harris lines and cribra orbitalia in Miami One and the comparative sites indicate that the south Florida population’s diet was nutritious enough to prevent widespread metabolic disorders associated with nutritional deficiency.

*Mortuary Practice*

All of the burials in feature 164 are secondary and commingled, but there is no information about body positions or the timing of interments. Demographic distribution does not show any evidence of differential burial treatment of adults versus juveniles or males versus females. The types of pathology did not appear to be a consideration in burial practice. Though Gelman reported that there were at least four single burials in feature 164, no such evidence was found among the sample. There were also very few burial artifacts associated with the burials and none were available for analysis during this study. There is also no evidence of social stratification in any burial practice.
All the Late Archaic and Glades period sites discussed in this thesis and containing human burials, including Miami One, were burial sites accompanied by a midden. Burials were placed near habitation sites. Margate-Blount, dated from the Late Archaic though the Glades period, was the only site at which a burial mound was observed. Windover is an Early to Middle Archaic site where burials were placed in a pond. It is the only wet site considered in this study because of its large size and wealth of burial information. All burials at Windover were primary. Commingled remains are attributed to peat-slides within the pond since many of the remains are still partially articulated, a feature not seen in secondary burials. At the Late Archaic through Glades period sites, secondary bundle burials are most common but primary extended and flexed burials are also observed at three of the six sites.

At Miami One, several shells, fish vertebrae and at least two pieces of pottery were included with the remains. There is no evidence to suggest that any of them are directly associated with any burial and are likely part of the midden. A stone pipe and a carved bone canoe were associated with burials. Bone and bone artifacts were found associated with burials at Santa Maria, the Icon-Brickell Parcel and Windover. At Santa Maria, bone beads and an unmodified shark’s tooth were found with burials. The Icon-Brickell Parcel (8DA98) shows three instances of articulated or partially articulated fish vertebrae found near one primary burial and two secondary burials. The only clear association came from one of the secondary burials where two articulated sets of fish vertebrae were found. Many burials at Windover were found with bone tools, personal adornments made from bone and unmodified bone. Shell tools were found associated with burials at Santa Maria, in the form of a shell celt or scraper, and Flagami South in
the form of three unspecified artifacts. Very few shells were found at the site of Windover. This scant inclusion of shells in the burials may be a reflection of the little use of marine resources in the Glades area during the Early Archaic. Wooden artifacts were only found at Margate-Blount where they were associated with three burials. One of these wooden artifacts was a paddle placed atop a primary burial. Wooden stakes found at Windover were most likely used to anchor the burials to the bottom of the pond and perhaps also served as grave markers. Lime stone slabs covering all burials at Santa Maria, at least one burial at Brickell-Bluff, two burials at Margate-Blount. They likely served to protect and mark the burials, much like the wooden stakes used at Windover. There were no lithic inclusions at the Glades period sites and very few at the Windover site. All lithics at the Windover site were associated with male or juvenile burials. Brickell Bluff was the only site where there were no burial goods associated. Windover certainly had many more burial artifacts associated with the burials than the Late Archaic and Glades period sites. The only exception was the higher percentage of shell and shell artifact inclusions at the Late Archaic and Glades period sites than at Windover. The higher number of artifacts recovered from Windover, especially perishable artifacts like wood and fiber matting, may have been a result of better preservation at the site.

None of the Glades period sites reported a differentiation of burial distribution patterns or inclusion of burial artifacts based on sex or age. At Windover, there was no indication of burial distribution patterns or inclusion of burial artifacts based on age or sex; however, there was an apparent pattern of distribution of types of artifacts bases on age and/or sex. Juveniles were most often found wrapped in fiber mats. Most types of bone tools were found with males, whereas unmodified bones and bone adornments were
found mostly with females. Some juveniles were found with artifacts they were not likely to have used in life. The data from the sites presented in this study suggest that there is a possibility that age and sex distribution among artifact types was restricted to the Early and Middle Archaic and this practice may have been abandoned during the Late Archaic and Glades periods.

There were no records of secondary skull burials or burials with deliberate exclusion of certain bone elements at Miami One. At Santa Maria, all the burials were missing the cervical vertebrae and one primary burial of a female exhibiting severe osteomyelitis is missing both feet, reported to have been intentional and not a result of poor preservation. The researchers believed that the exclusion of the vertebrae and feet may have been a way to “deter the dead from any return to the world of the living” (Carr et al. 1984:187); however, there is no evidence to suggest this was the case. A male cranium exhibiting possible sharp-force trauma was found on the lower chest of a female burial. It is unclear whether the post-cranial remains were absent as part of a burial practice or as a result of construction at the site. No relationship between the two individuals was established. The Icon-Brickell Parcel has three secondary cranium-only burials and one primary burial with a missing cranium. At Margate-Blount, a juvenile was found with ribs and vertebrae arranged in a circle around the skull. The left scapula, left clavicle and an unsided pelvic bone were placed underneath the cranium and the long bones were placed beside it. Finally, at Windover, one adult male found with an embedded projectile point in the pelvis which may have led to death was found to be missing the skull and first vertebra. Researchers at the site believe they were removed prior to burial. The removal of certain skeletal elements, specifically the skull and
vertebrae, and the burial of crania without post-cranial remains were observed at sites ranging from the Early Archaic though the Glades III period. There is no archaeological evidence at any of the above sites to account for these burial practices.
Chapter 6

Conclusion

South Florida archaeology has been the subject of study for over a hundred years; however, bioarchaeology as a separate area of interest has grown considerably in the years since Larsen (2001) and Hutchinson (2004). Environmental archaeology is a particularly useful theoretical framework for south Florida bioarchaeology as it takes into account changing environments, fluctuating availability of resources and the cultural adaptations that allow survival and dispersion of populations in geoeconomically defined regions. The Everglades region provides a unique opportunity to study the lifeway and development of a hunter-gatherer culture with a heavy reliance on marine resources in a temperate estuarine environment. The present study compares the human remains from Miami One (DA11) to those from Santa Maria (DA2132), the Icon-Brickell Parcel (DA98), Brickell Bluff (DA1082), Flagami South (DA1053), Margate-Blount (BD41) and Windover (BR246). Santa Maria, the Icon-Brickell Parcel, Brickell Bluff, Flagami South and Margate-Blount are dated from the Late Archaic through the Glades Period. Windover is an Early to Middle Archaic site and is included in the comparative sample to discuss a change of mortuary practice over time.

The analysis of the sites presented here, including Miami One (DA11), has indicated similar lifeway and pathological conditions among the population of the area. Subsistence is largely hunter-gatherer with a heavy reliance on marine resources. The diet of the Miami One population consisted of several species of tropical plants along
with small terrestrial mammals and marine species. The marine species included shellfish, fish and some mammals. This diet was sufficient enough to prevent nutritional deficiencies. The skeletal remains showed few insults related to metabolic disorders such as anemia. The site of Miami One and the comparative site sample do not exhibit a high incidence of hypoplasias or cribra orbitalia. There were no Harris lines observed at Miami One. Severe toothwear at Miami One at most of the comparative sites is a result of sediment inclusion in the diet. This high level of attrition is associated with hunter-gatherer societies and commonly seen among coastal groups who rely heavily on marine resources. This severe attrition is manifested in crowns which have been worn flat and consequently show extensive exposure of secondary dentin.

Osteoarthritis and degenerative joint disease are very common at Miami One skeletons and the comparative sites, largely as a result of aging. Miami one had the highest number of cases. The second highest number of cases was observed at Margate-Blount, though they were all attributed to a single individual with OA and DJD throughout the body. A few cases at Miami One are related to healed fractures or occupation stress, such as the case of a severely deformed lunate, a wrist bone, showing an area of macroporosity bordered by eburnation and surrounded by spicules. Though severe OA would have restricted movement and activity of the affected person, few cases at Miami One and the comparative sites are this advanced.

Infections at Miami One and the comparative sites include osteomyelitis and periostitis. Thirty-two cases were observed at Miami One. All comparative sites that reported pathologic conditions include at least one instance of infection. There is one possible instance of undifferentiated treponemal infection at Miami One and Margate-
Blount. At Miami One, the possible case of treponemal infection was observed on a left tibia with bowing, osteitis and periostitis related to active osteomyelitis. At Margate-Blount, a left tibia exhibited very similar characteristics. Cases of bone inflammation in which infection may not have been the mechanism were described as periostosis.

Trauma in the form of fracture was observed in seven cases at Miami One. Three of these cases were misaligned during the healing process. This is evidence that treatment of fractures was either absent or insufficient. A few traumatic injuries resulted in permanent damage such as OA, *myositis ossificans traumatica* and shortening of the limbs. Further, there is no evidence to support that injuries were due to accidents or conflict, whether internal or external. There is no archaeological evidence, such as weapons or trophies, at Miami One to indicate warfare.

Mortuary practice at Miami One consists of the use of natural solution holes in the limestone as ossuaries for commingled remains. Few primary burials were found at the site and none are reported in feature 164. Burial artifacts are sparse and none were analyzed for the present study. A stone pipe and carved bone canoe were recovered from Miami One. It is not clear whether faunal remains found with the skeletal remains at Miami One were directly associated with burials or the product of interments being placed within the midden. However, faunal remains have been directly associated with burials at some of the comparative sites. The Icon-Brickell Parcel contains a few articulated shark vertebrae and some were found in direct association with burials. A shark’s tooth and bone beads were found with burials at Santa Maria. According to the last bioarchaeological report of Miami One, limestone slabs were found atop some primary burials; however, the use of slabs was not reported for feature 164. The use of
limestone slabs are reported at Santa Maria and Margate-Blount. Neither Miami One nor the comparative sites showed any evidence of a differentiation of men and women or adults and juveniles in burial practice. The site of Windover is dated to a much earlier period (Early to Middle Archaic) and is the only wet site considered in the present study. Individuals were interred within the pond’s peat, which provided the proper chemical and physical conditions for excellent preservation of both the skeletal remains and the burial artifacts. The pattern of burial distribution at Windover and the inclusion of burial artifacts do not appear to be based on age or sex; however, the types of burial artifacts associated with the burials show such a pattern. At Santa Maria, the Icon-Brickell Parcel and Margate-Blount, some burials are lacking certain skeletal elements, most often the crania and vertebrae. The Icon-Brickell parcel also reports cranium-only burials. At Windover, the only individual reported to have evidence of perimortem sharp-force trauma was missing the cranium and first cervical. Researchers believe these elements were removed prior to burial. The mortuary data suggest that the inclusion of burial artifacts in interments has not changed since the Early Archaic; however, Late Archaic and Glades sites do not show any pattern of burial distribution or burial artifact association based on age or sex as observed at Windover.

The study of the Miami One site will add to the knowledge of life and health in south Florida thus creating a more complete picture of the population known as the Tequesta and their ancestors. The Everglades is the unique environment to which this population successfully adapted. Environmental archaeology is the appropriate framework for this study because of the visceral relationship between the people and their
natural environment. The Glades culture is the result of an adaptive process that allowed the Glades people to survive in this unique environment for nearly two millennia.
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Appendix A

Unit 207
The minimum number of individuals (MNI) in this unit is one adult, possibly a male. This assessment is based on four cranial, one femur, one ilium, one mandible, one radius and two metacarpals. The mandible is edentulous and indicative of a male individual. There are no pathologies present. The bones are brown and beige in color with some adherent dirt and mold. All the bones show signs of root etching. Some bones have been broken post mortem and some excavation damage is also evident.

Unit 211
The MNI of this unit is one adult and three juveniles. All adults are unsexed. The three juveniles are aged as follows: 1 year ± 4 months, 18 months ± 6 months and 2 years ± 8 months; all based on teeth. The rest of the juvenile remains are unaged. There are no pathologies present. The bones are brown and beige in color with some adherent dirt and mold. All the bones show signs of root etching. Some bones have been broken post mortem and some excavation damage is also evident.

Unit 212
The MNI of this unit is four adults and four juveniles. All adults are unsexed. The MNI is based on three left humeri and five left petrous portions. Among the teeth, there were three shovel-shaped adult incisors. The four juveniles are aged as follows: one is fetal to perinatal, one is between one and four years of age, one is between five to ten years old and one is between eleven to twenty years old. The rest of the juvenile remains are unaged. One rib fragment, possibly a left, shows signs of periostitis and a juvenile ulna show signs of osteomyelitis and osteoarthritis (OA) possibly as a result of a fracture. The bones are brown and beige in color with some adherent dirt and mold. All the bones show signs of root etching. Some bones have been broken post mortem and some excavation damage is also evident. There are also fish vertebrae present and other faunal remains.

Unit 213
The MNI for this unit is three adults and five juveniles. There is one female represented by a distal right humerus with a biepicondylar breadth of 57.9mm. Two male individuals are represented by two mandible fragments. The MNI is based on three right radii, three right tibiae and three left fibulae. Other duplicated elements were two left radii along with two right and two left ulnae. The juveniles are aged as follows: two fetal to perinatal based on two left ulnae, one between one and four years old, one between five and ten years old and one between eleven and twenty years old. The rest of the juvenile remains are unaged. There are two instances of infection; in a fibula and a cranial fragment. Two cervical vertebrae and two proximal ulnae show signs of severe osteoarthritis. The bones are brown and beige in color with some adherent dirt and mold. All the bones show signs of root etching. Some bones have been broken post mortem and some excavation damage is also evident.
Appendix A (Continued)

Unit 214
The MNI for this unit is one adult and one juvenile. This unit consists of two bags of unsorted remains which included long bone fragments, cranial fragments and teeth. Remains are unsexed and juvenile remains are unaged but were classified as juvenile based on size. There are no pathologies present. The bones are brown and beige in color with some adherent dirt and mold. All the bones show signs of root etching. Some bones have been broken post mortem and some excavation damage is also evident.

Unit 215
The MNI for this unit is two adults and two juveniles. The remains include one almost complete cranium in several pieces representing a female individual. The MNI is based on two right superior mandibular ramii. Other identified remains include long bone fragments, vertebrae, teeth and a distal phalange. The juvenile remains are represented teeth and aged between one and four years old. No pathologies are present. The bones are brown and beige in color with some adherent dirt and mold. All the bones show signs of root etching. Some bones have been broken post mortem and some excavation damage is also evident.

Unit 216
The MNI for this unit is of 11 adults and 5 juveniles. There are 10 male individuals represented by one frontal with both orbitals with blunt margins, an additional orbital with a blunt margin, one frontal bone with a large glabella and seven mandibles. There are six females represented by three mandibles and three temporals with small mastoid processes. The five juveniles are aged as follows: two perinatal to fetal individuals represented by two left humeri, one individual between one and four years of age, one between five and ten years of age and one between eleven and twenty years of age. The rest of the juvenile remains are unaged. There are five cases of infection represented by two femurs, one fibula and one tibia with osteomyelitis and one rib showing bone reformation due to infection. Five cases of degeneration are represented by one rib, one scapula, one thoracic, one tibia and one ulna. The ulna, a left, may also show signs of periostitis and fits with a left radius with signs of trauma. This ulna has a healed fracture where the shaft fragments attached side by side with a 31mm overlap. Another proximal right ulna shows a healed fracture. The bones are brown and beige in color with some adherent dirt and mold. All the bones show signs of root etching. Some bones have been broken post mortem and some excavation damage is also evident. Some bones also show signs of carnivore tooth marks.

Unit 217
The MNI is for unit is of ten adults and three juveniles. The adults are represented by ten left humeri. The two females are represented by a left humerus with a biepicondylar breadth of 61.5 mm and a mandible. The six males are represented by a blunt orbital margin and four mandibles. The three juveniles are aged as follows; one is fetal to perinatal, one is between one and four years of age, one is between five and ten
years of age and one is between eleven and twenty years of age. There are eight cases of infection represented by one long bone fragment, one fibula and one right ulna exhibiting periostitis; one mandible, one manubrium, one rib and one thoracic exhibit undefined signs of infection; one tibia is heavily bowed with severe osteomyelitis and may represent a possible case of treponemal infection. There are three cases of trauma represented by one lower arm bone shaft, one left radius and one right tibia. The left radius was fractured at the distal one third of the shaft and reset improperly as the resulting two shaft pieces healed side by side with an overlap of approximately 20mm. The lower arm bone and the right tibia suffered trauma which resulted in myositis ossificans. In the case of the tibia, the defect was located on the proximal end below the epiphysis. The bones are brown and beige in color with some adherent dirt and mold. All the bones show signs of root etching. Some bones have been broken post mortem and some excavation damage is also evident.

Unit 218
The MNI for this unit is of one unsexed adult represented by an unsided humeral shaft, a left femur and several unidentified fragments. The humeral shaft shows signs of an unidentified infection. The bones are brown and beige in color with some adherent dirt and mold. All the bones show signs of root etching. Some bones have been broken post mortem and some excavation damage is also evident.

Unit 219
The MNI for this unit is of five adults and two juveniles. The five adults are represented by five right humeri. There is one female individual represented by one right humerus with an epicondylar breadth of 52mm. The two juveniles are represented by one perinatal left ulna and one left femur between one and four years of age. There are three cases of infection represented by one lower arm bone and one femur with periostitis and one tibia showing osteomyelitis. Two cases of osteoarthritis are represented by a right fifth metacarpal and one right talus. The bones are brown and beige in color with some adherent dirt and mold. All the bones show signs of root etching. Some bones have been broken post mortem and some excavation damage is also evident.

Unit 220
The MNI for this unit is seven adults and one juvenile. The six adults are represented by seven left tali. Three females are represented by a frontal bone with thin orbital margins and two mandibles. One male is represented by a mandible. No pathologies are present. The bones are brown and beige in color with some adherent dirt and mold. All the bones show signs of root etching. Some bones have been broken post mortem and some excavation damage is also evident.

Unit 222
The MNI for this unit is of five adults and two juveniles. The five adults are represented by five left mandibles. Two females are represented by one unsided humerus with a biepicondylar breadth of 62.5mm and one right humerus with a biepicondylar
broadth of 56mm. One male is represented by one frontal bone with a blunt orbital margin. The two juveniles are represented by two right humeri between five and ten years of age. There are five cases of infection represented by one right fibula, one lower arm bone fragment, one radial shaft, one rib and one tibial shaft exhibiting evidence of osteomyelitis. One case of trauma is represented by a fractured distal humeral shaft that did not heal properly. The bones are brown and beige in color with some adherent dirt and mold. All the bones show signs of root etching. Some bones have been broken post mortem and some excavation damage is also evident.

Unit 252
The MNI for this unit is of two adults and two juveniles. The two adults are represented by two right ulnae and two right tibiae. Two females are represented by one mandible and one left temporal with a small mastoid process. The two juveniles are aged as follows: one is between one and four years of age and one is between five and ten years of age. There is one instance of infection represented by an unsided ulna with evidence of osteomyelitis. The bones are brown and beige in color with some adherent dirt and mold. All the bones show signs of root etching. Some bones have been broken post mortem and some excavation damage is also evident. One of the right tibiae shows signs of rodent tooth marks and a circular taphonomic defect.

Unit 254
The MNI for this unit is of three adults and two juveniles. The three adults are represented by three atlases. All adults are unsexed. The juveniles are aged as follows: one is between one and four years of age and one is between five and ten years of age. One case of infection is represented by five fibular fragments exhibiting evidence of periostitis. One metacarpal or metatarsal shows abnormal bone growth possibly due to a fracture accompanied by an active infection. The bones are brown and beige in color with some adherent dirt and mold. All the bones show signs of root etching. Some bones have been broken post mortem and some excavation damage is also evident.

Unit 255
The MNI for this unit is of one adult and one juvenile. The adult is unsexed and the juvenile is unaged. They are represented by several fragments, few of which are sided. There are no pathologies present. The bones are brown and beige in color with some adherent dirt and mold. All the bones show signs of root etching. Some bones have been broken post mortem and some excavation damage is also evident.

Unit 869
The MNI for this unit is five adults and one juvenile. The four adults are represented by five mandibles. The juvenile is represented by a fetal left humerus. There are five cases of infection represented by an unsided fibula and two cases of unidentified bone fragments showing evidence of periostitis; two cases of abnormally thick cranial ones. One mandibular condyle is heavily deformed and shows evidence of severe OA possibly the result of a fracture. The bones are brown and beige in color with some.
adherent dirt and mold. All the bones show signs of root etching. Some bones have been broken post mortem and some excavation damage is also evident.

Unit 893
The MNI for this unit is three adults and one juvenile. The adults are represented by three left mandible fragments. One male individual is represented by a mandible fragment. One female individual is represented by a left temporal with a small mastoid process. The juvenile is represented by a few teeth and a long bone fragment, and is aged between five and ten years old. There are no pathologies present. The bones are brown and beige in color with some adherent dirt and mold. All the bones show signs of root etching. Some bones have been broken post mortem and some excavation damage is also evident.

Miscellaneous Units
Units 732, 860 and 880 are represented by a long bone fragment, teeth and a right humerus respectively and have an MNI of 3. There are also teeth, a left temporal and bone fragments not associate with a unit. The temporal has a large mastoid process indicative of a male. There are no pathologies present. The bones are brown and beige in color with some adherent dirt and mold. All the bones show signs of root etching. Some bones have been broken post mortem and some excavation damage is also evident.