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Bioarchaeological Investigations of Community and Identity at the Avondale Burial Place (McArthur Cemetery), Bibb County, Georgia

Emily Vanderpool
Georgia State University

BIOARCHAEOLOGICAL INVESTIGATIONS OF COMMUNITY AND IDENTITY AT THE AVONDALE BURIAL PLACE (MCARTHUR CEMETERY), BIBB COUNTY, GEORGIA

by

EMILY RINKER VANDERPOOL

Under the Direction of Bethany Turner

ABSTRACT

This study conducts a multi-isotopic bioarchaeological analysis of the Avondale Burial Place (McArthur Cemetery), a recently discovered Emancipation-era African American cemetery near Macon, GA. Stable isotopic analyses were performed on available dental remains in order to reconstruct the diet and demography of the individuals buried at McArthur Cemetery. Specifically, $\delta^{18}O$ and $\delta^{13}C$ were characterized in tooth enamel and examined in tandem with collaborative osteological and mortuary analyses to reconstruct early-life diet and residential origin. The results suggest that members of the Avondale community buried in McArthur did not experience significant mobility, but rather resided in the area for most of their lives. Overall, these results greatly contribute to the genealogical research of McArthur Cemetery's descendants as well as the fragmented history of the South by exploring whether the individuals in this community took part in the Great Migration following the Civil War.

Index Words: Bioarchaeology, Stable Isotope Analysis, African American, Cemetery, Historical Archaeology, Mortuary Archaeology, Emancipation, Georgia

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EMILY RINKER VANDERPOOL

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EMILY RINKER VANDERPOOL

Committee Chair: Bethany Turner

Committee: Frank L'Engle Williams

Jeffrey Glover

Electronic Version Approved:

Office of Graduate Studies

College of Arts and Sciences

Georgia State University

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DEDICATION

First and foremost, this thesis is dedicated to the individuals interred at McArthur Cemetery. Hopefully these will hopefully contribute to their lost history and build on the work to restore their memory by their descendants. I believe Dr. Hugh Matternes and Valerie Davis deserve more than simply an acknowledgement. I would like to dedicate this to both of them as well because they allowed me the initial opportunity to work on this project and later supported my proposed research. Matternes' enthusiasm and encouragement inspired me to share my findings with the public and academic community, showing me the real potential of applied and public archaeology. I owe the beginning of my entire bioarchaeological career to Valerie Davis, who introduced me to osteological analysis and took the time to teach me proper excavation and analysis techniques. They have truly become my mentors and I aspire to live up to the high expectations they have for me in the academic and professional world. Without their encouragement and support, as well as the countless amount of information they have contributed to my thesis work, this project would have never reached fruition.

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CHAPTER 1

INTRODUCTION

Historical archaeology has the advantage of the written record to substantiate and assist in the reconstruction of historical events. However, archaeologists must be able to critically examine archaeological and historical evidence and evaluate its legitimacy as well as overcome social and scientific biases from the past. The historical archaeology and bioarchaeology of African Americans in the United States is an area that requires deeper understanding and attention in order to understand its influence on American history and its descendants. The fact that there is so much forgotten or omitted from African American history in the U.S. provides an opportunity for historical archaeologists and bioarchaeologists to contribute to its legacy. Little (1994) claims that if we as anthropologists want to call attention to important social issues, we must try to fill the gaps in history and embrace an activist archaeology by recognizing the potential impacts of research on communities, collaborate with community members, and engage in social change through that collaboration (Miller and Henderson 2010).

In the historical literature, there is very little information about what happened to African Americans following Emancipation in the latter part of the 19th century. Currently, "only a few African American communities have received extensive examination by social researchers. As a result, many aspects about life among those living in the Georgia piedmont are still not adequately understood" (Matternes et al., in press). Since McArthur Cemetery was in use directly following Emancipation in the South, questions have been posed by the descendant community as well as New South as to whether these individuals participated in the Great Migration or if communities differed in their involvement. This study focuses on community demography as a measure from which to better reconstruct community identity and has the potential to complete

lost family histories and give the individuals buried at the Avondale Burial Place (McArthur Cemetery) a voice after death. Because the archaeological record of many African American communities is not available from this time period, including McArthur's, bioarchaeology becomes the only means of gaining information regarding subsistence and community demography.

In 2008, the location of McArthur Cemetery was reported to the Georgia Department of Transportation (GDOT) by local landowner John H. Lucas during an architectural history survey of the property (GDOT 2011; Matternes et al., in press). Surface surveys and soil density tests were performed and shovel test pits yielded artifacts indicative of nineteenth- and early twentieth-century farmsteads and folk cemetery traditions (Matternes et al., in press). After a subsurface stripping and trenching query, GDOT archaeologists located the initial rectangular coffin stains, a signature indicator of nineteenth-century graves (Matternes et al., in press). New South Associates contracted with Alpha Team Search and Rescue (ATSAR) in confirming the location of individual burials with specially trained cadaver dogs (Matternes et al., in press). Survey and fieldwork were conducted by New South Associates between April 9, 2009 and June 30, 2010, in which 101 burials were excavated for analysis and relocation in accordance with the provisions of the National Historic Preservation Act (NHPA) and Georgia's Abandoned Cemetery Act (Matternes et al., in press).

I became involved in this specific project in June 2010 while completing an internship at New South Associates. While working as a field and laboratory technician during the excavation of McArthur Cemetery, I learned about the importance of community collaboration and the wealth of information that can be achieved through cemetery studies. Not only did this particular collaboration offer new information about cultural traditions of this historical African American

community, but it also led to the preservation and recognition of the remains of individuals interred within McArthur Cemetery. In September 2010, following the completion of the McArthur Cemetery excavation, I submitted a proposal to GDOT for permission to perform stable isotope analysis on the dental remains recovered from McArthur Cemetery. GDOT, in turn, submitted my proposal to McArthur's descendant community for approval. Following approval from McArthur's descendant community, I began performing analysis on the dental remains in March 2011 and completed analysis in October 2011.

This research focuses primarily on intra-site variation in order to gain insight into the specific population buried at McArthur. Multi-isotopic analyses viewed in tandem with osteological and mortuary analyses will reveal a compelling story about the time period and type of community in this specific area of Georgia. Specifically, I attempt to accurately frame the notion of community the individuals in McArthur Cemetery had and how it was structured following Emancipation. Analyses reveal aspects of household life by comparing the early-life diets of men, women, and children, identify the residential origin of individuals who relocated after Emancipation, and finally, identify what constituted community among the families buried in the cemetery based on cultural and spiritual beliefs. Being able to determine where an individual grew up can help us delineate whether a person was native to the area or not.

Historical archaeology has the power to use an interdisciplinary approach to accomplish these goals using written, oral, and material expression (Little 1994). Archaeology has grown into an anthropological discipline interested in topics associated with social science, physical science, politics, and human rights (Ferguson 2008). Employing bioarchaeological methods in historical archaeology has also proven extremely useful in reconstructing past identities in historical communities. For example, using skeletal analysis to examine pathological conditions

has the potential to reveal “patterns of malnutrition, stress, and disease in a wide variety of geographical and temporal contexts” (Turner and Armelagos, in press).

This research focuses primarily on the information obtained from stable isotope analysis, but will also employ the mortuary and osteological analyses performed by New South Associates and included in their official site report to further refine the isotopic results. When combined with stable isotope analysis, osteological and mortuary analysis better inform interpretations about diet and demography (Turner and Armelagos, in press) and allow me to draw more accurate and comprehensive conclusions about community and identity at the Avondale Burial Place.

CHAPTER 2

HISTORICAL AFRICAN AMERICAN BIOARCHAEOLOGY IN THE UNITED STATES 1712-1890

Historical archaeology in the southeastern United States has largely focused on plantation slavery, but now also considers post-Civil War social issues and the changing roles and situations of black Americans in the post-bellum South, including life on tenant farms and in urban environments (Little 1994). Despite popular belief, the Great Migration following the Civil War was not a singular event. It was a long-term demographic phenomenon marked by freed African Americans moving throughout the country; however, many chose to remain in the South for one reason or another (Wilkerson 2010). There is still very little historical information about what happened to the populations who chose to stay in the South after Emancipation during the 19th century. This is an extremely important area of study because it is a time period that contributed greatly to modern African American identity in the U.S.

However, there are limitations commonly associated with historical African American archaeological sites. These sites can be difficult to recognize because they were often located away from areas and are susceptible to vandalism and harassment (Orser 1998). Furthermore, there is often very little documentation or official record to accompany them, as many of these sites were kept on the periphery of society (Orser 1998). Finally, the question remains: what even qualifies as an "African American" site? Arbitrary racial categorization has made labeling sites as such very problematic. Many post-bellum graveyards, including the one specifically in McIntosh County, Georgia, contain different markers than European cemeteries such as wooden posts and epitaphs on wooden boards posted to trees (Rainville 2009; Simon Brown in Faulkner 1977; Stella Martin in Blassingame 1977). This variation makes it extremely difficult to

recognize since the material culture on the surface deteriorates more quickly over time. Honest mistakes can result from simply not recognizing different traditions, but many times, lost cemeteries are disregarded as a product of colonial racism and considered illegitimate because they are different or belong to marginalized groups (Glover et al. 2009; Jamieson 1995; Matternes, personal communication 2010; Rainville 2009).

For black Americans, the cemetery has been a significant focus of culture and identity. Beyond its association as a final resting place, cemeteries were one of the very few places where African Americans could openly practice cultural traditions before Emancipation (Rainville 2009). One of the most well-known cases involving a historical African American cemetery is the African Burial Ground in New York City. The site was recorded on a historical map, but the cemetery was not officially identified until 1991, after a construction project began, during which case some graves were damaged (La Roche and Blakey 1997). Community activism is credited with halting the excavation in order to document, preserve, and relocate the cemetery (La Roche and Blakey 1997). Howard University, a historically black institution, began to collaborate with the local descendant community, historians, physical and cultural anthropologists, and archaeologists to salvage the project and as a result, the African Burial Ground project became a response to the fields of physical anthropology, history, and archaeology that were historically used to discriminate against African American populations (La Roche and Blakey 1997).

The African Burial Ground project drew national attention because it highlighted the prevalence of desecration to historical African American cemeteries and the resulting inequality and loss of cultural history for marginalized groups (Rainville 2009). According to former New York Mayor David Dinkins:

> "Millions of Americans celebrate Ellis Island as the symbol of their communal identity in this land. Others celebrate Plymouth Rock. Until a few years ago, African American New Yorkers had no site to call our own. There was no place which said, we were here, we contributed, we played a significant role in New York's history right from the beginning…Now we – their descendants – have the symbol of our heritage embodied in lower Manhattan's African Burial Ground. The African Burial Ground is the irrefutable testimony to the contributions and suffering of our ancestors" (as cited in La Roche and Blakey 1997:100).

Many African Americans know little about their African ancestry as a result of the slave trade by Europeans from 1619 to 1850 and the lack of historical records make it extremely difficult for African Americans to identify with their indigenous communities (Winston and Kittles 2005). Furthermore, the it was weaker societies that fell victim to the slave trade that did not necessarily share the same cultural traditions as larger west African societies (Jamieson 1995). As a result, African Americans have employed more holistic forms of research to rebuild their history and celebrate the cultural traditions that they have contributed to American society, historical cemeteries playing a large role in this endeavor (Jamieson 1995). According to Orser (1998:69), many African Americans no longer want to dwell on slavery; instead, there has been an increasing demand to learn more about "the material conditions of freedom", hence the importance of post-Civil War projects.

The excavation of the First African Baptist Church in Philadelphia is another prime example of how collaborative efforts produce positive results for both researchers and the local community. There was descendant community interest prior to and during the excavation process, which led to a partnering of the descendant and scientific community (Roberts and McCarthy 1995). Furthermore, involvement by the Afro-American Historical and Cultural Museum was included in the actual research design and ultimately, the descendant community was also heavily involved in the reburial process (Roberts and McCarthy 1995). Although this example of involvement by the African American community was more passive, the opportunity

for involvement was extended and therefore conflict was avoided between archaeologists and the public (Roberts and McCarthy 1995).

Clearly, collaboration is vital to African American cemetery projects, but bioarchaeological analysis in and of itself also contributes significantly to African American history as a whole. Collecting mortuary research, while maintaining collaborative relationships with descendant communities, is paramount in reconstructing the lost history of African American communities in the United States. Old Frankfort Cemetery in downtown Frankfort, KY serves as an example of this need for community-based research. The excavation, which recovered 272 individuals, provided a wealth of skeletal and dental information about the Frankfort community between 1800 and 1860 (Wetzel 2007). More notably, this cemetery was used by African American, Native American, and European American groups, all of which apparently suffered from chronic malnutrition and disease (Wetzel 2007). Ultimately, this kind of research speaks to community structures and individual identity, which can also be applied to Civil War and post-Bellum cemeteries.

In addition to the historical significance of African American archaeological sites, they also serve as important cultural avenues for public archaeology. The Levi Jordan Plantation, a sugar plantation in Brazoria County, Texas, is not only significant as an archaeological site, but it is a prime example of the ways in which historical African American sites are representations of present-day community dynamics (McDavid 1997, 2004; Stahlgren 2010). Like many plantations in the American South, the Levi Jordan Plantation was home to both white and black individuals, creating a multi-cultural descendant community in the Brazoria County area. A concern developed between both groups: could control of the project be genuinely shared (McDavid 1997)? These concerns spanned from how artifacts are interpreted and exhibited, to

starting an open-ended, inclusive dialogue about how racial attitudes have changed throughout time (positively or negatively) (McDavid 1997).

Archaeological sites such as these serve to heighten awareness about the scientific value of studying ancestral remains as well as recognizing the historical contributions of African Americans in the United States (Little 2002). Heritage professionals as well as descendant communities must reject inflammatory language in the presentation of findings (McDavid 1997), but rather present findings in a way that encourages critical thinking and positive change in a community. There is a significant difference between assigning blame and constructively addressing past events and attitudes in order to move forward.

Because bioarchaeology utilizes archaeology, physical anthropology, history, and religion, it attracts a wide range of individuals in the public that are personally invested in the project, which researchers must be prepared for (Little 2002). The burial grounds of underrepresented groups contain a "largely forgotten or silenced history. Moreover, these groups are less likely to be represented in the documentary collections of historical societies…and their graveyards are more likely to be desecrated, ignored, and even destroyed by development" (Rainville 2009:197), in which case their history is lost forever.

In addition to academia, private cultural resource management firms have taken more steps to advocate for antebellum and post-bellum cemeteries and promote more public archaeology. Matternes claims that African American cemeteries are often overlooked because the burial traditions vary so greatly from European ones, but this magnifies their importance because they are "public records of people and communities that have gone before us" (Matternes, personal communication 2010). Public archaeology is not just about producing information for posterity; it revolves around inviting the public to participate in archaeological

projects and working in tandem with descendent communities. In this way, historical cemeteries can serve as a vehicle for community education and cultural understanding (Turner and Andrushko 2011; Little 2002; McDavid 2004; Rainville 2009; Stottman 2010).

Beginning in the 1960s, community archaeology stemmed from a commitment to local concerns and efforts to ensure that control of the project remained with members of the community (Ferguson 2008). Public archaeology acts as civic engagement in that it initiates dialogue and recognizes how current social issues were created by historical injustices (Ferguson 2008) and is a true representation of how archaeologists and descendants can work together to improve them. Addressing the demands of African American descendent communities leads to more attention to black history, and it serves the needs of both scientists and communities (Ferguson 2008). Cemeteries are a clear indication of community heritage and tradition, and in order to fully understand them and recreate an accurate record of their history, archaeologists and bioarchaeologists must be willing to collaborate with descendents or risk further alienation and reaffirming the impact of colonization they have experienced.

As part of public archaeology and collaboration, researchers must be careful to not use "community" as a mechanism of division between the majority white middle-classes and minorities (Waterton 2009). The intent of collaboration is to make heritage management "less patronizing and paternalistic, and more open to self-examination, critical reflection and negotiation…it means abandoning the notion that we are 'discovering the truth' on behalf of 'everyone'" (Waterton 2009:38). Scholars cannot participate in historical archaeology and bioarchaeology alone and offer only one message in an effort to educate the public; multiple groups of people such as local and descendant communities, along with cultural resource firms

and heritage professionals must participate in deciding how archaeological findings are interpreted for the public (Ferguson 2008).

Mitigation of historical archaeology can often result in conflict between heritage professionals, descendents, and the public. Heritage professionals are realizing this process involves understanding the many facets of conflict that can arise when working with marginalized populations (Waterton and Smith 2009). However, proper judgment must be used to evaluate whether mitigation is needed. Although historical cemeteries of underrepresented groups must be dealt with very carefully, not all conflict can and should be mitigated by archaeologists. Waterton and Smith (2009:76) explain that “heritage is about working through conflicts. It is a process in flux as populations and communities negotiate and evaluate the cultural and social values that they think are – or are not – important”. By serving as advocates and allowing communities to negotiate and mitigate their own situations regarding archaeological sites such as cemeteries, heritage professionals are truly decolonizing archaeology as a discipline.

Fortunately, academia has begun to embrace public archaeology as an applied science, hosting symposia at archaeological conferences, such as the Society for American Archaeology, Society for Historical Archaeology, and the Society for Applied Anthropology to promote collaboration between prehistoric, historical archaeologists, and the community (McDavid 2004). In recent years, there has been a significant increase in publications on historical cemeteries as well biological and historical archaeologists working in conjunction with one another to address questions about diet, health, and demography within historical populations (Rathbun and Steckel 2002). Continuing collaborative efforts in archaeology and heritage management will only serve to enhance the discipline in the future and contribute further to the history of the American South

and its descendants. Projects such as this one serve as a reminder that researchers should continue working with descendant and local communities to present a more comprehensive and accurate account of African American archaeology in the United States.

CHAPTER 3

THEORY

3.1 Ideational and Interactional Approaches

The African Diaspora is a concept that represents the voluntary and involuntary movement of Africans throughout history and results in “the emergence of cultural identity abroad based on origin and social conditions, and the psychological or physical return to the homeland” (Ferguson 2008:388). By utilizing public archaeology and bioarchaeology, anthropologists can build on history and legitimize cultures that have been displaced. It is important to remember that descendant communities are not comprised of biologically homogenous populations, but rather self-defined group identities (Ferguson 2008).

Stojanowski (2010) explains that identity is complex and ss a result, social order has become the focal point of identity studies and interpretations of this order and how individuals within it relate to each other can vary greatly depending on the investigator and the context of data (Stojanowski 2010). Taking this into account, researchers interpreting historical African American sites must also incorporate the collective memory which is still in a stage of constant development by the African Diaspora, which is comprised of a multitude of groups in and of itself. The African Diaspora in the United States has been in a constant state of forming “new, collectively based identities” (Eyerman 2001:5) as a response to social movements like the Emancipation and Reconstruction of the South.

As a result of marginalization and discrimination during slavery, the African American community was largely based on family connections. Ideational approaches to community studies focus on community members’ perception of themselves and their place within the community (Yaeger and Canuto 2000). This approach also touches on relational identity and

personhood; individuals are defined by how they relate to the people and environments around them, or rather, the “entangled being-together-with” the world (Hutson 2010:18). Huston explains that our “private experiences are always already public, and our actions can be understood only with reference to social conventions and customs that involve a community of people” (Hutson 2010:25). These identities are based on qualities that people believe they have in common with others as well as what they believe distinguishes them from outsiders, which therefore represents the combination of “mutually agreed upon and self-ascribed cultural categories” (Yaeger and Canuto 2000:3).

However, this does not mean that all members of a community share the same idea of what constitutes community or what issues unite them; external structures always affect individuals and the views they form regarding self-identification and community (Yaeger and Canuto 2000). Being “black” or “African American” is subjective. Slavery seemed to be the only universal commonality between African American communities, but with the rise of globalization, the very concept is problematic because “black” individuals who have emigrated from other areas of the globe do not necessarily identify with that time in history (Roby 2006).

Similar to the ideational approach, which focuses on how individuals perceive themselves within their community, the interactional approach focuses on how communities are constructed through individual roles and relationships. The community is not the basis for social interaction, but rather created *through* social interaction (Yaeger and Canuto 2000). This perspective is useful in examining African American historical archaeology because it also takes into account the spatial and material conditions that contribute to the structure of a community (Yaeger and Canuto 2000). Specific historical periods, such as slavery, Emancipation, and Reconstruction must be included in site analyses and examined as part of the community construct. These events

would have had a significant impact on the individuals buried at McArthur and influenced the ways in which they constructed and perceived their individual and community identity.

3.2 Post-Processualism and Community Identity

African American archaeology, and in this case cemetery studies, requires a post-processual theoretical framework that requires subjective interpretation of data. Influenced by critical theory (Gadsby and Barnes 2010; Hodder 1997; McDavid 2004; Roberts and McCarthy 1995), this approach promoted collaboration with living members of marginalized communities to assist with the interpretation of a site since the beliefs and practices of those marginalized groups are often not understood by researchers of different backgrounds. The interpretation of an archaeological site largely depends on who is excavating and analyzing the data and what specific biases those individuals have. Investigating African American sites, for example, are problematic in and of themselves; we must acknowledge the subjective nature of interpretation and our past cultural biases. The archaeology of marginalized populations is a product of contemporary society; our concept of the past is influenced by present values, attitudes, and politics (Roberts and McCarthy 1995). Without taking this into account, archaeologists only further the marginalization of historical populations rather than decolonizing their research.

Kenneth Brown (McDavid 2004) was one of the first researchers to apply an explicitly contextual post-processual theoretical and methodological approach to historical archaeology in the United States. Brown sought to incorporate a multi-disciplinary approach to his research and excavation of the Levi Jordan Plantation, which included community and professional collaboration to produce more comprehensive information and debunk previously misunderstood notions of what life was like for African Americans at the plantation (McDavid 2004). In this

sense, identity is fluid rather than concrete and capable of taking on various meanings depending on who is doing the interpreting (Roby 2006).

3.3 Critical Theory

The theoretical framework of this project also requires critical examination to determine exactly which interactions and external factors influenced the reconstruction of African American community after Emancipation and more importantly, how those interactions have continued to affect community identity. African American archaeology relies heavily on critical theory, rooted in Marxism (Duke and Saitta 1998; Gadsby and Barnes 2010; Leone 2005; McGuire and Reckner 2003; Potter 1994; Roby 2006; Stahlgren 2010). Critical theory examines the ways in which historical interpretations are used to alienate or discriminate against marginalized populations such as African Americans in order to maintain class differences within society (Franklin 1997; McDavid 1997). A critical approach essentially examines the ways in which authoritative entities manipulate societal institutions to perpetuate racial discrimination in American society (Baker 2001; Epperson 1999, 2004; Stottman 2010) while also attempting "to understand the interests and conflicts existing within the community…and to incorporate them into any public interpretations that take place" (McDavid 1997:117).

In the United States, capitalism promised liberty and belonging in exchange for market participation, cultural assimilation, and conformity; however, these conditions were all denied to groups like African Americans and Native Americans on the basis of racism, autochthonous nationalism, and ethnocentrism (Little 1994; McDavid 1997). Critical theory can help interpret similar events of marginalization in history and their continued impact on the present. For example, the 1880 displacement of Aborigines in Australia, who were moved to reserves that

were presided over by white managers (Byrne 2003), is similar to what happened to freedmen in the post-Bellum South who had no choice but to work as tenant farmers for white employers and minimal wages.

The bioarchaeology of historical African American cemeteries in the U.S. is one of the areas in which critical theory has had the most direct benefit for African Diasporic studies. Burial ritual was not actually controlled by the Euro-American population and was one of the few social activities in which African Americans could express themselves (Rainville 2009). The traditions associated with historical African American burials reveals that identities and communities were not completely shaped by oppressive institutions in the United States. Bioarchaeology follows this same notion that cultural practices, beliefs, and social relationships can be interpreted through the body's remains as a result of external factors that affect the condition of the human body (Sofaer 2006). In this case, bioarchaeology can reveal the oppressive aspects of a society and its effects on the body through trauma and pathology.

Social identities research is extremely important today, as ethnic, linguistic, or religious identities can lead to inequality with potential societal disparities (Knudson and Stojanowski 2008). Incorporating these concerns with heritage management is more important than ever. In doing so, archaeologists and bioarchaeologists can respond with critical examination of such constructs and interpretations of identity and community and their continued impact of history in the present. Collaborating with descendant communities further enhances these specialized skills and further contributes to public education and awareness of historical African American archaeological sites.

3.4 Bioarchaeology as Civic Engagement

It is vital that bioarchaeologists combine traditional aspects of critical theory with those of community action in order to promote a more activist archaeology (Gadsby and Barnes 2010). Bioarchaeology has made great strides in producing more accurate research regarding demography, migration, and colonization in a variety of locations all over the world (Knudson and Stojanowski 2008). Important as archaeology is to contributing to a broader understanding of historical communities, initiating dialogue is crucial for allowing disenfranchised groups to reclaim their past and reinterpret their history.

Historical African American cemetery projects exemplify both Wolf and Ortner's theories regarding individuals on the ground influencing social structure through collaboration. According to Ortner, ordinary people have the capacity to affect culture; people can be public intellectuals and consciously use agency to change culture (Ortner 2006). Individuals reconstruct their social world by realizing their ability to improve a situation, and in this case, take action to protect historic burial grounds. Wolf (1999) emphasizes that many populations, such as African Americans in the U.S., have a distinct heritage that did not make it into Euro-American-written history, and now they are organizing in order to improve the preservation of their past. Local people are becoming involved in global events affected by business elites and are taking initiative in addressing these problems, thus, transforming historical bioarchaeology into praxis anthropology (Roby 2006).

In efforts to further promote collaboration in archaeology and bioarchaeology, heritage professionals have explored social networking as a tool of civic engagement (Waterton and Smith 2009). Rainville (2009; Glover et al. 2009) claims that the internet and interactive databases contribute to the value of collaboration between archaeologists and descendant

communities because they provide an accessible way to inform as well as reach out to different groups and individuals such as descendants. Interactive websites that contain historical information about archaeological sites, contact information, and even site maps generated by Geographic Information Systems (GIS) make historical archaeological sites like cemeteries more relevant to the community, which can strengthen the effort to preserve them and recognize their history (Rainville 2009).

Archaeological projects such as the Levi Jordan Plantation and the Avondale Burial Place (GDOT 2010; McDavid 2002) are two examples of how the internet has been utilized as a successful collaborative mechanism between descendant communities and the public. These avenues of communication create a multivocal source of information where archaeologists are not the sole authorities of the truth about the history of the site; rather, African American and European descendants can come together to decide how to tell the stories and educate the public about the American South (McDavid 2004). In the case of McArthur Cemetery, the internet played an extremely important role in discovering and maintaining communication with its descendant community. In order to find potential descendants, an announcement was posted on Ancestry.com, a popular genealogy website. Members of the local community responded with enthusiasm and from there, an informational website was created to keep the public informed and act as a public forum for the Avondale Burial Place (GDOT 2010).

Ultimately, archaeologists must view research and public education efforts in the context of contemporary race relations (Franklin 1997). In order to obtain intellectual understanding of antebellum and post-bellum sites, researchers must expand their knowledge to include African American culture, past and present, as well as the “politics of African descendent populations, their cultures, and their histories” (La Roche and Blakey 1997:93). As a result, public

archaeology and collaboration have helped end the colonization of archaeology and improve relationships between researchers and local communities.

These initiatives have created a valuable line of communication between anthropologists and the public *before* cemetery projects begin so that ultimately, the project is completed with both the scientific and cultural concerns of the community in mind (Little 2002). Bioarchaeologists, in fact, take a unique position in historical archaeology projects. Due to their specialized understanding of human variation and behavior, they are able to offer valuable information to the public regarding historical communities and counter false historical claims about marginalized groups (Little 2002), which has proven to be an essential asset in the decolonization of archaeology and bioarchaeology. Stojanowski (2009) claims that bioarchaeology is particularly useful when addressing marginalized groups of the past because of the chronological framework of archaeology as well as how it acknowledges the biological aspects that shape the human experience. The interdisciplinary nature of bioarchaeology that deals with history, culture, and biological remains makes it an extremely useful approach in reconstructing the identity and lived experiences of marginalized populations.

3.5 Decolonizing Historical Archaeology

The term ‘colonized’ can have multiple meanings. Given (2004) defines colonized people as individuals or groups that are exploited by a foreign entity whose culture is radically different from their own. Archaeology has had to come to terms with the colonization of historical populations, which include Native Americans and communities in Australia; others, such as Irish Americans, African Americans, and impoverished industrial and immigrant communities in the U.S., were negatively impacted by colonial ideology (McDavid 2004). Mortuary archaeology

informed by critical theory is beneficial to all oppressed and displaced groups. From the Australian Aboriginal and Native American standpoints, disturbing the land or removing interred individuals from their native soil essentially violates sacred ground and robs descendants and their ancestors of their entitlement to land because they are no longer a part of it after death (Byrne 2003). Therefore, returning displaced dead to the homeland can serve as indigenous entitlement and reclamation of heritage. Bioarchaeology is one way to achieve this.

According to Rainville (2009), most states possess independent boards that supervise and enforce cemetery legislation, but they do not have the power to advocate for religious or Native American tribal organizations, which in the past left forgotten or abandoned native burials susceptible to damage and desecration. In response, the Native American Graves Protection and Repatriation Act was established in 1990, which federally regulates the treatment of Native American human remains and artifacts on public lands or at institutions receiving any federal funding (Christensen 2010). However, NAGPRA only protects federally recognized Native American tribes, which excludes groups that still identify with a tribal affiliation but cannot "prove it", so-to-speak (Larsen and Walker 2005; Trope and Echo-Hawk 2001; Weiss 2008).

African American graves do not have comparable separate legislation. All states do have laws to protect burials, but they vary in depth of coverage and in the extent of the punishment for disturbing or harming them (Rainville 2009). Even when NAGPRA was being passed, there was not the same urgency to advocate and protect archaeological sites of other minority groups, including African Americans (McDavid 2004). As a result, private cultural resource management firms are left with the responsibility of mitigating such dilemmas. Matternes explains that "in terms of the way CRM approaches mortuary archaeology the best strategy is to treat all cemeteries with the same guidelines as outlined by NAGPRA because, in many regards,

NAGPRA ended up providing the necessary legislation to provide protection to all cemeteries" (personal communication, October 5, 2010). The issue is not who owns and possesses the land, but rather who can claim roots to it (Byrne 2003).

What makes African American bioarchaeology so problematic is that Africans are not indigenous to North America as are Native Americans; they have no cultural patrimony or heritage "rights" in the United States. Although Euro-Americans are not native to the U.S., their mortuary traditions are held in a higher regard than African Americans'. Parker (1988) explains this attitude arose from a conflict over culture and ideology; the dead are at the center of this discourse but only living society can determine the outcome. Ideally, history belongs to everyone, but in reality it belongs to the groups and individuals that have access to its material remains and decide who else is allowed access to it (Franklin 1997).

In order to overcome anthropology's colonial history, historical archaeologists must recognize and address the inevitable intersection and conflicts between race, culture, and identity in post-colonial sites (Lawrence and Shepherd 2006). A history of conflict has forced archaeologists to come to terms with the notion that heritage is perpetually political (Christensen 2010; McDavid 1997; Waterton and Smith 2009); identity and heritage are based on community relationships and intercommunity relations. Therefore, those who have come to power will claim superiority and subsequently exclude the colonized from history. Because of historical bias, an apolitical archaeology does not exist. Ultimately, post-colonial archaeology is not concerned only with artifacts and excavation, but rather includes the complex issues of heritage, identity, and the legacy of colonial exploitation (Lawrence and Shepherd 2006). It is the responsibility of historical archaeologists to address these issues and expand the field to include local and

descendent communities in their research so that the disenfranchised may reclaim their heritage (Ferguson 2008).

Although collaboration did exist before NAGPRA, excavations of indigenous and slave sites in the United States largely excluded descendent communities until its instatement (Rainville 2009). Although descendant communities have been included in more heritage management projects, they are often being consulted rather than collaborated with. In many cases, archaeologists are still taking the role of expert over the local community and thus furthering Euro-American authority over these groups (Lawrence and Shepherd 2006). In Australia, for example, archaeologists have been accused of using their expertise to gain control over Aboriginal heritage; because of the conflicts that arise from this, archaeologists must attempt to facilitate rather than run a project and involve indigenous communities more in the research process (Smith et al. 2003).

Cases like this reaffirm that historical archaeology requires contemporary collaboration, involving participation of stakeholders outside of academia (Ferguson 2008; Stottman 2010). Community-based archaeology programs are now a common result of heritage professionals realizing that archaeology requires community input and is more than collecting and interpreting data (McDavid 2004). Furthermore, contemporary collaboration within antebellum and post-bellum archaeological sites requires the recognition of past colonialism and its repercussions on exploited populations. Archaeologists need to realize that these projects are not centered on race, but rather a group of people with diverse heritages that lived in a community together at a specific location in history (Ferguson 2008). It is imperative that researchers build group-level interpretations using individually-based analyses. Studying historical African American

archaeological sites starts with examining individuals, and more specifically individual life spans, and therefore cannot impose group-level preconceptions.

The African Burial Ground project, in its own respect, was a combination of Diasporan scholarship, political and social activism, and vindication for the African American population in New York (Barrett and Blakey 2011). By engaging in collaboration, archaeologists and the local community attempted to rectify the Eurocentric exclusion by employing interdisciplinary biocultural methodology that adequately addressed the needs of each stakeholder (Barrett and Blakey 2011). Archaeologists have the opportunity to work as participants and collaborators in cultural identity and heritage management. As researchers, we must ensure that our work denounces racist power structures and colonial methods of anthropology, while also understanding their impact in the past (McDavid 2004; Roby 2006; Stottman 2010).

A primary goal of bioarchaeologists is to critically examine human specimens in tandem with mortuary tradition and material artifacts to construct an accurate notion of culture. By combining analytical methods and embracing a more holistic form of archaeology, researchers can construct more accurate depictions of the past without being limited by only one kind of archaeological or historical data (Knudson and Stojanowski 2008). The biocultural approach utilizes cultural comparison with a biological element which applies to "both archaeological skeletal samples and human populations throughout time and space" (Zuckerman and Armelagos 2011:16). Furthermore, Zuckerman and Armelagos (2011:28) claim that this methodology has revolutionized bioarchaeology by transforming it "from a descriptive enterprise to a socially, culturally, and politically informed dynamic force in biological anthropology".

It is preferential to employ a bioarchaeological methodology rather than one based in forensics when analyzing historical burials, especially those of marginalized populations.

Bioarchaeological investigations of historical African American burials have yielded information regarding stress, diet, demography, and disease (Blakey 2001) prior to and after emancipation, all the while taking into account cultural information derived from mortuary patterns and burial artifacts. Forensics relies on an acultural and ahistorical approach which is more useful in the physical identification of an individual rather than the physical *and* cultural identification of an individual as part of a larger social group (Barrett and Blakey 2011; Ferguson 2008). Bioarchaeology, however, offers a combination of historical, archaeological, osteological, and geochemical elements to identify the cultural characteristics of a person as well as their lived environment (La Roche and Blakey 1997; Buikstra and Cook 1980). Using these aspects in tandem with one another ultimately moves “the discipline of archaeology toward a more accurate, inclusive, and ethically sound practice” (Ferguson 2008:2).

CHAPTER 4

EXCAVATION OF MCARTHUR CEMETERY

The Avondale Burial Place (McArthur Cemetery) is geographically located between the present-day Walden and Avondale communities south of Macon, GA (Matternes et al., in press). The actual burials were located "on a low rise in an undeveloped lot corner with large agricultural fields to its west and south, a pond to its north and a wooded lot to its east" (Matternes et al., in press:6). In close proximity to the cemetery are several creek beds, since dried out, that flowed into "an unnamed stream (east of the site) and eventually into Echeconnee Creek. This creek in turn flows into the Ocmulgee River east of the project area" (Matternes et al., in press:6). The Ocmulgee River begins in the Piedmont and follows the Fall Line at Macon onto the Coastal Plain until it finally flows into the Oconee River to form the Altamaha River (Tucker 2002). As a result, this provides an ideal habitat for a variety of fish, plants, and animals, which benefited the surrounding community of African American tenant farmers (Matternes et al., in press).

While negotiating the extension of Sardis Church Road, GDOT was made aware by one of the landowners of the existence of a small family cemetery located in a wooded area. The cemetery was completely unmarked and could not be verified by deeds, plats, maps, or county histories (GDOT 2011). The lack of local knowledge of McArthur Cemetery "suggests that the descendants of the families who established the cemetery moved away some time ago" (GDOT 2011) and resulted in the deterioration of the cemetery eventually becoming overgrown by forest.

While GDOT investigated the site, trying to determine the number of burials present, GDOT reached out to a number of the descendent families still living in the area by creating a post on a popular genealogical research website asking for any information regarding the

Avondale Burial Place. Two family members responded; one from a McArthur descendent and one from a descendent of slaves owned by the McArthur family, the Bartons. Eventually, more families were identified including the Thomases, Lessells, Durdens, and Burgays (GDOT 2011). After consulting with families that came forward, GDOT contracted with New South Associates, Inc. to relocate the burials to a local cemetery. The goal was to not only relocate the burials to an area less vulnerable to future development, but also provide descendent families with the opportunity to recognize and commemorate their ancestors' history (GDOT 2011).

New South conducted survey and fieldwork between April 9, 2009 and June 30, 2012, contracted by Post, Buckley, Shuh, and Jernigan by GDOT (Matternes et al., in press). In order to gain as much information as possible about the cemetery, GDOT and New South collaborated with families in the area, who provided genealogical information and oral histories. Based on the results of ground penetrating radar and cadaver dogs, the cemetery perimeter was determined and three feet of soil removed with a backhoe in order to expose potential coffin stains. Potential burials were marked with nails and neon flagging tape. Each of the 101 identified burials was excavated using established osteological methods (Bass 2005).

Physical analysis of the skeletal remains from McArthur Cemetery was conducted during the summer and winter of 2010 by New South's physical anthropologist, Valerie Davis, using established methods (Bass 2005; Owsley and Ubelaker 2003; Steele and Bramblett 1988), including sex determination, general indicators of bone size, stature, and dental formation on individuals when applicable. Preservation, morphology, and pathological conditions were also noted. An inventory of coffin hardware and artifacts was also compiled and photographed. Following analysis, all human remains and artifacts found with them were placed in new, plastic burial containers designed for re-interment. All mortuary artifacts and human remains will be

reburied at the Bethel AME Church in Byron, GA (Matternes et al., in press), where the graves are recognized and families will be able to visit them.

Local stakeholders involved in this project range from local to state-level groups including the living McArthur Cemetery descendants, GDOT, current landowners, and New South Associates, Inc. Fortunately, there have not been any major difficulties while these entities have worked together. This can be attributed to the fact that the descendant community became involved *before* GDOT contracted with New South to perform surveys and excavation. Steps were taken to locate any descendants before the cemetery relocation began and as a result, the McArthur descendants were excited about the discovery and in full support of the burials being relocated to a safer and more accessible area. Every effort has also been made to keep the community updated on new developments and invite their input in the project. Because of the collaborative nature of this project, including the creation of a website to keep families and the public up to date on events and progress, the relocation of McArthur has become an educational and beneficial community experience rather than a disturbance.

4.1 Stable Isotope Analysis

Geochemical analysis can be extremely insightful when applied to dental remains. Isotope analysis can be applied to skeletal populations all over the world; this also includes hair and flesh that has been mummified as well as bone collagen and tooth enamel, which is why it is so useful in the field for reconstructing life histories of individuals regardless of the age at which they died (Ambrose 1993; Turner et al. 2005). Stable isotope analysis (oxygen and carbon) can reveal a chronological timeline of the environments in which an individual has lived as well as an individual's diet from previous residential locations depending on the carbon signatures from

plant food sources and oxygen signatures from imbibed water over an individual's lifetime (Owsley and Ubelaker 2003; Turner et al. 2005). From a bioarchaeological standpoint, diets are most indicative of an individual's quality of life. This is mostly because they provide "quantifiable measures of adequacy in terms of calories ingested versus energy expenditures and can be assessed in light of current knowledge regarding human nutritional requirements" (Crist 1995:198).

Geochemical analysis has proven to be extremely useful in both prehistoric and historical populations. Isotope ratios have been used to identify diet and residential mobility in a community at the New York African Burial Ground (La Roche and Blakey 1997), Tiwanaku in Peru (Knudson et al. 2004), cave mummies in Bolivia (Knudson et al. 2004; Knudson et al. 2005), Vikings in Britain (Budd et al. 2004), African slaves in colonial Mexico (Bentley 2006), the Newton Plantation Cemetery (Nystrom et al. 2011), and different Andean populations within Peru (Turner and Andrushko 2011). Recently, several studies have also used stable isotope analysis to reconstruct weaning trends and early childhood diets among adult remains, such as a small population in Kaminaljuyu, Guatemala (Wright and Schwarcz 1998). Addressing questions regarding subsistence variation, regional subsistence economies, gender, and status (Turner and Andrushko 2011) further demonstrates the utility of isotope analyses in prehistoric and historic populations.

When interpreting these results, we must be careful to not generalize. Race cannot be interpreted through geochemical analysis (Epperson 2004) and is not a substitution for individual perceptions of self-identity. Researchers must expound on this notion by utilizing isotope analysis in conjunction with other techniques such as skeletal and mortuary analysis. This will ensure that results are unique to the specific assemblage and its community rather than the entire

region from which it is drawn. It is also worth noting that small sample sizes, which are fairly common in isotope studies, affect the statistical power of such analyses (Turner et al. 2009). The number of individuals and their preservation play a very important role in geochemical analyses; the more individuals that are present, the more accurate conclusions can be drawn regarding mobility and demography. This does not mean, however, that small sample size cannot yield significant results; isotopic analysis can uncover rich biological patterns even in poorly preserved remains (Turner et al. 2005). Geochemical analysis can still track the life histories of individuals, but smaller sample sizes make it more difficult to draw conclusions about larger groups.

However, stable isotope analysis is an intrusive and destructive analytical technique. In order to validate the wealth of information that can be obtained from this type of analysis, researchers must maintain an "equitable partnership, inclusive dissemination of findings, and opportunities for students and scholars to train in associated laboratories" (Turner and Andrushko 2011:55). By sharing data and collections with other students and researchers, there will in turn be less need for additional destructive analyses, which leads to more ethical and responsible research (Turner and Andrushko 2011).

In this case, collaboration and civic engagement is paramount to the continuation of analytical methods such as stable isotope analysis. Even though geochemical is a valuable tool in reconstructing life histories, it is destructive in nature. As a result, researchers must weigh the cost of geochemical analysis against the benefit of the outcome in order to make ethical decisions. This is an example of where collaboration becomes a vital component to the scientific process.

4.2 Tooth Enamel

Dental remains are especially useful in examining various aspects of life history because of their highly durable nature. They are more able to withstand breakdown and alteration than other human bones and their biochemical composition essentially fossilizes and preserves properties such as surface defects, isotopic oxygen signatures from consumed water, and isotopic carbon signatures from consumed fats, protein, and carbohydrates (Turner et al. 2005). Brothwell (1981) even argues that teeth are the most valuable age and life history indicators because of the identifiable changes they undergo over an individual's lifetime.

In this study, stable isotope analysis relies on oxygen and carbon isotopes preserved in tooth enamel (Katzenberg and Pfeiffer 1995; Knudson and Stojanowski 2008; Turner et al. 2009). These isotopes are not radioactive and therefore do not decay or change in abundance over time. Unless there is outside contamination of the sample that occurred after burial, stable isotope analysis is an ideal way to trace isotopic variations from atmospheric and soil sources to the animals or people that consume them, thus serving as a map of sorts to track characteristics of the physiology, ecology, and food webs in various ecosystems (Ambrose 1993).

There are two stable isotopes of carbon, ^{13}C and ^{12}C, the majority of which are found in the ocean with the rest found in the atmosphere (Schoeninger and Moore 1992). In this project, ^{13}C ratios will be analyzed. In transferring from the ocean to the atmosphere, carbon dioxide is depleted in ^{13}C compared to the amount in the ocean (Schoeninger and Moore 1992). Carbon in ocean water and the atmosphere is transferred to living organisms, including humans, through photosynthesis by plants, a process which increases the ^{13}C concentration in organisms compared to source carbon from C_3 and C_4 plants (Schoeninger and Moore 1992). The ^{13}C concentration determines whether an individual consumed more C_3 or C_4 plant sources (Tucker 2002).

Therefore, by measuring the carbon isotope ($\delta^{13}C$) ratios found in bone or tooth enamel of an individual, it is possible to infer what kinds of foods were being consumed at various points in the individual's life. Furthermore, by identifying photosynthetic pathways, $\delta^{13}C$ ratios have the ability to differentiate between terrestrial versus marine animal consumers, thus indicating the region in which an individual or group resided during the time in which the tissue of interest formed (Boyd 1996; Hutchinson et al. 2000; Katzenberg and Saunders 2000).

Oxygen isotope ($\delta^{18}O$) ratios are equally useful in reconstructing an individual's life history. However, instead of indicating what an individual consumed, oxygen isotope ratios indicate where an individual or group of individuals resided throughout their lifetime based on the water they consumed. An individual's body water is influenced by imbibed meteoric water, which is linked to the latitude and altitude of a region, its climate, seasonal temperature, and rainfall, which makes this an especially effective method in tracking individual mobility (Knudson and Stojanowski 2008; Price and Burton 2010; Turner et al. 2009). Ambrose (1993) explains that water is either isotopically heavy or isotopically light. Light water molecules evaporate faster than heavy water molecules, which either remains at its water source or condenses rather than entering the air, and as a result, the air in certain areas becomes saturated with light oxygen isotopes (Ambrose 1993). Precipitation that comes from these areas is also filled with light oxygen isotopes. Therefore, comparing $\delta^{18}O$ ratios in individuals with $\delta^{18}O$ in local water sources can reveal local and non-local individuals within a specific population.

4.3 The Petrous Bone

In the event that dental remains are not available for isotopic analysis because of poor preservation or lack of dentition, the petrous bone provides similar, reliable isotopic signals to enamel (Jorkov et al. 2009). Petrous samples were taken from two individuals of the McArthur, both of which yielded no dentition but the petrous was intact. The petrous bone is located in the temporal section of the skull and is considered the "sturdiest bone in the body…It is formed by endochondral ossification, beginning already at approximately the 16-18 gestational weeks, becoming fully ossified at the time of birth" (Jorkov et al. 2009:200). The inner layer of the otic capsule, surrounding the petrous bone, ceases remodeling after two years of age, thus preserving dietary information from the fetal stage to two years old (Jorkov et al. 2009). Because of this, the part of the petrous that forms during gestation can provide valuable information about the mother's diet (Jorkov et al. 2009) and the prenatal nutrition of an individual.

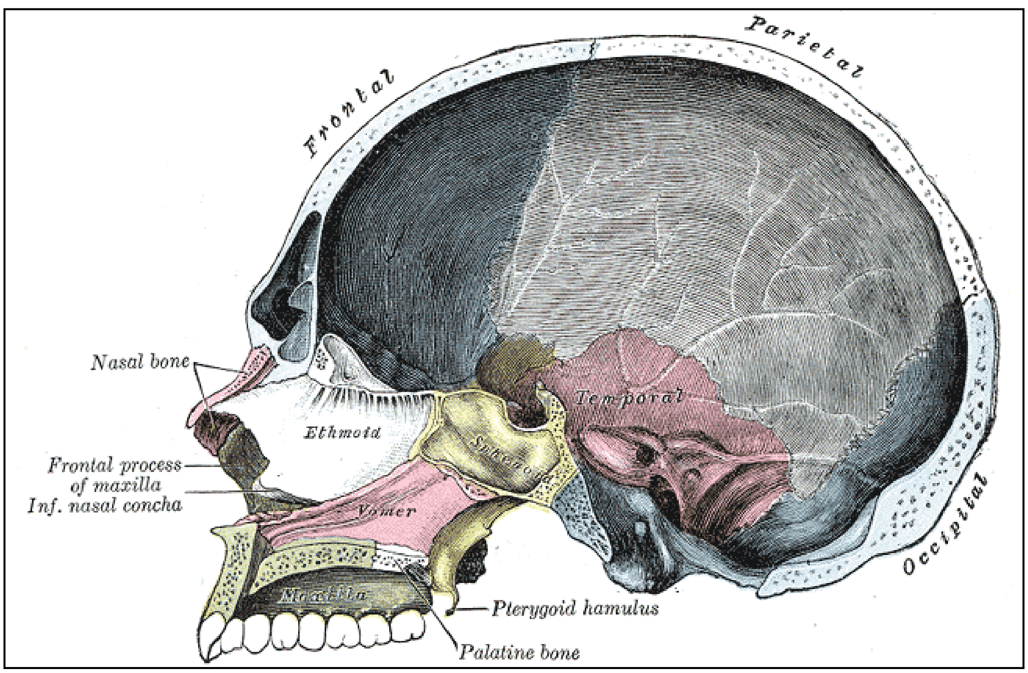

Fig. 4.1 *The petrous portion of the temporal bone, highlighted in pink, is distinctive because of its wedge shape and its formation during gestation (Gray and Carter 1858).*

Fig. 4.2 *Petrous bone from Burial 6(Photographed by the Author)*

Fig. 4.3 *Petrous bone from Burial 7(Photographed by the Author)*

CHAPTER 5

RESIDENTIAL ORIGINS AND SUBSISTENCE METHODOLOGY

5.1 Sample Classification

Each tooth was grouped into two development periods; first molars, incisors, and the petrous bone comprising the "infancy/early childhood" (IEC) period, while canines, premolars, and second molars comprise "middle childhood" (MC), summarized in Table 5.1 (Turner et al. 2005; Turner 2008). The majority of teeth sampled were categorized as IEC, eight samples were MC, and two samples were of unknown age.

Table 5.1 *Categorization of tooth type by developmental period*

Tooth Type	***Years of Development***	***Assigned Period***
Petrous	16-18 wks. Gestational	IEC
I	0.0-5.5	IEC
C	0.3-7.0	MC
PM1	1.0-7.5	MC
M1	0.0-3.5	IEC
M2	2.5-8.0	MC
M (unidentified)	0.0-15	IEC

5.2 Regional Ecology

Oxygen isotope ratios preserved in tooth enamel are representations of imbibed water from the time in which the tooth formed, which are influenced by temperature, humidity, altitude, and other attributes of the local climate (Ambrose 1993; Katzenberg and Pfeiffer 1995; Knudson and Stojanowski 2008; Price and Burton 2010; Turner 2008; Turner et al. 2009). Linked to local climate, variation in oxygen isotope ratios is indicative of variation in drinking water sources (Turner 2008). Ratios are often indicative of consumption via river or stream, boiling, cistern storage, and even breastfeeding, thus providing further information such as subsistence and weaning patterns.

In order to determine whether the individuals buried at McArthur all resided in the same area from early childhood on, their estimated water isotope ratios will be compared to the isotopic composition of natural water sources around the Avondale community.

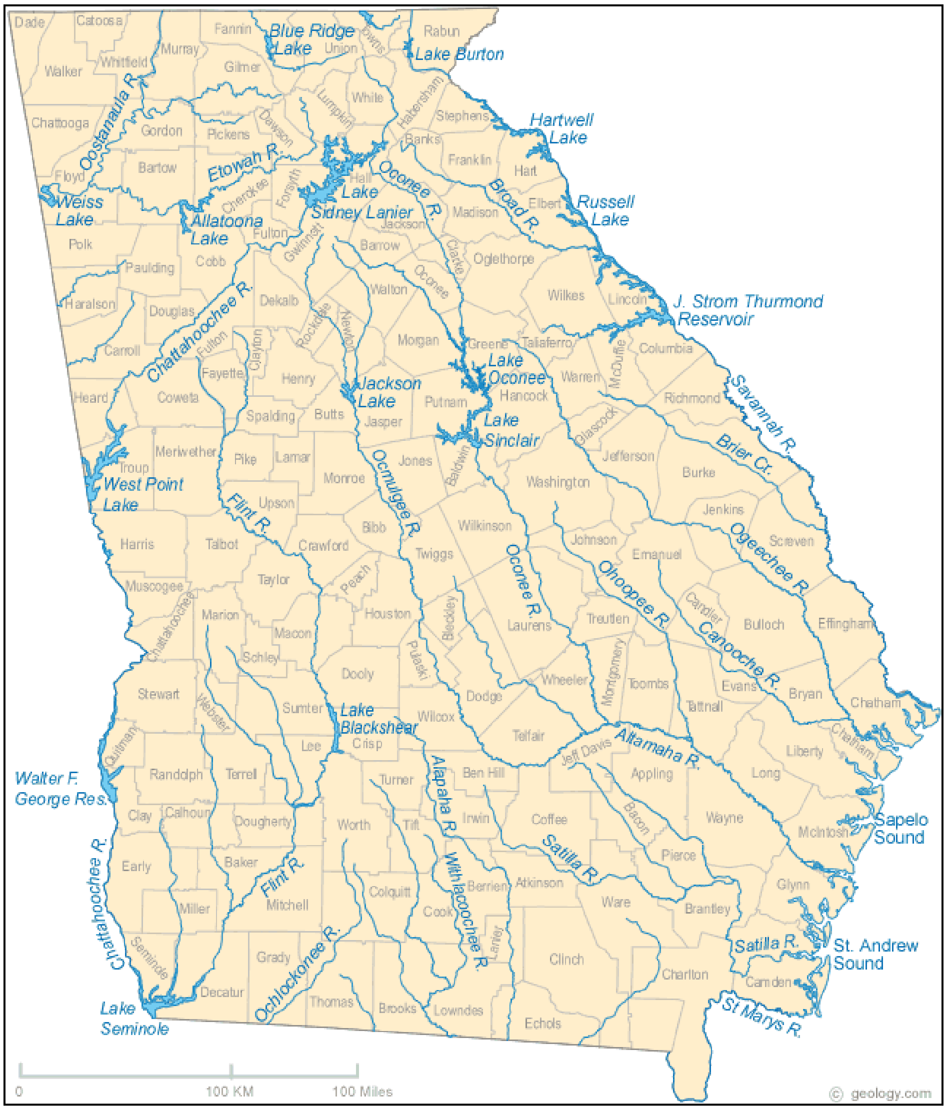

Fig. 5.2 *Georgia counties, lakes, and rivers. Bibb County is located in central Georgia directly west of the Ocmulgee River (Geology.com 2011).*

A study conducted in 2004 by the Georgia Water Resources Institute investigated the isotopic variation of base flow within the Piedmont Basin, including the Middle Oconee River near Arcade, GA (Rose 2004). Since the Echeconnee Creek flows into the Ocmulgee River and

ultimately into the Oconee River, the isotopic values of the Oconee River and the McArthur community can be compared to determine if the individuals are indeed local to the area. Among the water sources sampled were four streams that empty into the Oconee River, precipitation collected in Decatur, GA and finally groundwater from the Arcade, GA area (Rose 2004). The mean base flow composition of the four streams was -5.2‰, precipitation yielded a ratio of -5.4‰, and the ground water yielded a mean ratio of -5.6‰ (Rose 2004).

Below (Table 5.3) is also a sample of δ^{18}O ranges from various rivers across the United States. By comparing the McArthur δ^{18}O ratios, δ^{18}O ratios in the Oconee River, and the ranges of δ^{18}O across the U.S., we can further delineate whether the individuals at McArthur are local or not. Since oxygen isotope levels fluctuate depending on geographic region, we can assume that the δ^{18}O ratios present in the Oconee River are reflective of that particular region of Georgia rather than any other.

Table 5.3 *^{18}O ranges across the United States (Kendall and Coplen 2001)*

Location	***^{18}O (‰)***
Southern FL	>-2
Northern FL	-4 to -2
Central GA	-6 to -4
KY	-8 to -6
PA	-10 to -8
Northern NY	-12 to -10
Northern ME	-14 to -12
Central UT	-16 to -14
ID	-18 to -16
Northern MT	<-18

5.3 Significance of Weaning Practices

Malnutrition in the children buried at McArthur Cemetery was likely a product of social inequality in the region. As mentioned before, African American tenant farmers had little access to quality foods and the majority of money they had went towards purchasing land in order to

farm and live on. It was believed that vegetables were not acceptable to feed children, so it was customary to wean children onto a high carbohydrate-low protein diet of foods such as cornbread, hominy, and fat; the result of which is multiple vitamin deficiencies in children (Kiple and Kiple 1977). This kind of dietary transition, coupled with weaning too early, also resulted in protein-calorie malnutrition, calcium-magnesium deficiencies, vitamin D deficiencies, tetany, and various other vitamin deficiencies such as scurvy, rickets, and anemias (Kiple and Kiple 1977; Matternes et al., in press).

By comparing the mean oxygen and carbon isotope ratios using the developmental periods of the tooth samples, we can further identify potential non-local individuals in the McArthur Cemetery population as well as weaning practices within the Avondale community. Non-local $\delta^{18}O$ ratios may be reinforced by varying dietary habits, thus indicating a strong possibility that an individual or group of individuals migrated to the area at a certain point in time. For example, a strong variation in $\delta^{18}O$ ratios between IEC and MC enamel samples indicates that multiple individuals migrated to the Avondale community from areas where they spent their childhood. If individuals are local to the area, $\delta^{18}O$ ratios between IEC and MC enamel can inform weaning practices within the community. Furthermore, in distinguishing whether the individuals are male or female informs the potential familial and occupational relationships of the Avondale community.

5.4 Subsistence Patterns of Historical African American Tenant Farmers

Directly following Emancipation, African American tenant farmers subsisted on the bare minimum, which usually meant simple, inexpensive foods that could last for longer periods of time. Diets mostly consisted of cornbread, grits, boiled vegetables (the water, referred to as “pot

liquor", was also consumed during the meal), meats like fatback if it was available, and tea (Cussler and de Give 1970; Yentsch 2007).

In addition to $\delta^{18}O$ ratios, aspects of residential mobility can be discerned from $\delta^{13}C$ found within tooth enamel, which provides information about the past diet of an individual. In order to reconstruct the diet through stable isotopic analysis, one must be able to compare the isotopic compositions of specific dietary resources and the nutritional and cultural environments of the individuals being studied (Ambrose 1993). Basically, if available food sources are identified, the "proportions of resources of different isotopic compositions can be estimated" (Ambrose 1993:83).

C_3 plants have ^{13}C ratios from -35 to -22‰ with a mean of -26.5‰ (Tucker 2002; Turner et al. 2005). C_3 plants include wheat, rice, all root crops, legumes, vegetables, nuts, honey, seed crops, and a variety of fruits, most of which are found in temperate regions like the southeastern United States (Ambrose 1993; Buikstra and Cook 1980; Tucker 2002). C_4 plants discriminate less against ^{13}C than C_3 plants, thus producing a higher and more enriched $^{13}C/^{12}C$ ratio. C_4 plants have ^{13}C values from -15 to -10‰ with a mean of 12.5‰" (Buikstra and Cook 1980; Tucker 2002; Turner et al. 2005) and include plants such as sorghum, millets, maize, and sugar cane (Ambrose 1993). These plants are usually found in dry, hot, and sunny climates; however, maize can be found in less arid environments and still maintain the same isotopic signature (Ambrose 1993; Tucker 2002). C_3 and C_4 plants are essentially opposites in that they thrive in distinctly different environments (i.e. tropical vs. temperate, mid-latitude summer and winter rainfall zones, low vs. high altitudes), which can ultimately serve as an indicator of residential mobility patterns (Ambrose 1993; Buikstra and Cook 1980).

The primary components of the African American share cropper consisted of meat, meal, and molasses, usually whatever could be made with pork and corn; in most cases even the pork was produced from livestock raised on corn (Matternes et al., in press). These ingredients were fairly inexpensive easy to acquire for the money that share croppers had, which was next to nothing. Cornmeal was a chief source of protein for most slaves and this carried over into share cropping families (Kiple and Kiple 1977). Cornmeal could also be used for a variety of foods such as cornbread or mush, which was fed to children during the weaning process.

Following the Civil War, corn was the leading crop for tenant farmers in the South along with cotton for its production value; again, farmers had to choose whether to grow food products or cotton, which would hopefully produce and sell successfully (Fite 1979).

5.5 Theoretical Applications

In this study, it was important to distinguish between samples displaying isotopic ratios obtained from infant/early childhood and middle childhood periods. Disregarding these developmental periods inherently problemetizes the results by not recognizing potential dietary and mobility changes that could have occurred during the childhood of each individual. Without these categorizations, it would also be impossible to examine the weaning trends of the McArthur population with no differentiation between tooth developmental periods. The opportunistic nature of the McArthur sample population requires a multi-faceted approach that employs a variety of analytical techniques in order to make valid interpretations about the individuals buried at McArthur Cemetery.

That being said, additional archaeological methods, such as osteological and mortuary analyses, will be employed in order to critically examine who potentially resided in the Avondale

community and for how long. Isotopic analyses inform residential and dietary habits of individuals. Osteological analysis, however, identifies health and occupational trends within a group of people. Additionally, mortuary analysis examines burial trends within a cemetery to infer relationships between groups of individuals. These analytical techniques combined will not only recognize residential and dietary trends within the McArthur individuals, but also help determine whether the individuals identified themselves as part of the Avondale community as opposed to simply residing in the same geographical area.

Drawing on the multi-faceted nature of this study, I also employed a longitudinal approach with dental microwear analysis (DMA). In addition to the cross-sectional examination of isotopic ratios between tooth developmental periods, DMA also addresses the wear patterns in teeth at the individual's age of death in order to identify potential changes in dietary habit throughout an individual's lifetime. For example, isotopic ratios in early childhood may indicate a diet heavy in C_3 foods, but wear patterns at the age of death indicate a diet heavy in C_4 foods. Variations like these are especially important in informing communal habits based on food sources available in the Avondale area.

The information derived from this study is also based on existing historical information contributed by McArthur Cemetery's descendant community. It is the goal of this study to use collaborative efforts to contribute to the McArthur descendant community's research rather than perpetuate stereotypical colonial ideology. Following the completion of this study, the results will be distributed to the McArthur descendant community in a comprehensive format for the families to use in their own genealogical research. The ultimate goal of this study is to critically examine the results of a multi-faceted analysis to produce accurate and ethically sound information. By reciprocating the generosity of McArthur's descendant community, who allowed

me to perform analysis on the remains, I hope to contribute valuable insights to community life in Avondale and the post-Bellum South as well as the historical record of the descendants' families.

5.6 Preparation for Stable Isotope Analysis

Permission to perform physical and chemical analysis on the McArthur Cemetery remains was granted by the Georgia Department of Transportation, which subsequently requested permission from the McArthur descendant community through communication on the Avondale Burial Place website. Since the initial excavation, the McArthur remains have been analyzed and stored at New South's mortuary archaeology laboratory in Stone Mountain, GA.

Stable isotopic analysis performed in this project was limited to dental remains, specifically tooth enamel. It is vital to note that the health and morphological data obtained from McArthur Cemetery is biased towards individuals who were interred on the southern end of the excavation site (Matternes et al., in press), which is located on low ground. Burials 1-50 exhibited significantly better preservation than the rest of the burials because they were situated on higher ground and were therefore less susceptible to soil saturation by water. The preferred dental samples for isotopic analysis (Table 5.4) were identifiable permanent teeth such as first molars. However, if M1s were not available, second, third molars, and incisors were opportunistically selected based on whether the tooth yielded enough enamel to sample from.

Isotope analysis was performed in July of 2011 at the University of Florida. Samples were prepared for tooth enamel and petrous bone. Dr. Bethany Turner provided access to Georgia State University's bioarchaeology lab, the necessary equipment and chemicals, and also supervised the preparation of the samples. Isotopic values are expressed as per mil (‰) relative

to standard marine ocean water (SMOW) with a mean $\delta^{18}O$ of NBS-19 analytical standard of 28.1‰ (vs. SMOW) and a standard deviation of 0.11‰.

Table 5.4 *Tooth enamel samples prepared for isotopic analyses*

Burial Number	***Tooth Type***	***Weight of Sample Prior to Chemical Processing (mg)***
3	M1	58.5
5	M1	106.5
6	Petrous	11.1
7	Petrous	55.4
8	I	5.62
11	m2	80
16	M2	3.6
17	M1	99.8
18	M1	19.1
20	m	31.05
21	PM1	28
22	M1	69.2
23	M1	88.4
24	M1	50.1
25	M1	48.9
27	PM	106.4
30	M1	70.1
31	M1	112.7
32	M	127.2
33	M	63.7
34	M	149.8
35	M2	140
36	M1	64.4
38	M1	55.2
39	M1	61.4
51	M1	47.1
52	M1	63.06
53	M1	117.3
85	C	65
96	M2	68.05
97	M1	84.8
101	M	62.1
104	PM2	51.5
105	I1	60.6

Each tooth enamel and petrous bone sample was digitally photographed to provide a visual record of the sample prior to its destruction. Microwear molds were also made on each

tooth using epoxy resin mixed in a 1:4 ratio (Galbany et al. 2004) and microwear analysis performed to document dental wear and pathologies. The dental microwear molds have been archived in the Georgia State University Bioarchaeology Laboratory.

Using established methods described in Turner et al. (2009), surface contamination, which is usually found on the outermost layers of enamel and bone, was removed on approximately 1mm of the sample by abrading the surface with a Dremel tool fitted with a tungsten carbide rotary wheel. A sample weighing approximately 10-30mg (depending on availability) was removed from each tooth and bone, which spans the cement-enamel junction of the occlusal margin or the area of maximum height if the teeth were worn (Turner et al. 2005; Turner et al. 2009). At least 20 mg was sampled from each tooth and petrous bone. Trabecular bone was removed from the petrous bone samples with a Dremel tool to remove any potential contaminants.

Each sample was catalogued and cleaned with bleach and acetone in Georgia State University's bioarchaeology lab. The samples were crushed into a fine powder using a clean, agate mortar and pestle, weighed, and put into conical bottomed centrifuge tubes. The samples were soaked in a 2% NaOCl (bleach) and double-distilled water (ddH_2O) solution until all surface contaminants were removed from the enamel powder. A clean mortar and pestle was used for each sample to avoid cross-contamination. The enamel samples were then soaked for a total of 96 hours and the petrous samples for a total of 72 hours. Afterward, each sample was centrifuged and rinsed five times with ddH_2O to a neutral pH until all organics had dissolved and effervescence had ceased.

Both the enamel and petrous samples were then soaked in a 0.2% acetic acid solution and refrigerated for 2 hours to remove any diagenetic contaminants. The samples were centrifuged

and rinsed five times to a neutral pH with ddH_2O and freeze-dried overnight in an automated prep system. Isotopic values are expressed as per mil (‰) relative to standard marine ocean water (SMOW). The freeze-dried enamel samples were sent to Dr. Jason Curtis in the Stable Isotope Mass Spectrometry Laboratory at the Department of Geological Sciences, University of Florida Gainesville. Dr. Curtis performed the stable isotope characterization in July of 2011.

5.7 Childhood Skeletal Pathologies

Skeletal analysis in this project concentrates primarily on infant and childhood pathologies. These manifestations can be used to interpret early dietary habits and climate conditions by comparing them to isotopic data (Turner and Armelagos, ms.). Furthermore, this can also help to distinguish between dietary and environmental variables that could have influenced the frequency of pathological conditions through isotopic and skeletal analysis (Turner and Armelagos, ms.). Two specific early childhood pathologies were examined in the McArthur population; linear enamel hypoplasia and cribra orbitalia.

Linear enamel hypoplasia (LEH) is caused by the disruption of tooth enamel formation resulting in a punctuated deficit of enamel development (King et al. 2005; Matternes et al., in press). LEH manifests on the crown of both deciduous and permanent teeth as pits, furrows, or missing enamel and are visible as long as tooth enamel is intact, which makes them one of the most reliable indicators of stress on the human skeleton (Buikstra and Cook 1980; Goodman et al.1990; King et al. 2005; Matternes et al., in press; Schultz et al. 1998; Wetzel 2007). LEH are relatively easy to identify and are usually caused by physiological stressors including malnutrition, infectious disease, and psychological and physical trauma (Goodman et al. 1990; Matternes et al., in press; Wetzel 2007) over the course of an individual childhood. Significant

presence of LEH in the McArthur population can help determine the dietary and environmental conditions of potential local and non-local individuals buried in the cemetery, ultimately informing the demographical makeup of the Avondale community. LEHs, however, are generalized responses rather than indicators of a single event (Goodman et al. 1990). Therefore, examining the frequency of LEH in individuals must be accompanied by other analytical methods to determine the cause.

Cribra orbitalia (CO) is commonly associated with anemia brought on by iron-deficiency, Vitamin B deficiencies, and/or chronic parasitic infections (Buikstra and Cook 1980; Mann and Hunt 2005; Novak 2011; Stuart-Macadam and Kent 1992; Walker et al. 2009). CO manifests itself in lesions on the orbital roof of the skull, making the bone appear thick and spongy (Mann and Hunt 2005). Both CO and LEH are indicators of childhood stress, often found simultaneously in an individual (Aufderheide and Rodríquez-Martín 1998; Buikstra and Cook 1980), making them exceptionally useful in determining dietary habits and demography when compared to isotopic values. Furthermore, CO is an exceptional indicator of health and environmental conditions, as it is often present in individuals who experience inadequate sanitary conditions and poor hygiene (Novak 2011).

5.8 Osteoarthritis, Alterations, and Occupational Patterning

It is important to note that the graves at McArthur Cemetery were unmarked, and therefore individual identification of each grave was a priority in case additional biographical information could link individuals to specific descendants (Matternes et al., in press). New South’s physical anthropologist, Valerie Davis, completed skeletal sex identification with methods outlined by Bass (1987) and age identification using dental and skeletal development

indicators (Matternes et al., in press), and the analysis presented in this research is based on her osteological analysis of the McArthur Cemetery population.

Osteology has proven extremely useful in reconstructing life histories of historic and prehistoric populations. Osteology can provide information pertaining to individual and group health, but has also been criticized because it can inaccurately reflect mortality patterns, and many times, there is no current comparative population. However, using osteology in conjunction with geochemical and mortuary analyses have improved these methods significantly (Grauer and McNamara 1995; Katzenberg 2000; Larsen 2002). Long bones are excellent indicators of pathological conditions. Bone reacts to various trauma and infectious diseases by altering their structure in various ways (Barrett and Blakey 2011; Goodman and Martin 2002; Nawrocki 1995; Roberts and Manchester 1995; Steele and Bramblett 1988; Weiss 2008) such as building new bone or destroying existing bone, depending on the condition (Steele and Bramblett 1988). Alterations to bone such as disease, trauma, fractures, and filing help bioarchaeologists to reconstruct chronological health aspects of an individual’s life history as well as cultural practices experienced within a community.

Osteoarthritis is characterized as an inflammation of the joints and manifests as deterioration of the joint surface and additional bone formation around the rim of the articular surface of the joint (Kelley and Angel 1987; Owsley et al. 1987; Steele and Bramblett 1988). Occurring in weight-bearing joints, osteoarthritis especially affects knees, hips, shoulders, fingers, and toes and often develops with age (Ortner and Putschar 1981; Steele and Bramblett 1988; Steinbock 1976). Osteoarthritis is usually evident in skeletal analysis by pitting of the bone, osteophyte formation, or polished areas of bone found on the articular surface of the affected joint, which is caused by the abrasion of articular surfaces against one another (Steele

and Bramblett 1988). Heavy concentrations of (or lack thereof) osteoarthritis can indicate certain work patterns, such as agricultural labor (Kellgren and Lawrence 1958; Lawrence 1961, 1969; Mintz and Fraga 1973; Ortner 1968). Individuals recovered from the African Burial Ground in New York, for example, displayed pronounced skeletal indicators of stress likely caused by heavy manual labor while others exhibited very few signs of stress, thus distinguishing enslaved versus free blacks or slaves who worked inside versus outside (Wilczak et al. 2004). Distinctive labor patterns were also recognized in the Catoctin industrial enslaved population, whose skeletal remains exhibited work-stress patterns indicative of specific ironworking (Wilczak et al. 2004:444). Compared to isotopic parameters, osteoarthritis can inform whether individuals at McArthur likely belonged to the workforce in the Avondale community or if they spent their life elsewhere before settling in this area.

The limitations associated with osteological analysis generally lie in their inability to accurately frame past life histories without supplemental archaeological evidence and they may be inconclusive in and of themselves. Osteology alone cannot reveal all aspects of past individuals or their communities; it is indirect in nature and without additional analytical methods is problematic to definitively reconstruct residential mobility and immigration within a site (Turner et al. 2009). Even with excellent preservation, bone pathologies can appear similar to one another, making identification more difficult (Steele and Bramblett 1988). Furthermore, many osteological malformations are not diagnostic of any single event and can be indicative of many health or environmental issues (Steele and Bramblett 1988).

Even if additional applications such as isotopic analysis are performed on long bones, it would only provide partial life history information since collagen and apatite remodels throughout life; this means that results would only provide information from the last 10 or so

years of life (Manolagas 2000). However, if viewed in tandem with multiple analytical methods such as mortuary analysis, skeletal and bone chemistry analysis has the opportunity to refine current interpretations of slavery and Emancipation and their impact on current African American populations (Crist 1995).

5.9 Dental Pathologies

Because of its durable nature, tooth enamel carries a vast amount of bioarchaeological significance. Tooth casts have allowed researchers to gain significant insight to the dietary habits of prehistoric and historical populations while also decreasing the amount of stress caused to dental remains by physical handling (Galbany et al. 2004). In addition to determining the age of an individual, tooth enamel provides information about nursing duration and weaning in children (Katzenberg and Pfeiffer 1995). By determining these practices, researchers can then also estimate birth spacing, population regulation, and fertility patterns within a population depending on skeletal and dental indicators of stress, such as enamel hypoplasias (Buikstra and Cook 1980; Goodman et al.1990; Katzenberg and Pfeiffer 1995; King et al. 2005; Matternes et al., in press; Schultz et al. 1998; Wetzel 2007). Ultimately, these childhood and reproductive attributes inform the larger picture of the health and life histories of individuals within the study population.

Whether dealing with historic or prehistoric remains, tooth enamel continues to be one of the best materials to use with stable isotope analysis. The durability of tooth enamel is so that it can be preserved for several million years (Ambrose 1993). The density and hardness of tooth enamel makes it “more inert than bone or dentine and is more resistant to post-burial isotopic contamination” (Bentley 2006:167). Even more impressive is its utility with poorly preserved remains. In addition to physical durability, tooth enamel acts as a diet recorder starting during an

individual’s childhood. It forms at “stable, incremental rates and does not remodel once formed, thereby preserving the biochemical composition and other features such as surface defects, from specific periods during development” (Turner et al. 2009:321) while also recording carbon consumed by an individual (Bell et al. 2001).

5.10 Dental Microwear Analysis

Used in conjunction with isotopic analysis, dental microwear analysis has proven to be an exceptional way to explore dietary habits and provide information to supplement carbon and oxygen isotope ratios (Organ et al. 2005). Analyzing pathologies such as dental disease and dental caries are often indicative of the diet or health of an individual over their lifetime (Caselitz 1998; Cucina 2010; Hillson 1986; Roberts and Manchester 1995; Strohm and Alt 1998). Evidence of enamel hypoplasia and various oral pathologies are also indicators of specifically childhood health disparities, which can be linked by isotopic analysis to an individual’s place of birth or where they spent childhood (Cucina 2010). Even in deciduous dentition, it is possible to determine whether enamel defects provide clues to morbidity during infancy or reflect the mother’s health as well (Barrett and Blakey 2011). Wear patterns found at the age of death are also valuable indicators of dietary habits and nutrition, as various foods leave different microscopic marks on enamel (El-Zaatari 2010; Kreuger and Ungar 2010; Rose and Ungar 1998). However, dental wear and caries should be viewed in tandem with other archaeological and bioarchaeological analyses since outside factors such as food preparation methods can affect the frequency of dental caries and wear patterns in certain populations (Boyd 1996).

Dental microwear analysis (DMA) is used to interpret occlusal features such as pits and scratches on molars, which are indicative of an individual’s dietary habits (El-Zaatari 2010;

Krueger and Ungar 2010; Ma and Teaford 2010; Organ et al. 2005; Schmidt 2001). Pits in tooth enamel are usually caused by foods that are hard enough to form actual indentations in the enamel while scratches are caused by foods with intermediate properties or grit or phytoliths found on the surface of foods when they are consumed (El-Zaatari 2010; Schmidt 2001). Since the $\delta^{13}C$ ratios of the McArthur population indicated intermediate food sources, microwear analysis will further pinpoint which foods the individuals relied on. Although many foods share the same isotopic register, they can vary greatly in their dental microwear patterns. For example, some C_3 and C_4 plants share the same isotopic register, but individually, some of them are harder and potentially cause pitting whereas other foods with the same $\delta^{13}C$ ratio may not even produce microwear.

Silicone molds were made of each individual tooth prior to extracting enamel samples from the McArthur populations. Using established methods (El-Zaatari 2010; Galbany et al. 2004; Krueger and Ungar 2010; Schmidt 2001), the molds were filled with epoxy resin with a hardener-to-base ratio of 4 to 1. The hardener and base were manually mixed and then spun in a centrifuge for 15-30 seconds in order to avoid air bubble formation before it was poured into the silicone tooth molds. Diet was inferred by counting dental microwear features on the occlusal surfaces of permanent molars within a 0.4 by 0.4 mm ocular reticle using a low-magnification stereomicroscope at 35x and an external light source oriented obliquely to the occlusal surface (Solounias and Semprebon 2002; Semprebon et al. 2004; Williams and Holmes, in review:10; Williams and Patterson 2010). Microwear features were then categorized as small, medium, or large pits and fine or course scratches.

5.11 Mortuary Analysis

Because of the variety of factors that affect sample size, it is vital that isotopic and osteological methods are conducted in tandem with mortuary analysis. Employing all three types of analysis provides bioarchaeologists with a more holistic view of the community they are reconstructing. Even when bioarchaeologists are faced with poor preservation conditions, mortuary analysis still offers much data regarding community and identity within a population. Mortuary analysis, which includes the deposition of grave goods, burial orientation, and distribution of individuals within a cemetery (Baker et al. 2001; Jamieson 1995) allows researchers to make valuable interpretations about the environment, health and composition of a community. Mortuary analysis in this project is based on the mortuary analysis performed by New South Associates and further builds on the data provided in their site report from McArthur Cemetery.

Mortuary tradition is often the most recognized element of African American culture during the 19th and early 20th centuries (Davidson 2010). In the antebellum and post-bellum South, African Americans were responsible for the burial of their own dead in their own cemeteries, which allowed for open expression of cultural traditions (Jamieson 1995). Eckert argues that cemetery and mortuary patterns are indicative of social organization and complexity which express community structure in the context of social, religious, and aesthetic traditions (Eckert 2003; O'Shea 1984). Ritual is based on societal structure and produces patterning in the material record while mortuary pattern is more focused on memory and therefore more idiosyncratic because it was likely influenced by other aspects of social life (Button 2007). Cultural traditions such as postmortem preparation, vault construction, cremation, multiple burials, and chemical and physical reactions with burial goods can also affect the preservation

and condition of human remains (Nawrocki 1995), which archaeologists must take into account when analyzing human and material remains of a burial.

Many African American religious practices include “ritual-like caching of objects, which allow for an understanding of beliefs during and after the time of slavery” (Ferguson 2008:218). Burial artifacts commonly found within historical African American burials have included surface decorations such as head and foot stones as well as more personal possessions interred with the individual such as household ceramics, medicine bottles, coins, jewelry, and coffin hardware (Burn 1991; Davidson 2010; Fenn 1985; Jeane 1978; Milbauer 1989; Parrington and Wideman 1986; Thompson and Cornett 1981). Specifically at McArthur Cemetery, an abundance of infant and child burials revealed blue beaded necklaces, which are often interred with children in order to ward off evil spirits since the souls of children are more innocent and susceptible to the tricks of demons (Jamieson 1995). These examples of mortuary tradition speak to the social context and construction of individual identity and community organization in the Avondale community by conveying traditional customs and spiritual beliefs which include both Christian and West African traditions.

Although archaeologists can learn a great deal from mortuary artifacts and burial patterns, mortuary treatment is not necessarily an accurate reflection of the deceased’s life (O’Shea 1984; Stojanowski 2009). It is actually the living family members who determine the mortuary treatment of the dead, including the objects to be included in the burial facility and the actual burial orientation. There have also been many problems with generalizing West African cultures. Many archaeologists have relied on vague comparisons of different African populations in order to establish continuity in African Americans, which inaccurately depicts the traditions of most groups (Jamieson 1995). Different African American groups can share similar material

culture, but their prescribed meaning for these objects can differ greatly and contribute to a completely unique ethnic identity (Lucy 2005).

There is also very limited use of ethnographic research and comparative data from African burial sites, which causes researchers to underestimate the variability of mortuary practices that influenced African Americans in the South (Jamieson 1995). Jamieson (1995:43) argues that the lack of ethnographic data has created many false generalizations; among them the "common burial practice on both continents of orienting the body in an east-west direction". This practice could be based solely in West African tradition, but this assumption disregards the variation in both Christian and West African traditions (Jamieson 1995). Researchers need to realize that slaves came from a wide range of places in Africa and therefore cannot be generalized as a single culture.

Finally, there is no guarantee that mortuary artifacts will still exist in historical cemeteries by the time they are identified. The American South is susceptible to a variety of weather conditions including rain and extreme seasonal temperatures. These conditions are not very conducive to artifact preservation, especially if they are comprised of wood or fiber. Soil content can also affect the preservation of artifacts buried with individuals. Artifacts can easily survive in arid climates (e.g. Egypt), but regions like south central Georgia causes mortuary artifacts to deteriorate rapidly. Limitations like these are why bioarchaeologists must use a holistic approach that includes osteological, geochemical, and mortuary analysis to reconstruct identity and community in the cemeteries of marginalized populations. African American identity has turned out to be far more diverse than archaeologists previously thought, and therefore, communities should be examined not on the basis of race, but rather how individuals in a group self-identify with one another.

CHAPTER 6

RESIDENTIAL ORIGINS WITHIN MCARTHUR'S POPULATION

6.1 Stable Oxygen Isotope Results

Out of 37 tooth enamel samples, 34 yielded useful isotopic data. The remaining 3 samples were suspect because of low amount of CO_2 produced from the mass spectrometer readings. This could have been caused by diagenesis or even possible contamination in the laboratory. As a result of varying ages and quality of preservation, ante- and postmortem tooth loss was common within the individuals at McArthur therefore the same teeth could not be consistently collected from each person.

Table 6.1 *Summary of McArthur Cemetery oxygen isotope ratios by individual*

Burial Number	*Age at Death (years)*	*Sex*	*Developmental Period*	*$\delta^{18}O$ (‰)*
3	B +/- 2 mos	F	IEC	27.83
5	35-40	M	IEC	27.88
6	4y +/- 1	-	IEC	27.72
7	1y +/- 4 mos	-	IEC	26.56
8	B +/- 2 mos	-	IEC	26.78
11	5y +/- 1.5	-	MC	27.64
16	50-59	M	MC	26.70
17	-	-	IEC	28.36
18	30-50	F	IEC	27.29
20	3y +/- 12 mos	-	IEC	28.10
21	35-45	F	MC	27.72
22	30-34	M	IEC	27.29
23	25-35	F	IEC	27.44
24	45-49	M	IEC	27.76
25	15y +/- 2.5	-	IEC	26.70
27	60+	M	MC	27.10
30	6y +/- 2	-	IEC	27.13
31	20-30	M	IEC	27.34
32	3y +/- 1	-	IEC	26.98
33	50-59	F	unidentified	25.59
34	3y +/- 1	-	IEC	27.07
35	45-49	M	MC	26.86
36	4y +/- 1	-	IEC	27.40
38	20-29	M	IEC	27.25
39	38-52	F	IEC	26.09
51	≤ 30	F	IEC	28.06
52	30-35	M	IEC	27.07
53	9y +/- 2	-	IEC	27.03
85	35-45	M	MC	25.31
96	35-45	F	MC	27.84
97	10y +/- 2.5	-	IEC	26.89
101	Adult	-	unidentified	25.65
104	Adult	M	MC	26.85
105	45-55	M	IEC	27.30

Oxygen isotope ratios ($\delta^{18}O$) are expressed relative to standard marine ocean water (SMOW). The following formula was used to convert $\delta^{18}O$ PeeDee Belemnite (PDB) to $\delta^{18}O$ relative to Standard Marine Ocean Water:

$$\delta^{18}OSMOW = (\delta^{18}OPDB*1.0307) + 30.37$$

Table 6.2 *Summary statistics of residential isotopic parameters of McArthur Cemetery*

Parameter	Sample N	Mean (‰)	Standard Deviation	Median (‰)	Min/Max (‰)	Range (‰)
Infant/Early Childhood $\delta^{18}O$	24	27.30	0.53	27.29	26.09/28.36	2.27
Middle Childhood $\delta^{18}O$	8	27	0.81	26.98	25.31/27.84	2.53
Unknown Age $\delta^{18}O$	2	25.62	0.04	25.62	25.59/25.65	0.06

The following formula from Turner (2009; see also Dupras and Schwarcz 2001; 2008; Iacumin et al. 1996) was used to convert enamel carbonate $\delta^{18}O$ to the estimated $\delta^{18}O$ of imbibed water:

$$(\delta^{18}\text{OSMOW} - 31.2) / 0.78$$

The resulting set of $\delta^{18}O$ values, summarized in Table 6.3, spans the entire range of $\delta^{18}O$ estimated for river, precipitation, and ground water in the region, also appearing significantly enriched and depleted in some individuals. Three individuals displayed $\delta^{18}O$ values significantly depleted below -7.10‰, while two individuals displayed $\delta^{18}O$ values enriched above -4.0‰. The remaining 29 individuals' $\delta^{18}O$ values ranged from -6.55 to -4.02‰.

Table 6.3 *Estimated residential isotopic values by individual*

Burial Number	*Age at Death (years)*	*Sex*	*Developmental Period*	*Estimated Water (‰)*
3	B +/- 2 mos	F	IEC	-4.32
5	35-40	M	IEC	-4.26
6	4y +/- 1	-	IEC	-4.46
7	1y +/- 4 mos	-	IEC	-5.95
8	B +/- 2 mos	-	IEC	-5.67
11	5y +/- 1.5	-	MC	-4.57
16	50-59	M	MC	-5.77
17	-	-	IEC	-3.64
18	30-50	F	IEC	-5.01
20	3y +/- 12 mos	-	IEC	-3.98
21	35-45	F	MC	-4.46
22	30-34	M	IEC	-5.01
23	25-35	F	IEC	-4.82
24	45-49	M	IEC	-4.41
25	15y +/- 2.5	-	IEC	-5.76
27	60+	M	MC	-5.26
30	6y +/- 2	-	IEC	-5.21
31	20-30	M	IEC	-4.95
32	3y +/- 1	-	IEC	-5.41
33	50-59	F	unidentified	-7.19
34	3y +/- 1	-	IEC	-5.29
35	45-49	M	MC	-5.56
36	4y +/- 1	-	IEC	-4.88
38	20-29	M	IEC	-5.06
39	38-52	F	IEC	-6.55
51	≤ 30	F	IEC	-4.02
52	30-35	M	IEC	-5.30
53	9y +/- 2	-	IEC	-5.35
85	35-45	M	MC	-7.55
96	35-45	F	MC	-4.31
97	10y +/- 2.5	-	IEC	-5.52
101	Adult	-	unidentified	-7.11
104	Adult	M	MC	-5.58
105	45-55	M	IEC	-5.00

The $\delta^{18}O$ ratios of the individuals at McArthur Cemetery ranged from -7.55 to -3.64‰ with a mean of -5.09‰, median of -5.04‰, and standard deviation of 0.79. With oxygen isotope ratios of precipitation, river, and ground water in the area ranging from -5.6 to -5.2‰ (Rose 2004), it is likely that the majority of individuals at McArthur Cemetery resided in the same general area during their childhood.

Although there appears to be significant variation of oxygen isotope ratios within the McArthur population, this could be a result of the water sources themselves rather than regional differences. Water consumed from rivers undergo varying evaporative pressures at different points, which can result in "magnitudes of $\delta^{18}O$ variation within regions, and may in fact exceed that between regions" (Turner et al. 2009:320, see also Knudson 2009). Furthermore, consumed water that was previously exposed to additional evaporative processes, such as boiling and brewing of beverages like tea and coffee, can further skew $\delta^{18}O$ in the enamel of those who consumed this water (Turner et al. 2009). Breastfeeding and weaning practices also affect $\delta^{18}O$ ratios in tooth formation. When relying on teeth that develop early in life, such as permanent first molars and first incisors, there is usually enrichment of $\delta^{18}O$ in IEC teeth categorized as a result of breast milk consumption, which also contains $\delta^{18}O$ values from water sources consumed by the mother that are eventually metabolized into breast milk (Turner et al. 2009; Wright and Schwarcz 1998).

The close proximity of $\delta^{18}O$ values between IEC and MC developmental periods indicate that the majority of individuals at McArthur consumed water from similar sources during the time of their tooth formation, meaning that they likely resided in the same general area around Macon, GA for most of their life.

Table 6.4 *Estimated water vs. developmental period*

Burial Number	***Developmental Period***	***Estimated Water (‰)***
3	IEC	-4.32
5	IEC	-4.26
6	IEC	-4.46
7	IEC	-5.95
8	IEC	-5.67
11	MC	-4.57
16	MC	-5.77
17	IEC	-3.64
18	IEC	-5.01
20	IEC	-3.98
21	MC	-4.46
22	IEC	-5.01
23	IEC	-4.82
24	IEC	-4.41
25	IEC	-5.76
27	MC	-5.26
30	IEC	-5.21
31	IEC	-4.95
32	IEC	-5.41
33	unidentified	-7.19
34	IEC	-5.29
35	MC	-5.56
36	IEC	-4.88
38	IEC	-5.06
39	IEC	-6.55
51	IEC	-4.02
52	IEC	-5.30
53	IEC	-5.35
85	MC	-7.55
96	MC	-4.31
97	IEC	-5.52
101	unidentified	-7.11
104	MC	-5.58
105	IEC	-5.00

Notably, $\delta^{18}O$ ratios for natural water sources in the Ocmulgee River region spanned over 0.4‰ (Rose 2004), which is a significant variation. However, only a third of those individuals sampled at McArthur (9 out of 34) fell within that $\delta^{18}O$ range. Four individuals displayed slight $\delta^{18}O$ depletion ranging from -5.67 to -5.95‰ and two major outliers exhibited depleted $\delta^{18}O$ ratios of -6.55 and -7.55‰. The remaining individuals (17 out of 34 individuals; or exactly half) who do not fall within the natural water source $\delta^{18}O$ ranges exhibit enriched levels of $\delta^{18}O$ ranging from -5.06 to -3.64‰. However, all MC teeth that were sampled are scattered

throughout the distribution of $\delta^{18}O$ ratios, reaffirming that the individuals were not necessarily born elsewhere, but rather, in the general Avondale area.

Adding water was a common way of extending resources to make soups, stews, and mashes made from cornmeal. Since home canning was not common, beans, for example, were dried and then boiled at a later date (Yentsch 2007). There were also no refrigerators or running water, so residents likely relied on surrounding water sources which consisted of streams, creeks, and larger rivers where accessible (Yentsch 2007). The amount of boiling and brewing residents near Avondale would be doing, in addition to breastfeeding practices, can likely explain the enriched $\delta^{18}O$ ratios evident in their enamel.

Individuals who were breastfed as children display more enriched $\delta^{18}O$ ratios, which are also representative of the water their mothers consumed (Turner et al. 2005; Turner et al. 2009; Wright and Schwarcz 1998). In many African American traditions, it was common for mothers on bed rest to eat only soups, bread, coffee, and no meat, thus limiting what their infants received from breast milk to more evaporative water sources (Cussler and de Give 1970). Furthermore, infants were usually weaned onto foods such as cornmeal mush, grits, oatmeal, or stews, usually similar food as what their parents ate since resources were limited (Cussler and de Give 1970; Yentsch 2007). This type of diet using highly evaporative water, which could have also been stored at the homestead depending on the proximity of natural sources, could account for the enriched $\delta^{18}O$ ratios extending into middle childhood. Additionally, in North America, the breastfeeding interval among slave populations was approximately one year, which more mimicked white European populations rather than black populations in Africa (Klein and Engerman 1978). However, weaning children onto foods with highly evaporative properties

could cause MC enamel to display similarly enriched $\delta^{18}O$ ratios as IEC enamel that indicate breastfeeding.

6.2 Childhood Skeletal Pathologies

In order to better understand the relationship between the demographic and dietary patterns of the McArthur population, childhood pathological conditions were compared to tooth developmental periods and isotopic parameters (Table 6.5). Linear enamel hypoplasias (LEH) occur during the time an individual's tooth grows (early childhood), and therefore high prevalence of this condition within a population can inform the dietary habits and climate conditions of the individuals when also compared to oxygen and carbon isotopic parameters. Similarly, instances of cribra orbitalia (CO) also serve as an indicator for malnutrition, anemia, intestinal parasites, and societal inequalities. These manifestations can highlight common dietary or demographic trends within groups of individuals, and in this case can identify possible non-local individuals.

Out of the 34 individuals yielding isotopic data, 11 showed evidence of LEH and/or CO. Because of poor preservation in a large part of the total McArthur population, these pathological occurrences should be considered the minimum. Seven out of the 11 cases of LEH were considered mild, with two of those cases only having one LEH. Three of the 11 cases were considered moderate and one case was considered severe. CO was only found in one of the 11 cases and was also found in the individual with the only severe case of LEH.

Table 6.5 *Descriptive parameters and selected pathological conditions at McArthur Cemetery (data obtained from New South Associates, Inc.)*

Burial Number	Age at Death (yrs.)	Developmental Period	Sex	Severity of LEH	Cribra Orbitalia Present
3	B +/-2 mos.	IEC	F	Mild	No
51	≤30	IEC	F	Mild	No
22	30-34	IEC	M	Moderate	No
24	45-49	IEC	M	Mild	No
52	30-35	IEC	M	Moderate	No
105	45-55	IEC	M	Mild (1)	No
17	Child	IEC	n/a	Severe	Yes
25	15 +/-2.5	IEC	n/a	Moderate	No
36	4 +/- 1	IEC	n/a	Mild (1)	No
53	9 +/- 2	IEC	n/a	Mild	No
33	50-59	Unknown	F	Mild (1)	No

Statistical analyses were performed using SPSS 17.0 for Microsoft Windows and Excel for Microsoft Office 2007 and included non-parametric tests since the distributions of $\delta^{18}O$ and $\delta^{13}C$ are not normally distributed across the McArthur sample population. One-way analyses of variance (ANOVA) were utilized to determine whether there were significant patterns between the $\delta^{18}O$ and $\delta^{13}C$ ratios and the various attributes of the McArthur sample population. One-way ANOVAS tested the significance between the stable isotope ratios and sex (Appendix A). Sex was coded as follows: male – 1, female – 2, and unknown – 0. Unknown also includes children whose sex could not be identified. Mean isotopic ratios were also not significant to the sex of the McArthur individuals.

A one-way non-binary ANOVA was used to test the relationship between mean $\delta^{18}O$ ratios and the presence of LEH in individuals (Appendix B) ($\delta^{13}C$ was not used since it was not normally distributed). Frequency of LEH was coded as follows: not present – 0, one – 1, mild – 2, moderate – 3, and severe – 4. The ANOVA indicated that significance varied between $\delta^{18}O$ ratios and degree of LEH. However, these variations were relatively small and therefore, it could be assumed that there was little overall significance in the relationship between $\delta^{18}O$ ratios and

the degree of LEH in the McArthur individuals. Individual sample t-tests were also employed to compare the mean isotopic data with binary variables, or in other words, one variable in two groups. In this case, presence of LEH was compared with the mean isotopic data (Appendix C). T-tests determined that $\delta^{18}O$ and $\delta^{13}C$ ratios were not an indication of whether LEH was present in an individual.

Additionally, nonparametric tests were performed to determine the relationships between $\delta^{13}C$ ratios, presence of LEH, age at death, sex, burial location, presence of dental caries, and presence of cribra orbitalia (Appendix D). Burial location was categorized as either high ground (dry, good preservation) - 1 or low ground (wet, poor preservation) – 2, as there was a distinct drop in elevation in the cemetery. Burials 17 and 25 are isotopic outliers, but this was a random occurrence as opposed to individuals with certain ages or pathologies. Presence of caries was coded as follows: not present – 0 and present – 1. It was also determined that early life diet was not indicative of overall oral health and the presence of caries was not dependent on whether individuals formed caries later in life.

Finally, chi-square tests (Appendix E) were employed to determine whether the individuals with dental caries were dying at a certain age. Age at death was coded as follows: birth to three years – 1, three to 10 years – 2, 11 to 18 years – 3, and 18+ years – 4. As is turns out, the presence of caries did not have a significant effect on an individual's age of death at McArthur Cemetery.

Even though dental and childhood skeletal pathologies did not appear to affect the overall lifespan of an individual, it is important to note the volume of infants and children buried at McArthur Cemetery. Infant and early childhood deaths among historical African American communities often went underreported (Rathbun and Steckel 2002), which is why studying the

archaeology and bioarchaeology of historical African American cemeteries is paramount in the understanding of community health and demographics. Because of the lack of study of pathologies in African American children following Emancipation, these deficiencies were eventually labeled as stereotypical "black diseases" (Kiple and Kiple 1977). In reality, these pathologies were caused by inadequate maternal health, prenatal conditions, and childhood malnutrition (Matternes et al., in press); a result of structural inequality and poverty.

In historical African American communities such as Avondale, lack of community health contributed greatly to infant and child mortality rates. Especially because of its rural location, sanitation, disease control, and nutrition were not adequately addressed, leaving the very young and old vulnerable to health problems (Matternes et al., in press). Southern Bibb County was also affected by diseases such as malaria, yellow fever, whooping cough, and tuberculosis, as well as parasitic infections like hookworm and gastrointestinal diseases (Kiple and Kiple 1977; Matternes et al., in press). Tetany, or the involuntary contraction of muscles (Guyton and Hall 2006), was not recognized as an illness in the 19th century, but rather recognized by its symptoms which include convulsions and teething, which was often considered to be a 19th century phenomenon of Sudden Infant Death Syndrome (SIDS) (Kiple and Kiple 1977; Matternes et al., in press). These so-called convulsions were fatal to babies, usually affecting them during the time they were teething, which caused people to believe their death was literally caused by teething when, in reality, it was caused by malnutrition and the eruption of teeth was irrelevant (Kiple and Kiple 1977). This belief is illustrated at McArthur Cemetery in specific burials where teething aids were found buried with infants, for example, a mortar and pestle.

Over 60% of the population buried at McArthur died before the age of 20, and approximately 20% of those individuals were infants under the age of one (Matternes et al., in

press). The majority of these childhood deaths occurred in children under the age of three years (Matternes et al., in press). This was the general age bracket in which children were being weaned off of breast milk and introduced to the high carbohydrate-low protein diets that negatively affected their health. These dietary practices combined with poor community health initiatives and extreme poverty created a community where individuals were lucky to survive their childhood.

Ultimately, societal inequalities in the post-Bellum South manifested themselves in pathologies that made African American children more susceptible to infectious diseases, higher rates of infant mortality, high frequencies of dental caries, as well as bone and skin ailments; all of which are caused by nutritional deficiencies (Kiple and Kiple 1977). In essence, these children were the victims of structuralized malnutrition in the United States, African environmental heritage, and North American climatic circumstances (Kiple and Kiple 1977). Though they were technically free people, African Americans were often no better off than they had been during slavery, having to navigate the American South as a perpetually oppressed people.

6.3 Osteoarthritis and Occupational Patterning

In addition to childhood pathologies, instances of osteoarthritis were noted in order to determine possible occupational patterns within the Avondale community, which largely consisted of tenant farmers. Osteoarthritis is characterized as an inflammation of the joints and manifests as deterioration of the joint surface and additional bone formation around the rim of the articular surface of the joint (Matternes et al., in press; Steele and Bramblett 1988). Osteoarthritis is usually found in the knees, hips, shoulders, fingers, and toes (Matternes et al., in press; Steele and Bramblett 1988), usually developing with age or as a result of occupational

habits. Heavy concentrations of osteoarthritis can indicate certain work patterns, such as agricultural labor. Alternatively, lack of osteoarthritis can indicate a lack of participation in hard labor or certain occupational patterns. However, age also needs to be taken into account with both of these observations. Compared to isotopic parameters, osteoarthritis can inform whether individuals at McArthur likely belonged to the workforce in the Avondale community or if they spent their life elsewhere before settling in this area.

The earliest occurrence of osteoarthritis was found in an individual at age twenty, which is categorized as mild to moderate. In the eight individuals displaying osteoarthritis at age of death, the majority of these cases can be considered mild. Although each of the eight individuals displays multiple affected areas, most of them are mild to moderate with only one severe case. Mild cases affected the skull, mandible, arms, legs, knees, innominates, and vertebrae. However, they were not concentrated in any specific area. Moderate cases varied between shoulders, arms, innominates, and vertebrae, but also did not concentrate on one specific area.

The only case of severe osteoarthritis is found in a man over the age of sixty (Burial 16). Additionally, mild osteoarthritis was found in his forearm, thigh, knee, pelvis, and thoracic vertebrae. Moderate cases were found in his forearm, cervical, thoracic, and first lumbar vertebrae, with severe osteoarthritis afflicting the rest of his lumbar vertebrae.

Table 6.6 *Presence of osteoarthritis in the McArthur population (courtesy of V. Davis)*

Burial Number	Severity	Location	Age	Sex
5	Mild	Mandible Lt. Humerus	35-40	M
16	Mild Moderate Severe	Rt. Ulna Rt. Innominate Rt. Femur Rt. Patella Thoracic Vertebrae Lt. Radius Cervicle Vertebrae T12 L1 Lumbar Vertebrae	60+	M
18	Mild Moderate	Rt. Femur T2 T3 T4	20-30	M
21	Mild Moderate	Rt. Innominate Lt. Femur Rt. Clavicle	35-45	F
22	Mild	Thoracics	30-34	M
35	Mild	Lt. Ulna	45-49	M
38	Moderate	Lt. Innominate	20-29	M
39	Mild	Skull	38-52	F

Although instances of osteoarthritis occurred in areas conducive to strain caused by agricultural work, these cases do not seem to indicate occupational patterning. Cases were mostly mild and affected 60% of young adults. However, the one adult male individual that experienced severe osteoarthritis was significantly older at the time of death than the others, which calls into question whether his arthritis was caused mostly by occupational conditions or simply advanced age. Additionally, most cases of osteoarthritis whether mild, moderate, or severe occurred in the vertebrae. This was to be expected since the population worked as tenant farmers and jobs that required bending and lifting. Even with these living conditions, none of these cases were especially severe. It is also worth noting that not all individuals buried at

McArthur Cemetery could be analyzed, as preservation varied greatly. There could have potentially been more cases of osteoarthritis to indicate occupational patterning, but the remains available for analysis indicate no such patterning.

6.4 Mortuary Analysis

Mortuary analysis is a valuable bioarchaeological method and is especially useful in community and identity studies. Following Emancipation, African American traditions were still deeply suppressed by the white majority, and burial traditions in black cemeteries provided validation for membership within the community, and furthermore, a reaffirmation of land ownership (Botwick 1997). In the post-Bellum South, African American cemeteries were components of close-knit communities and were usually situated in isolated parts of the geographical community where they would not be disturbed, also consistent with extended family cemetery traditions (Jones-Jackson 1987:73). McArthur Cemetery, in particular, was discovered in a wooded area surrounded by agricultural fields.

Historical African American cemeteries were normally made up of inter-related extended families, similar to how the majority of their living communities in the South were comprised (Jeane 1992:113). These cemeteries were meant for the residents of its community, therefore any monuments or decorations tended to be more simplistic rather than elaborate (Matternes et al., in press). To many rural landowners, the cemetery also served as a representation of a family's membership in the community and legitimizing their status as property owners (Botwick 1997). According to Jeane (1992), historical African American cemeteries in the lowland and upland were usually divided into plots reserved for specific families, heavily based around the nuclear family. Children were usually buried in close proximity to their parents and spouses were buried

next to one another (Miller et al. 2004). Burial on church grounds or within a specific family cemetery was further reaffirmation of that individual's place in the community's social structure (Botwick 1997).

It is not surprising that the individuals buried at McArthur resided in the Avondale community for the majority of their lives; many African Americans made it a priority that they would be interred in the family cemetery, even going as far as to make sure they were transported back to their home towns in the event that they died away from their family's cemetery (Combes 1974:56; GDOT 2010; Georgia Writers Project 1972:95). Furthermore, many communities, including historical African American and European-Christian communities, share practices that identify outsiders buried in or near their cemeteries (Stilgoe 1978). 'Stranger lots' are associated with some cemeteries, such as the Osburn Family Cemetery in Walker County, GA (Windham et al. 2011). These are small, isolated burial grounds were created for strangers and non-family members, which community members believed would contaminate the family cemetery, which held great spiritual significance (Windham et al. 2011). A cemetery like this, however, was not found in any proximity to McArthur Cemetery.

The burials in McArthur Cemetery, shown below (Fig. 6.7), are concentrated within the same general area, with no significant outliers. Any staggered burials, such as those on the southern end of the cemetery, were potentially a result of landscape limitations such as forested areas or terrain since they are located on a slight hill. Within the cemetery itself, a mix of West African, European American, and Native American cultures and funerary and burial traditions were identified during excavation (Matternes et al., in press). These traditions varied from burial orientation to grave goods interred with the individuals.

One such tradition, the East-West burial orientation, dates back to pagan burial practices which were adopted by many Christians; individuals were buried with the head to the west, symbolic of rebirth, so that the dead can face Jesus upon his second coming (Milbauer 1989:177). Individuals who were not buried in the East-West orientation were usually people the community deemed unworthy of spiritual grace (Burn 1991; Cohen 1958; Mills et al. 2008). These included murderers, those who committed suicide, people with anti-social personalities, or those of low moral character (Gregorie 1954; Hildebrand 2006; Stilgoe 1978). However, all burial orientations in McArthur Cemetery were consistent with the East-West orientation.

The burial attributes such as the variety of grave goods in McArthur Cemetery would seem to indicate that the Avondale community was comprised of many non-local individuals, but when viewed in conjunction with stable isotope results, it is more likely that the cultural variation found within burial practices is a result of different forms of cultural exchange within the community and between families. The East-West orientation of the burials and the apparent grouping of individuals by family (spouses beside one another, children buried with parents, etc.) indicate that McArthur cemetery is likely made up of extended family networks that resided within the Avondale community.

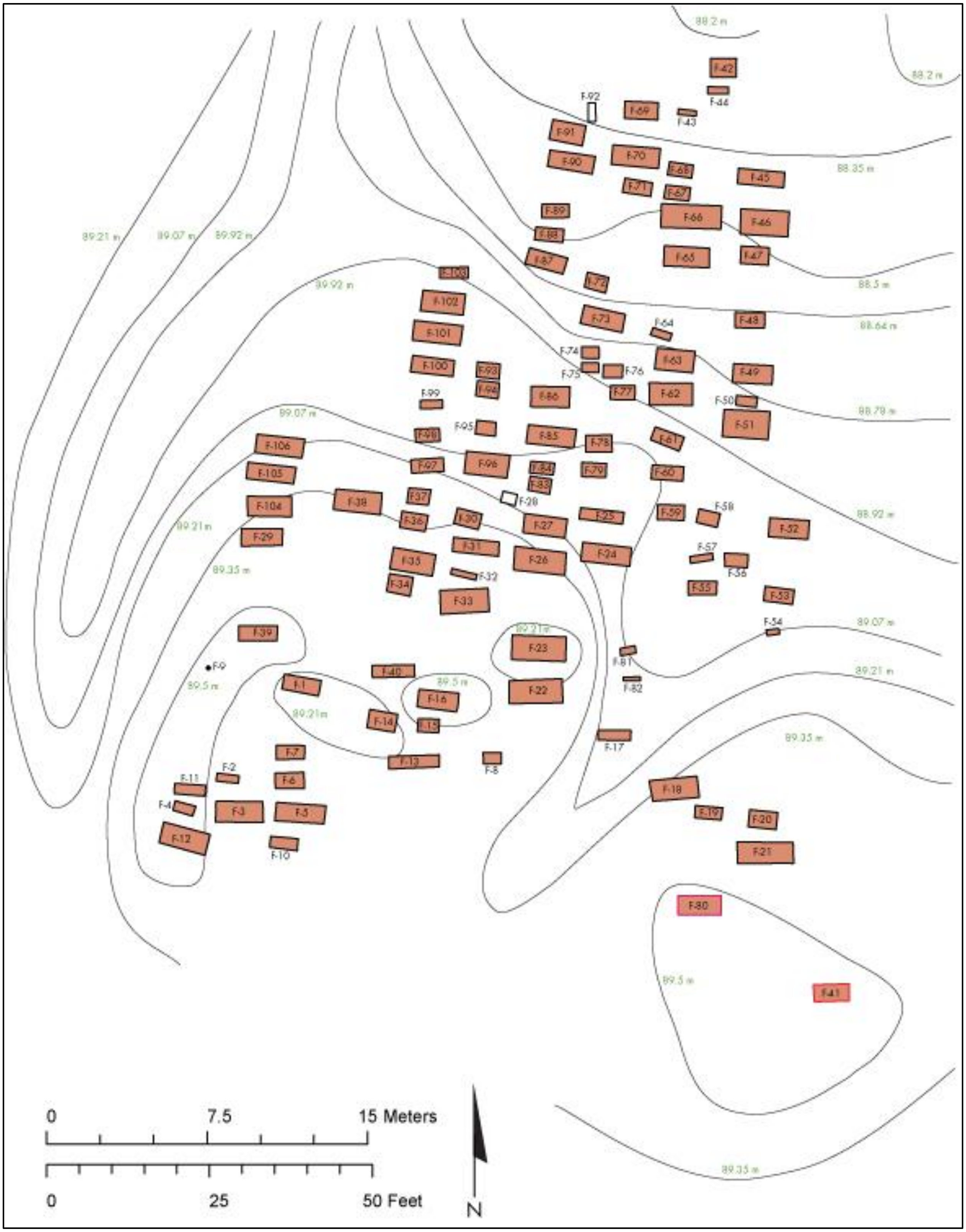

Fig. 6.7 *Map of McArthur Cemetery burials (used with permission of New South Associates)*

CHAPTER 7

SUBSISTENCE PATTERNS WITHIN MCARTHUR'S POPULATION

7.1 Stable Carbon Isotope Results

The same 34 tooth enamel samples which yielded useful isotopic data were used to examine $\delta^{13}C$ ratios. Like the $\delta^{18}O$ analysis, the same developmental age periods were assigned using established developmental parameters and displayed in Table 7. (Turner et al. 2005). The $\delta^{13}C$ ratio is expressed relative to PeeDee Belemnite. The following formula from Tomczak (2003) was used to convert enamel $\delta^{13}C$ to the estimated $\delta^{13}C$ of consumed food sources:

$$\delta^{13}C \text{ (‰, vs. VPDB)} - 11$$

The resulting set of $\delta^{13}C$ values, summarized in Table 7.2, spans from -20.10 to -13.56‰, which includes food sources in the C_4 range. There does not seem to be any significant distinction of $\delta^{13}C$ ratios between IEC and MC tooth formation. $\delta^{13}C$ ratios indicate that the McArthur population heavily relied on C_4 foods, as their values did not reach -22‰. However, 24 of the 34 individuals in the McArthur population exhibited depleted $\delta^{13}C$ ratios from -16.19 to -20.10‰, essentially between the parameters of C_3 and C_4 foods. These estimated diet values represent the overall compilation of an individual's diet, which include terrestrial and marine animals, C_3 and C_4 plants, as well as plants with crassulean-acid metabolism (CAM) photosynthetic pathways, which actually possess $\delta^{13}C$ ratios that are intermediate between C_3 and C_4 plants (Turner 2008). However, it is also possible these intermediate values are indications of a diverse diet which includes both C_3 and C_4 plants as well as certain protein food sources.

Table 7.1 *Summary statistics of dietary isotopic parameters of McArthur Cemetery*

Developmental Period	Sample N	Mean (‰)	Standard Deviation	Median (‰)	Min/Max (‰)	Range (‰)
Infant/Early Childhood $\delta^{13}C$	24	-6.03	1.85	-5.97	-8.86/-2.56	-6.3
Middle Childhood $\delta^{13}C$	8	-7.06	1.99	-7.55	-9.10/-3.41	-5.69
Unknown $\delta^{13}C$	2	-4.70	0.10	-4.70	-4.77/-4.63	-0.14

Table 7.2 *Estimated diet isotopic values by individual*

Burial Number	*Age at Death (years)*	*Sex*	*Developmental Period*	*Estimated Diet $\delta^{13}C$ (‰)*
3	B +/- 2 mos	F	IEC	-16.19
5	35-40	M	IEC	-17.11
6	4y +/- 1	-	IEC	-19.86
7	1y +/- 4 mos	-	IEC	-19.55
8	B +/- 2 mos	-	IEC	-19.77
11	5y +/- 1.5	-	MC	-19.51
16	50-59	M	MC	-19.55
17	-	-	IEC	-18.02
18	30-50	F	IEC	-17.26
20	3y +/- 12 mos	-	IEC	-17.62
21	35-45	F	MC	-19.59
22	30-34	M	IEC	-19.86
23	25-35	F	IEC	-19.52
24	45-49	M	IEC	-18.64
25	15y +/- 2.5	-	IEC	-14.29
27	60+	M	MC	-16.40
30	6y +/- 2	-	IEC	-17.32
31	20-30	M	IEC	-16.48
32	3y +/- 1	-	IEC	-15.09
33	50-59	F	unidentified	-15.63
34	3y +/- 1	-	IEC	-15.19
35	45-49	M	MC	-17.58
36	4y +/- 1	-	IEC	-14.47
38	20-29	M	IEC	-16.83
39	38-52	F	IEC	-13.56
51	≤ 30	F	IEC	-15.87
52	30-35	M	IEC	-16.78
53	9y +/- 2	-	IEC	-17.39
85	35-45	M	MC	-14.41
96	35-45	F	MC	-20.10
97	10y +/- 2.5	-	IEC	-16.55
101	Adult	-	unidentified	-15.77
104	Adult	M	MC	-17.34
105	45-55	M	IEC	-15.55

The $\delta^{13}C$ ratios of the individuals at McArthur Cemetery ranged from -20.10 to -13.56‰ with a mean of -17.29‰, median of -17.29‰, and standard deviation of 1.90. $\delta^{13}C$ values fell within the ranges for C_4 plant sources, but did not appear heavy in C_3 plant sources, as most of the $\delta^{13}C$ values fell between C_3 and C_4 plants. This was to be expected; it is likely that the individuals buried at McArthur Cemetery relied heavily on C_4 plants like maize products. Twenty-four of the 34 individuals in the McArthur Cemetery population exhibited $\delta^{13}C$ ratios that fell between the ranges of C_3 and C_4 plants. CAM plants possess $\delta^{13}C$ ratios that are intermediate between C_3 and C_4 plants, but they include plants like pineapple, cacti, and orchids, which grow in far more arid climates and would not be accessible to rural farmers in the southeastern United States. Therefore, this range of $\delta^{13}C$ ratios is likely the product of an extremely varied diet.

Freedom did not come with an increase in quantity or quality of food. Ex-slaves who became tenant farmers usually had access to less food of worse quality than they did when they were slaves because their white owners had access to better quality foods, much of which they could partake in, even if it was only the leftovers (Yentsch 2007). Older former slaves likely had better and more of a variety of food than did younger children born right before or after Emancipation since it was customary for slaves to eat the same kinds of foods the master ate, who had more financial access to a variety of quality foods (Scott 2001). When slavery ended, the freedom to purchase land came with the financial burden. Many tenant farmers decided to buy land rather than spend the little money they had on quality foods. This limitation in food sources could have potentially contributed to the mortality rates displayed in McArthur Cemetery, more of which will be discussed later.

Diets of individuals buried in McArthur Cemetery were heavy in C_4 plant sources, but could have also been influenced by a variety of foods containing C_3 plant ingredients and various meat sources. It is important to remember that African American tenant farmers in the Post-Bellum South were very poor and subsisted on whatever foods were accessible and available at any given time. African American sharecroppers did not own much livestock if any at all, forcing families to hunt wild game and forage opportunistically (Matternes et al., in press; Scott 2001; Yentsch 2007). Those who did have gardens grew corn, sweet potatoes, sugar cane, sorghum, collards, turnips, cowpeas and any other vegetables that proved successful (Fite 1979; Matternes et al., in press), many of which are sources of C_3 photosynthetic pathways. Others subsisted on a very predictable diet of low-cost products such as grits, boiled vegetables, and fatback if it was available (Yentsch 2007).

This, of course, is assuming that recently freed African American farmers had the knowledge and means to successfully grow their own crops. Those farmers that grew cotton often bought what produce they could have potentially grown because they lacked the experience and the resources to learn since farming information was distributed by journals and most black tenant farmers were illiterate (Fite 1979). Those that purchased produce could afford little and those who grew it had to make it last through the season. As a result, the menus of each family were distinct depending on what they happened to have access to, which is evident by the widely distributed $\delta^{13}C$ ratios of their tooth enamel.

7.2 Weaning Practices

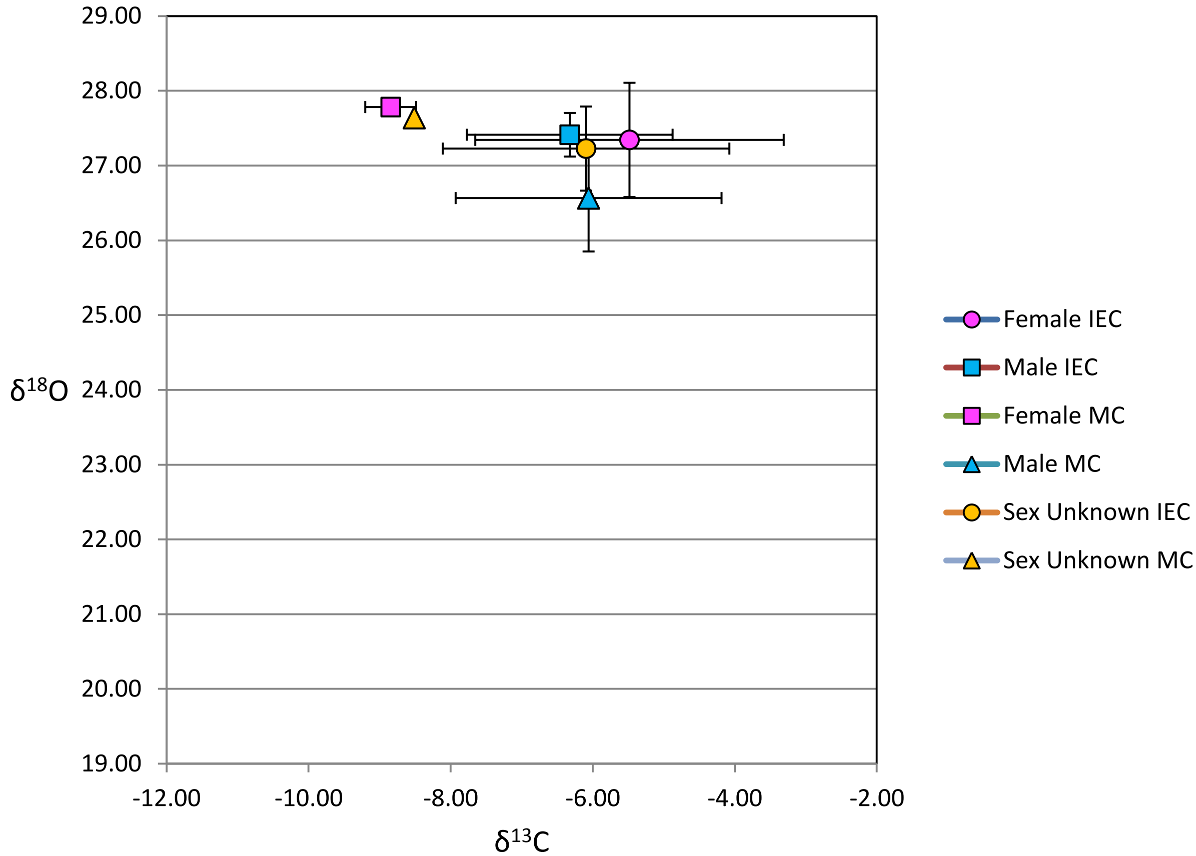

Fig. 7.3 *Mean $\delta^{18}O$ and $\delta^{13}C$ ratios of the McArthur population*

The mean oxygen isotope values in five out of the six developmental categories, including female IEC, male IEC, female MC, unknown IEC, and unknown MC, fell between 27.23 and 27.78‰. The only outlier was the mean δ^{18}O ratio for those categorized as male MC, which was 26.56‰. Because the remaining mean δ^{18}O ratios generally fall within the same proximity, it is more likely that male children consumed water from different sources during middle childhood tooth development than it is that these individuals migrated from a different location. Furthermore, the fact that the female MC and unknown MC mean δ^{13}C ratios are

outliers is a further indication that water consumption and dietary habits underwent some change during middle childhood.

All teeth that formed during infancy or early childhood display similar $\delta^{18}O$ ratios between 27.23 and 27.41‰ (if converted to estimated water, ranges from -5.08 to -4.85‰), which is more enriched than the local water sources in the area. However, this is to be expected since the breastfeeding interval among slave populations in the United States was approximately one year (Klein and Engerman 1978). Infants were then weaned onto foods such as cornmeal mush, oatmeal, or stews (Cussler and de Give 1970; Yentsch 2007), of which the water content displays more enriched $\delta^{18}O$ ratios. Therefore, tooth enamel in the McArthur individuals would continue to display enriched $\delta^{18}O$ ratios following their weaning onto solid foods when new teeth formed during middle childhood.

There is, however, a major shift in $\delta^{18}O$ ratios once teeth begin to form in middle childhood. Female teeth became more enriched in $\delta^{18}O$ while male teeth became more depleted. This could be an indication of household work patterning between family members. Depending on the age that male children were introduced to farm labor, it is possible their $\delta^{18}O$ ratios were depleted at the same time if they were consuming water from a different source. Teeth forming during middle childhood appear between approximately one and eight years (Turner et al. 2005; Turner 2008). If male children were taken away from the household during this time frame in order to assist with farm work, it is possible that they had access to different kinds of water than their female counterparts. Water stored in the home would have been more enriched in $\delta^{18}O$ than fresh water obtained from a stream or creek. Furthermore, if female children spent more time in the home when their teeth formed during middle childhood, they would have had more access to foods more enriched with $\delta^{18}O$ such as soups, stews, tea, and stored water. Consuming these

foods more regularly than male children would explain the enriched $\delta^{18}O$ ratios in females whose teeth formed during middle childhood.

A major shift also occurs in the $\delta^{13}C$ ratios of teeth that formed in middle childhood with both males and females. Along with the continuing enrichment of $\delta^{18}O$ in females and individuals of unknown sex, $\delta^{13}C$ ratios are significantly more depleted. The mean $\delta^{13}C$ ratio of female MC tooth enamel is -8.84‰ (-19.84‰ when converted to estimated diet). This ratio still falls between the parameters of C_3 and C_4 plants. Although the diets of children in the Avondale community were diverse (however low quality), it appears that female diets were influenced heavily by C_3 foods. This is not too surprising since it is possible families might have had access to wheat products, vegetables, or root crops depending on whether they had gardens or not. Children were often fed various versions of these foods, which would likely include boiling or creating wheat-based mush, thus accounting for the enriched $\delta^{18}O$ levels found in their enamel.

Male teeth that formed during middle childhood, however, displayed a more enriched mean $\delta^{13}C$ ratio of -6.06‰ (-17.06‰ when converted to estimated diet). Like the female children, the diets of males also varied greatly, explaining the intermediate ratios between C_3 and C_4 plants. However, it appears that during MC tooth formation, males were slightly more dependent on C_4 foods. This is to be expected because the diets of African American tenant farmers relied heavily on C_4 foods, which include maize products. Larsen (1998) points out dietary patterns commonly exist between the sexes in agricultural settings. In the Eastern Woodlands of North America, specifically the Georgia Bight, Larsen found that women, who were more responsible for food preparation, often caused women to consume more plant carbohydrates than men (Larsen 1998). Dietary differences like these based on the division of labor may have also played a role in the health of post-Bellum tenant farmers in Georgia.

7.3 Dental Pathologies

Dental caries, also known as cavities, are characterized by the demineralization of enamel by organic acids, more specifically, the "bacterial fermentation of carbohydrates, especially sugars" (Matternes et al., in press: 147). Enamel on the tooth's surface deteriorates and eventually produces lesions and pits (Matternes et al., in press; Ungar et al. 2008), which can be indicative of dietary habits in certain populations. Each tooth sampled from the McArthur Cemetery population was analyzed for dental pathologies, specifically dental caries, and compared to the dietary information obtained from stable isotopic analysis. Individuals who displayed dental caries are summarized in Table 7.4, which includes sex, age at death, and burial location, which greatly affected preservation of the burial remains. It should be noted that burials excavated on the lower ground of the cemetery displayed much poorer preservation than those on higher ground, making this sampling opportunistic and representative of the minimum number of individuals possessing dental caries.

Table 7.4 *Presence of dental caries in the McArthur population (courtesy of V. Davis)*

Burial Number	***Sex***	***Age at Death (years)***	***Burial Location***
17	Unknown	3-10	High ground
18	Female	18+	High ground
24	Male	18+	High ground
25	Unknown	11-18	High ground
27	Male	18+	High ground
32	Unknown	3-10	High ground
35	Male	18+	High ground
36	Unknown	3-10	High ground
38	Male	18+	High ground
51	Female	18+	Low ground
85	Male	18+	Low ground

Low Ph levels in plaque have been shown to cause demineralization in tooth enamel and dentine and can cause dental caries that manifest themselves in lesions, cavities, and tooth loss,

often resulting from large amounts of plaque or a diet high in fermentable carbohydrates (Hillson 1986). The rise of agriculture, especially maize agriculture, dramatically increased the frequency of caries found in archaeological populations compared to hunter-gatherer sites (Boyd 1996; Buikstra and Cook 1980; Larsen 2002; Matternes et al., in press). Maize is higher in sucrose than other foods which, combined with bacteria naturally found on teeth, deteriorates tooth enamel and produces caries (Hillson 1986; Tucker 2002). Frequency of caries also increased with the rise of refined sugar and flours in foods in industrialized societies, which has also been found in southern African American communities, whose diet was heavily based on corn products and molasses, which is heavy in refined sugar (Matternes et al., in press).

Tooth wear was also analyzed in the McArthur sample population. When examined in conjunction with dental caries, there seems to be a "negative correlation between the degree of dental wear and the frequency of occlusal surface caries" (Matternes et al., in press:148). Teeth that display less wear are more susceptible to cariogenic bacteria which invades the fissures and grooves of teeth (Matternes et al., in press).

Fig. 7.5 *Dental caries in adult male individual (Burial 18; photographed by the Author)*

Fig. 7.6 *Minimal dental caries but significant dental wear in adult male individual (Burial 22; photographed by the Author)*

The diet of African Americans in the post-Bellum South consisted primarily of refined sugar and corn-based products, even down to the meat that was consumed; therefore, it is no surprise that dental caries were so prevalent in the McArthur population. The high frequency of caries alone in the McArthur population does not definitively conclude that it consists completely of local individuals, but rather consistent with a diet heavily reliant on corn, sugar, and carbohydrates (Matternes et al., in press), which characterized the majority of historical African American communities in the rural South. However, combined with stable isotopic analysis, which suggests that the individuals at McArthur were made up of mostly local individuals, the frequency of dental caries as an indicator of diet reinforces this hypothesis.

7.4 Dental Microwear Analysis (DMA)

Only molars were sampled for this analysis in order to maintain consistency, as incisor wear may differ from molar wear on account of varying incisor use (Krueger and Ungar 2010).

Microwear on the McArthur dental casts were categorized as pits (small, medium, and large) or scratches (fine or coarse). DMA took place on the occlusal margin of each tooth cast, the same area where isotopic samples were extracted for analysis. Since the $\delta^{13}C$ ratios of the McArthur population indicated intermediate food sources, microwear analysis will further pinpoint which foods the individuals relied on. Although many foods share the same isotopic register, they can vary greatly in their dental microwear patterns. However, it is important to remember that microwear reflects end-of-life diet, while isotopic analysis reflects early-life (or in utero in the case of petrous and deciduous enamel) diet. In this study, microwear analysis is used to examine potential differences in dietary habits early versus later in life, which can also identify individuals who consumed foods from different geographic sources at different points in life.

Tubers and wild plants are soft and usually produce scratches from grit or phytoliths that adhere to their surfaces and are consumed along with the plants (Schmidt 2001); this can also occur if foods are grinded with a mortar and pestle during preparation, allowing outside contaminants to mix with it. Nuts and starchier food sources are harder and usually produce pits (Schmidt 2001), which actually create indentations in the tooth enamel. The size and frequency of each wear pattern will help determine whether the diets of the individuals at McArthur can be effectively estimated from the isotopic data, as this analysis is exceptionally useful in examining dietary variability within a specific population (El-Zaatari 2010).

Table 7.7 *Dental microwear analysis of occlusal surfaces of permanent molars from the McArthur population*

Burial Number	***Small Pits***	***Medium Pits***	***Large Pits***	***Fine Scratches***	***Course Scratches***
3	2	-	-	10	2
11	3	-	-	-	3
13	3	4	2	-	-
13	5	1	-	2	-
16	-	1	-	5	-
17	-	8	-	-	2
18	8	-	-	7	1
22	-	-	-	6	-
23	6	-	-	3	-
23	2	-	-	5	-
24	3	-	-	4	-
24	3	-	-	7	-
25	7	2	1	-	-
25	4	1	-	4	1
30	3	1	-	2	-
30	2	-	-	4	-
31	4	-	-	1	-
32	4	1	-	3	-
33	2	2	1	-	3
34	4	-	-	12	-
35	4	-	-	5	-
36	3	-	-	1	3
36	8	2	-	-	-
36	2	-	-	12	-
38	9	-	-	2	-
39	10	-	-	3	-
51	4	1	-	8	1
52	5	-	-	4	-
53	3	-	-	-	2
96	3	-	-	6	-
97	1	-	-	3	-
101	5	2	-	1	4

The vast majority of the McArthur individuals experienced small pits (29 individuals) and/or fine scratches (25 individuals) on their tooth enamel. 10 individuals displayed course scratches on their enamel usually in addition to fine scratches. 12 individuals displayed medium pits, most of which also displayed small pits. Large pits were present in three individuals who also displayed small and medium pits.

Table 7.8 *Frequency of pits and scratches in the McArthur population*

N Individuals with Fine Scratches	N Individuals with Course Scratches	N Individuals Sharing Both	N Individuals with Small Pits	N Individuals with Medium Pits	N Individuals Sharing Both
25	10	6	29	12	10

The high frequency of fine scratches on the McArthur population's tooth enamel is consistent with historical evidence of food preparation. Food grinded in preparation or cooked uncovered is likely to be affected by outside contaminants such as grit that can cause scratching (El-Zaatari 2010). Foods consumed by rural African American tenant farmers in the 19th century consisted of maize products and oat products that for the most part required grinding or processing in some fashion, leaving food exposed to grit from the air or surfaces such as mortar and pestles. Furthermore, this processing softens foods and leaves more evidence of scratching than pitting (Schmidt 2001). Meat, however, usually does not leave scratches unless it is contaminated with grit from the preparation environment (Organ et al. 2005). These types of foods that required grinding or processing were fed to infants during their weaning process as well as older children and adults, accounting for the high frequency of fine scratches in first molars.

An equally high frequency of small pits in the population's enamel is consistent with the amount of starchy foods the McArthur individuals likely consumed. Inexpensive foods such as cornmeal and potatoes were a staple of the tenant farmer's diet; foods which also create pits in tooth enamel. It should also be noted that much of the McArthur population's diets were highly opportunistic, which could have included foods like seeds and nuts, which leave significantly more pits in enamel than other foods.

The mixture of fine scratches and small pits is consistent with $\delta^{13}C$ isotopic data suggesting that the McArthur population subsisted on a combination of C_3 and C_4 plant sources.

Since both fine scratches and small pits were present, this also suggests that processing was a common part of food preparation, which limited the amount of larger pits and course scratches found in the McArthur population's tooth enamel.

CHAPTER 8

CONCLUSIONS

This research has attempted to incorporate multiple methods of analysis to accurately investigate how community and identity were constructed in the past. Osteological, mortuary, and stable isotopic analyses were used to reconstruct identity and community by examining dietary habits and mobility patterns of the individuals at McArthur in order to produce a more comprehensive history of the Avondale community and the post-Bellum South as a whole. These analyses ultimately revealed that there is no indication that the individuals buried at the cemetery were non-local to the area, but rather resided in the Avondale area from a young age.

Ultimately, δ^{18}O ratios indicate that those buried at McArthur consumed water from the same natural sources within the general Avondale area. However, these δ^{18}O ratios are also reflections of enriched forms of this water including breast milk consumed by infants and food preparation techniques such as water storage, brewing, and boiling. Carbon ratios indicate that there were probably more dietary differences between families than the presence of non-local individuals in the Avondale community. The vast majority of δ^{13}C values were intermediate of C_3 and C_4 plants, meaning that they probably had an extremely varied diet dependent on what each individual family could access. Because African Americans in the post-Bellum South were heavily reliant on corn products and animals who likely consumed corn products, the diets of the McArthur population were likely heavy in C_4 plant sources but influenced by a variety of additional foods, which muddy the δ^{13}C isotope signature.

Mean δ^{18}O and δ^{13}C ratios indicated that water consumption and dietary habits underwent a significant change during middle childhood, likely from weaning practices onto different foods. Most notably, male and female mean δ^{18}O ratios significantly diverged during middle childhood,

possibly from labor traditions being introduced during childhood. As a result, male and female children potentially consumed different types of foods and water from varying sources on a regular basis.

Foods consumed by the McArthur population promoted bacterial growth and poor oral health (Matternes et al., in press). The high frequencies of caries in the McArthur population is an indication that they indeed relied heavily on sugar and corn-based products as well as livestock that consumed said products, but not necessarily that they were local individuals. When viewed in tandem with stable isotope analysis and mortuary analysis, it is apparent that the McArthur population is likely comprised of local residents and the frequency of dental caries as an indicator of diet reinforces this hypothesis.

There were no significant trends in childhood pathologies among the individuals at McArthur Cemetery. Although there were several cases of LEH, there was no correlation between LEH and any other singular attribute. However, these findings are minimal and based on a limited sample population in which individuals were selected opportunistically as a result of poor preservation. The same is true of osteoarthritis findings. No significant occupational patterning was found for the instances of osteoarthritis in the McArthur population. But similar to the childhood pathologies, these findings are minimal and based on a limited sample size because of poor preservation.

The McArthur population consists of a broad range of individuals, which may be adequate to generalize the population of this specific community. Archaeological evidence indicates that many individuals buried in the cemetery were either slaves or descendents of slaves who had “been brought into the area to work in the region’s agricultural industry” (Matternes et al., in press:270). Also notable is the abundance of infants and children buried in

the cemetery. Like other communities in the region, Avondale was affected by the various epidemics that moved through the area. Nutritional disparities and lack of proper sanitation and healthcare only exacerbated these conditions (Matternes et al., in press). These problems in addition to the community's rural location and poor socioeconomic status further contributed to the mortality of the very young.

Within the burials themselves, a strong mixture of West African, European American, and Native American cultures and funerary and burial traditions were identified during excavation (Matternes et al., in press). These burial attributes would seem to indicate that the Avondale community was comprised of many non-local individuals who migrated to the Avondale area following Emancipation. However, when viewed in tandem with stable isotope ratios, it is clear that Avondale was likely comprised of local individuals, the majority of which grew up in the general area and practiced a variety of beliefs within that community as a result of intermarrying and other forms of cultural exchange.

Compared to other post-Emancipation cemeteries, such as the Newburgh Colored Burial Ground (1830-1870) in Newburgh, NY, McArthur Cemetery reveals surprising commonalities in post-Bellum African American communities. Isotopic ($^{87}Sr/^{86}Sr$) analysis of the Newburgh Colored Burial Ground indicated that Newburgh's free black population was comprised of individuals born in the immediate region (Nystrom et al. 2011). The Newburgh site was an urban location, which gradually drew more freedmen to its industrial workforce after Emancipation, but it did not experience an influx of non-locals. The fact that the residents of a rural southern community share very similar mobility patterns (or lack thereof) with an urban northern community reveals that if African Americans participated in the Great Migration, they did so in a gradual manner over many years rather than a mass exodus from their homes during slavery.

8.1 Future Research

Microwear molds were utilized in this project as a way to preserve the integrity of each whole tooth that was sampled from the McArthur population. In order to pinpoint the dietary components of the McArthur individuals, it would be useful to perform Scanning Electron Microscopy (SEM). For this project, dental pathologies and wear patterns were identified by recording visible imperfections on the microwear mold surfaces. Using these same microwear molds initially created from the intact teeth, SEM analysis would be able to identify specific foods that require distinct ingestion behavior, as they leave distinguishable wear patterns such as scratches or microscopic pits in molars (Scott et al. 2005; Ungar et al. 2008).

Because of the drastic differences in $\delta^{18}O$ ratios, a few individuals in the sample population could have potentially been born elsewhere. This is a case where future analyses could be helpful in clarifying any outliers that might indicate the presence of non-local individuals. By performing strontium and lead isotopic analysis (also known as heavy isotope analysis) on the five male individuals who displayed a significantly depleted mean $\delta^{18}O$ ratio, more exact locations can be identified as to whether the individuals indeed grew up in the Avondale area and consumed different water sources or whether they were actually non-local individuals.

Furthermore, it would be useful to run additional carbon and oxygen isotope analyses on duplicate samples from different teeth in order to track chronological changes in weaning and dietary trends. Unlike this analysis, where the teeth sampled were a combination of IEC and MC teeth, the chronological analysis would utilize those individuals where both IEC and MC teeth were sampled. This chronological analysis would also be extremely useful in confirming whether individuals were local to the area and underwent dietary changes during weaning or if they were

non-local after all. However, this would also include a limited sample since multiple samples were not taken from all of the individuals at McArthur Cemetery.

8.2 Applying Research to Collaborative Efforts

Many bioarchaeology projects are criticized because no research is contributed by the descendant community (Epperson 2004); this project, however, is based on the information brought forth by descendants. Without the enthusiasm and generosity of McArthur's descendant community, the relocation and further research of the cemetery would not have been possible. I plan to provide the results found in this project to the McArthur descendant community by synthesizing the data into an accessible document such as a pamphlet and providing it to each member of the descendant community. This document will also be submitted to the Avondale Burial Place website where it can be viewed by additional interested parties. I will clearly explain how the results were obtained and what conclusions can be drawn from this research, which will ideally include insights to the community formed at McArthur. Since DNA analysis has already been performed, family members will be able to find information pertaining to the specific individuals they are related to and be able to further their own genealogical research.

The historical archaeology and bioarchaeology of identity relies heavily on community studies and past individuals' relationship to it. This is especially true when researching and working with marginalized populations. Little (2002:109) claims that a group's "social past, ancestral history, and national appreciation constitute much of how that group's members view themselves and how they are perceived by others in modern society." Empowerment requires reciprocity; marginalized groups must empower themselves by taking control of their heritage by becoming involved in projects and archaeologists must in turn actively engage and work with

these communities to ensure that their concerns are addressed. Societies gather social worth and meaning from heritage; if bioarchaeologists do not engage the descendant communities of their sites, then biases of the past can ignore the history of disenfranchised minorities (Little 2002), leaving these communities feeling eternally displaced.

Public awareness plays a vital role in the recognition of marginalized populations. Bioarchaeology has the ability to draw interest to projects involving historical populations that have been disenfranchised. The African American Burial Ground Project in New York, for example, initiated international interest in bioarchaeology of the African Diaspora and recognize the contributions and complexities of sites like these (Cuddy and Leone 2008). Currently, “only a quarter of the fifty states have statutes that allow descendent communities access to private property to visit their ancestral graves” (Rainville 2009:200), meaning even if a cemetery is recognized on private property, descendents are not always guaranteed fair access to their family’s remains.

Very little is known about the reconstruction of African American communities after emancipation, and in addition to family histories, this research will contribute to the historical record of the American South. Most importantly, studying community identity at McArthur embraces an interdisciplinary approach that encompasses bioarchaeology and public archaeology. In order to build on African American history, the motivations of researchers and their methods for excavation should come from studying the people and not a “race”. Bioarchaeologists in particular have the responsibility to advocate for public awareness of historical graveyards and the descendant communities they belong to (Ferguson 2008). As a result, the more information that communities and researchers can provide together, the more

likely it is that the public will see these marginalized communities as a legitimate part of national history and want to preserve them for generations to come.

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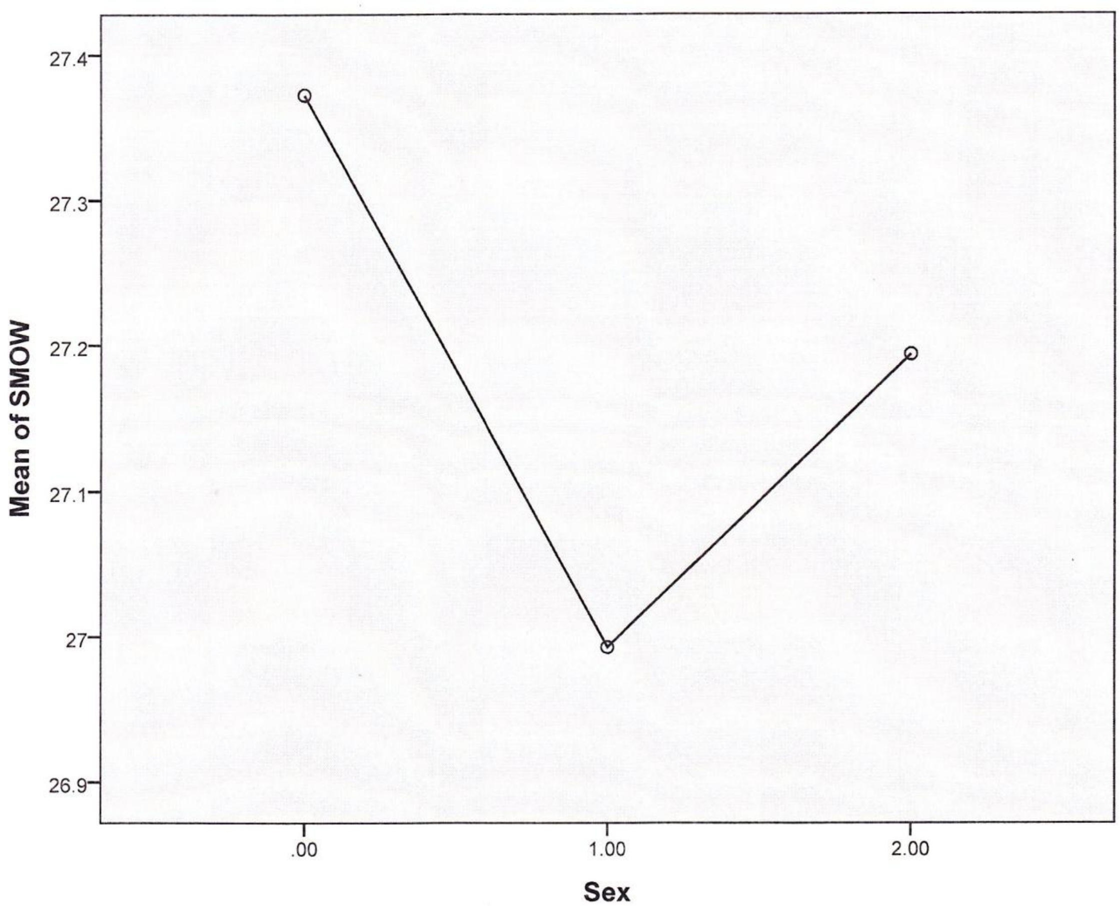
APPENDICES

Appendix A

ANOVA: SMOW vs. Sex (only individuals who manifested some sort of pathology)

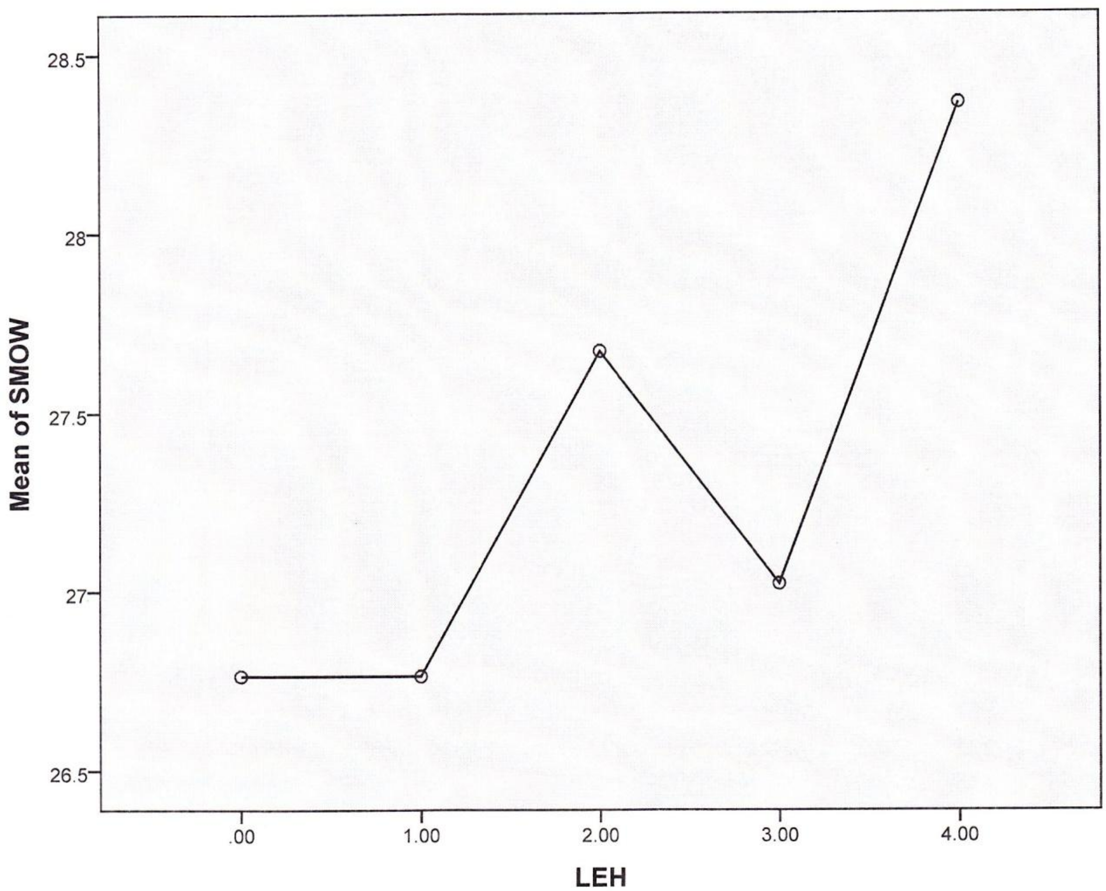
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.401	2	.201	.291	.753
Within Groups	8.976	13	.690		
Total	9.377	15			



Appendix B

ANOVA: Mean $\delta^{18}O$ ratios vs. presence of LEH

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.794	4	.949	1.869	.186
Within Groups	5.583	11	.508		
Total	9.377	15			



Appendix C

Individual Sample T-Test: Mean isotopic data vs. presence of LEH

Group Statistics

	LEHPresence	N	Mean	Std. Deviation	Std. Error Mean
SMOW	.00	5	26.76	.828	.370
	1.00	11	27.31	.749	.226
d13C (‰, vs VPDB)	.00	5	-5.50	1.248	.558
	1.00	11	-5.61	1.734	.523

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Mea	
		F	Sig.	t	df
SMOW	Equal variances assumed	.044	.836	-1.308	
	Equal variances not assumed			-1.257	7.1
d13C (‰, vs VPDB)	Equal variances assumed	1.152	.301	.129	
	Equal variances not assumed			.146	10.7

Independent Samples Test

		t-test for Equality of Means		
		Sig. (2-tailed)	Mean Difference	Std. Error Difference
SMOW	Equal variances assumed	.212	-.545	.417
	Equal variances not assumed	.248	-.545	.434
d13C (‰, vs VPDB)	Equal variances assumed	.900	.112	.869
	Equal variances not assumed	.887	.112	.765

Independent Samples Test

		t-test for Equality of Means	
		95% Confidence Interval of the Difference	
		Lower	Upper
SMOW	Equal variances assumed	-1.439	.349
	Equal variances not assumed	-1.566	.476
d13C (‰, vs VPDB)	Equal variances assumed	-1.751	1.974
	Equal variances not assumed	-1.576	1.799

Appendix D

NONPARAMETRIC TEST: $\delta^{13}C$ vs. presence of LEH, age category, sex, burial location, presence of dental caries, and presence of cribra orbitalia

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of LEHPresence is the same across categories of d13C (‰, vs VPDB).	Independent-Samples Kruskal-Wallis Test	.451	Retain the null hypothesis.
2	The distribution of AgeCat is the same across categories of d13C (‰, vs VPDB).	Independent-Samples Kruskal-Wallis Test	.451	Retain the null hypothesis.
3	The distribution of Sex is the same across categories of d13C (‰, vs VPDB).	Independent-Samples Kruskal-Wallis Test	.451	Retain the null hypothesis.
4	The distribution of BurialLocation is the same across categories of d13C (‰, vs VPDB).	Independent-Samples Kruskal-Wallis Test	.451	Retain the null hypothesis.
5	The distribution of Caries is the same across categories of d13C (‰, vs VPDB).	Independent-Samples Kruskal-Wallis Test	.451	Retain the null hypothesis.
6	The distribution of CribraOrbitalia is the same across categories of d13C (‰, vs VPDB).	Independent-Samples Kruskal-Wallis Test	.451	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Appendix E

CHI-SQUARE: Age at death vs. presence of dental caries

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.295[a]	3	.513
Likelihood Ratio	2.930	3	.402
Linear-by-Linear Association	.397	1	.529
N of Valid Cases	16		