STASIS IN THE POPULATION OF METAPONTO: ANALYSIS OF ENVIRONMENT, HEALTH, AND POLITICAL UNREST

By

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The Greek colony of Metaponto offers an invaluable insight to the study of both rural and urban populations. Analysis of population is an important study to be able to examine social, political, and economic impacts of the time and how a group of people dealt with these stressors. Starting around 500 B.C. Metaponto experienced a period of great prosperity followed by a period of stasis starting around 425 B.C. Analysis was completed to understand whether stasis was the result of 1) epidemic disease, 2) environmental degradation, 3) political unrest, and 4) a combination of factors. Data used included archaeological data and historical accounts of Metaponto from Greek historians. Stress and possible warfare from different groups of people in the Mediterranean against Metaponto would have created increased tension within a colony already ravaged by disease. This could have caused the perfect storm to create stasis temporarily ending the period of prosperity.
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INTRODUCTION

Metaponto is a very important site in Southern Italy for the study of both rural and urban populations. Metaponto was founded by Greeks from the Peloponnesus around 650 B.C. and ended in the third century B.C with occupations of native Italians following in subsequent time periods (Carter 2011a; Carter 2011b). Metaponto was famed for its immense amount of wealth that came from the farming of barley. The area had very rich farmland due to the change in sea levels thousands of years previously (Carter 1980:2). In this paper, I explore possible reasons for the stasis in the population meaning a plateau in population increase afflicting the population beginning in 425 B.C. when previously the population was prospering. This study more broadly has the potential to reveal demographic processes associated with both regional growth and decline. In particular, potential factors contributing to this population fluctuation that I specifically analyze include; 1) epidemic disease, 2) environmental degradation, 3) political unrest, and 4) a combination of factors. The main focus of this thesis is on the rural population because of the vast amount of data available, but makes reference to the urban population as well. To make note the rural population is often referred to as the chora of Metaponto (Carter 2011a:617).

Extensive research has already been done on the burials of the Pantanello necropolis which is a rural area in Metaponto (Henneberg 1985, Hall 1986, Henneberg and Henneberg 1990, Henneberge et al. 1992, Henneberg 1998, Henneberg and Henneberg 1998, Henneberg and Henneberg 2001). Examination of health and environment indicates the prevalence of some
diseases such as anemia in the population which has led researchers to suggest the presence of malaria (Henneberg and Henneberg 1990:87, Henneberg et. al 1992:455). Other signs on the bones suggest the presence of systemic infections (Henneberg et al. 1992:456).

Botanical remains have been found through excavation and provide a valuable insight to what the people of Metaponto were farming and gathering. A time line of the prevalence of foods has allowed a reconstruction of how farming changed over time and how that might have affected diet. Examination of the environment and social pressures coinciding with changes in crops were analyzed by other researchers in addition to possible erosion of the soil (Constantini 1983; Carter 2011a:623-625). Environmental data also helped determine whether or not climate changed between the seventh and third centuries B.C. had an effect on the types of crops being produced (Carter 2011b:727; Folk 2011).

The broader political context was explored to determine if there were any types of battles fought in the region or beyond that may have drawn out the male population from the Metaponto colony. The indigenous population could have risen up against the people of Metaponto in an effort to reclaim their land. Another group of people that could have been responsible for warfare is the Lucanians (Carter 1990a:36). A group of people could have either attacked the Metaponto population very quickly or could have been drawn out and slowly caused the assimilation of the attacking group into Metaponto. The population of Metaponto itself could have been experiencing political unrest within the colony due to political and economic pressures in the region.
BACKGROUND

Greek Colonialism

Greek civilization is most well known as the birth place of democracy and it has been extensively described by ancient historians such as Herodotus, Thucydides, and Plato during the Classical period. Before this, however, the Greeks began to colonize the Mediterranean region. Greek colonization spurred better ship technology and an increasingly efficient army to displace the indigenous populations (Hammond 1986:109-110). Colonization by the Greeks was made possible, in part, by relative peace at home where they were able to direct resources in the interest of colonizing (Hammond 1986:112). Each new colony would have at first received a tremendous amount of support from the homeland, but would eventually become independent (Hammond 1986:112). The main reason for colonization was trade (Hammond 1986:121) and, in the case of Metaponto (Figure 1), the exploitation of rich farmland that led to increased barley production and trade. It is important to note that Metaponto (its modern Italian name) is also referred to at times by the Greek Metapontion and Latin Metapontum. Barley production was a primary reason for why the Metaponto colony commanded such wealth. It is proposed by Joseph Carter (1990b) that even with the minimum caloric intake necessary for a family that there would have still been a large surplus to sell.

The founding of Metaponto has many different stories tied to it which are told by the historian Strabo (Strabo 1967:6.1.15). Part of the myth that has some truth in it is how the people of Sybaris wanted to stop the expansion of the colony of Taras so they had new colonists found the colony of Metaponto nearby (Strabo 1967:6.1.15). Since its founding in 650 B.C. Metaponto grew very quickly and amassed a great amount of wealth and expanded further inland for farmland (Carter 2011a:563; Carter 2011b:699). Around 500 B.C. there was a crisis in
Metaponto in the form of political unrest with growing tension about whether the old or newer colonists were entitled to the land (Carter 2011a:563). Pythagorean groups appeared during this time period on the side of the wealthy, but they were not successful (Carter 2011a:563; Carter 2011b:727,738-740). The common people rose up against the rich, which resulted in the redistribution of land and ending of all debt (Carter 2011b:727,740).

Figure 1  Map of Southern Italy and Greek Colonies (Carter 1990:14).
Around 475 B.C. there was a renewed amount of growth within the population up until the late fifth century B.C (Carter 2011a:565; Carter 2011b:745). Beginning in the late fifth century B.C. up until about 375 B.C. stasis hung like a black cloud over the colony (Carter 2011a:565). During this time there was lack of building projects, lack of upkeep on buildings, and evidence for reuse of stone materials (Carter 2011a:565; Carter 2011b:745,784-785). After the decline, the colony once again thrives up until the early third century B.C., but the population soon declines after fighting the Romans marking the end of the colony (Carter 2011a:565-566).

**Excavations**

The site of Metaponto is located near the ocean in southern Italy between the Basento and Bradano rivers (Figure 2). Metaponto was discovered by aerial photographs in 1959 which showed land divisions still present since its time as a Greek colony (Carter 1990a:5). It was determined to be for agricultural purposes in sectioning out land to different families (Carter 1990a:5). This was later followed by a field survey of the site in 1965 by Professor Dinu Adamesteanu (Carter 1990a:5). Almost ten years later Professor Dinu Adamesteanu asked the University of Texas to become involved in the excavations of the rural area of Metaponto (Carter 1990a: 5). The University of Texas accepted to excavate the area due to the great learning opportunity for its students (Carter 1974:3).

In 1973 the Ente Sviluppo bulldozed an area for the agricultural school in the area where ancient pottery and roof tiles were uncovered in the Pantanello necropolis (Carter 1974:5-6). The 1975 survey of the Pantanello focused on creating a chronology of the site from Neolithic to Roman times (Carter 1975:4). From 1976 to 1982 much of the field work focused on rural life of the people of Metaponto by examining areas such as farmhouses, kilns, a sanctuary, and cemeteries (Carter 1976, 1977, 1978, 1979, 1980, 1983a, 1983b, 1983c). The area of Pantanello
offered an opportunity for the preservation of many organic materials because of the anaerobic swampy conditions providing valuable insight into the types of crops produced in the area (Constantini 1983). The site has undergone multiple salvage excavations, one of which was in 1982 when the field where Pantanello was located in was burned and plowed (Carter 1990a:9).

Figure 2 General overview map of Metaponto depicting sanctuary distribution (Carter 1998c:Figure 1.1).
During excavation of the chora of Metaponto there were three main transects named the Bradano-Basento transect, SNAM pipeline transect commonly referred to as Pizzica, and the Pantanello transect (Carter 2011a:626-628). The Bradano-Basento transect excavations covered the expanse of 1974-1986, 1990-1991, and 2008, the SNAM pipeline transect was excavated in 1999, and the Pantanello transect was excavated from 1981-2001 (Carter 2011a:626-628). Figure 3 shows an image of the different transects of the chora of Metaponto as well as the urban center referred to in the figure as asty.

Figure 3 Excavation areas of rural Metaponto (Prieto 2011:Figure 3.6).
METHODOLOGY

My analysis focused on evaluating the potential impact of health, environment, and warfare on the decline in population during the fourth century B.C. In particular, I examined: 1) epidemic disease; 2) change in environment causing changes in farming; 3) warfare drawing men out of Metaponto to fight, and 4) multiple causes. The importance of determining the cause of the stasis within the population of the Greek colony of Metaponto will help further illuminate population profiles not just in times of growth, but during hard times as well. Through studying population one can discern a profile of the political, economic, and social affecting the population and how they dealt with it.

Profile of the Population

In order to gain an understanding of the cause of stasis it was important to first create a profile of the population. The main source for information on population comes from the rural area of Pantanello where many burials were excavated (Henneberg and Henneberg 2001 and Henneberg 1998). The rural and urban populations of the Metaponto area are seen as synonymous due to analysis of dentition (Henneberg 1998). Examination of the frequency of burials and necropoleis over time was completed as well as the death rate in the area through a life table. The percentage of male, female and child burials were also examined to gain a better understanding of the average lifespan of an individual and changes in population makeup through different time periods. The types of tombs and how they changed was also examined to gain better insight into how burial preferences might have changed over the course of the occupation of the site.
Epidemic Disease

Pathological analysis of bones was conducted to help understand what types of diseases affected the population (Henneberg 1998). Environment could have also played a role in promoting certain diseases. The vector that transmits the disease malaria caused by *Plasmodium* is the anopheles mosquito (Roberts and Manchester 2005:233). Mosquitoes thrive in warm swampy areas, like Metaponto during Greek colonization of the area, so the transmission of malaria may have been higher in this area than elsewhere. Various diseases leave signature indicators on bone. With malaria, for example, individuals experience severe anemia so high percentages of the burial population exhibiting markers of anemia may be indicative of a malarial environment (Henneberg and Henneberg 1998). Some of the indicators of anemia on bone include cribia orbitalia which is the pitting of bone in the eye orbit and porotic hyperostosis which is the pitting of bone on the skull (Henneberg and Henneberg 1998). In populations endemically affected by malaria, the genetic disorder of sickle cell anemia and thalassemia is often favored by microevolution as it promotes a degree of resistance to the more harmful disease of malaria. Sickle cell anemia affects the shape of blood cells and their ability to deliver oxygen. Oxygen does not bind as well to the crescent shaped blood cells causing a lack of oxygen to tissues and can lead to blood vessels becoming blocked (Roberts and Manchester 2005:233). Thalassemia is a disease where there is a mutation in the formation of red blood cells that causes them to have a very short life span by being destroyed quickly after formation (Roberts and Manchester 2005:233). Due to the short lifespan of the red blood cells in both sickle cell anemia and thalassemia malaria is not able to infect them due to the insufficient amount of time to infect the cells.
Evidence of abnormal bone growth has been found in the Pantanello necropolis of the Metaponto area which would have helped with the formation of increased red bone marrow which in turn would have helped with red blood cell formation (Henneberg and Henneberg 1998). This extra red blood cell formation would have tried to create more blood cells to help bind more oxygen (Henneberg and Henneberg 1998).

Studies on dental health were also examined in order to determine the health of the population. Factors that were studied include the frequency of dental caries and linear hypoplasia. High occurrence of dental caries would have made an impact on a person’s health. Death would have been unlikely, but if the person was already sick from another disease the condition their teeth were in would have played a role in speeding up the process of death. In the case of linear hypoplasia the main avenues examined were diet, infectious disease, and high fluoride concentrations in the water. Linear hypoplasia would tell people about the individuals’ early life because that is when the lines form during development of permanent teeth between the ages of 2.5-4.5 years of age (Henneberg 1998:160).

**Environmental Degradation**

I also examined the role the environment may have played in the population decline in Metaponto in the fourth century B.C. First, environment may contribute to the frequency of various diseases. Environment is also important in order to reconstruct the type of habitat in which people lived. The type of environment that people lived in can show how people adapted to that particular habitat.

The climate was also studied to determine if there were any time periods where the weather was warmer or colder than normal which could have an effect on farming. The water table was studied to see if there were changes over time. If the water table were to drop low
enough it could mean that there was less water availability which could have had an effect on the demography and similarly so if there was an increase in the water table (Carter 1990b, Carter 1980, Sullivan 1983).

**Political Unrest**

Warfare was examined through ancient sources to determine if there was any possibility of warfare during the stasis. Evidence for increased fortification during the time period was analyzed as well as Metaponto’s relationship with its neighboring colonies. When the Greeks colonized Metaponto they displaced the indigenous population who was very upset at having been moved from such rich farmland (Carter 1975:3). The indigenous population could have decided to finally rise up against the Greeks or they could have integrated themselves into the Greek population. To determine this, analysis was done to see if there is any archaeological evidence for continuous fortification and if indigenous sites last long beyond the founding of Metaponto. In addition to the indigenous population Joseph Carter had suggested that during this time period the Lucanians could have attacked the colony (Carter 1990a:19). In order to better understand this as a possibility it was analyzed to see if there was a change in grave goods that were Lucanian in style symbolizing invasion.

In addition to warfare outside of the colony there could have been warfare within the colony itself. A growing population would mean an increasing amount of land to sustain the population. The population was growing not only from within, but from people from Greece moving to Metaponto. There could have been a shortage of land in general or of fertile land causing arguments of who should be entitled to the land whether it be the original colonizers or immigrants from Greece as what happened in 500 B.C. In addition to tensions about land political tensions about the type of government in charge could also cause political unrest within
the population. Growing tension from the land shortage and the type of government in place could have resulted in warfare among the people of Metaponto and can be seen archaeologically. Archaeological correlates as proposed by Joseph Carter for signs of political unrest in a population are changes in demography, a drop in burial count particularly amongst males, and abandoned farmhouses (Carter 2011:740-741). Maps of populations in various time periods were analyzed to see if there is a change in the number of sites either deserted or created overtime to understand if there was a change in demography meaning were people immigrating to different areas of Metaponto. Analysis of burial count including female to male ratio and changes in burial types were also studied as a factor of political unrest.

RESULTS

Profile of the Population

In order to better understand reasons for stasis within the population it is important to first draw a profile of the population through examination of average life expectancy and changes in population over time. Analysis of the profile of the population depict what changes occurred over time to help address theories as to what was happening to the population. The average life span for a female was 39 years of age and 41 for a male (Henneberg and Henneberg 1990:78). Life expectancy at Metaponto was similar to ancient Athens and Corinth (Henneberg and Henneberg 1990:78). Table 1 shows a life expectancy table that takes into account underrepresentation of children (Henneberg and Henneberg 1998:511). The calculation for the table shows that when it is assumed that the total fertility rate of the average female was six children 50.8% of the population died between birth and the age of 14 (Henneberg and
Henneberg 1998:511). The life table (Table 1) displays comparable data to prehistoric populations, peasants of nineteenth century Poland, and other early developing historic populations (Henneberg and Henneberg 1998:511).

A very interesting find among the burials at the Pantanello necropolis was the high ratio of females to males where there were 1.88 females to every male (Henneberg and Henneberg 1990:77). Figure 4 shows how the ratio of female and males varied across age groups starting after the age of 15 when the distinction between sexes was able to be analyzed. The ratio is of the burials from the Pantanello necropolis over a 300 year period beginning in 580 B.C. (Henneberg and Henneberg 1990:77). Throughout the entire occupation of Metaponto there is a higher ratio of females to males and the ratio of females to males is the highest from the period of 380-275 B.C. is about 2:1 (Table 2). The period before this however from 425-381 B.C. during the period of stasis the ratio is lower being 1.61 females to every male. This is still a high ratio even though it is lower than the average where a ratio closer to 1:1 would be more seemly.

A high ratio of females to males indicates that men could have been sent off for warfare and Figure 4 shows that ratio is more distinct during the prime of their life and drops back to nearly a 1:1 ratio much later in life. The high ratio of females to males is also an indicator of political unrest within the colony. Men would have left to fight battles in their prime whether it was against foreign invaders or within the colony itself. Men had a higher status than women meaning that they could have gone to urban centers to work and their higher status mean burial elsewhere. There is also a spike in female mortality starting in their 20’s which is due to dying from childbirth. Childbirth would have been very dangerous in Metaponto and would have been the cause of many deaths in females during their childbearing years.
The population of Metaponto grew over time from its founding around 650 B.C. up until its end in the third century B.C. with some declines as well as stasis (Carter 2011a, Carter 2011b). The amount of burials over time steadily increases throughout occupation of the site (Figure 5). As depicted in Figure 5, in the years 450 and 400 B.C. there is a rapid increase in the number of necropoleis followed by an almost equal amount of burials to necropoleis. When referring to necropoleis it means burial grounds and Table 5 shows necropoleis greater or equal to 0.45 hectares. It is important to note that within the chart burial dates were taken from their midpoint and only counted once whereas as long as the necropolis was greater than 0.45 hectares it was counted as more than once meaning that it was used in more than one period. One of the reasons for this is that there was an increase in the number of deaths and therefore a greater

Table 1  Life Table (Adapted from Henneberg and Henneberg 1998:Table 11.4).

<table>
<thead>
<tr>
<th>Age</th>
<th>d[x]</th>
<th>l[x]</th>
<th>q[x]</th>
<th>e[x]</th>
<th>c[x]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td>19.8</td>
<td>100.0</td>
<td>0.198</td>
<td>21.2</td>
<td>4.3</td>
</tr>
<tr>
<td>1-4</td>
<td>18.2</td>
<td>80.2</td>
<td>0.227</td>
<td>25.3</td>
<td>13.4</td>
</tr>
<tr>
<td>5-9</td>
<td>7.9</td>
<td>62</td>
<td>0.127</td>
<td>28.1</td>
<td>13.7</td>
</tr>
<tr>
<td>10-14</td>
<td>4.9</td>
<td>54.1</td>
<td>0.090</td>
<td>26.8</td>
<td>12.2</td>
</tr>
<tr>
<td>15-19</td>
<td>1.5</td>
<td>49.2</td>
<td>0.031</td>
<td>24.3</td>
<td>11.4</td>
</tr>
<tr>
<td>20-29</td>
<td>16.1</td>
<td>47.7</td>
<td>0.338</td>
<td>20.0</td>
<td>18.7</td>
</tr>
<tr>
<td>30-39</td>
<td>13.1</td>
<td>31.6</td>
<td>0.415</td>
<td>17.6</td>
<td>11.8</td>
</tr>
<tr>
<td>40-49</td>
<td>6.9</td>
<td>18.5</td>
<td>0.375</td>
<td>16.6</td>
<td>7.1</td>
</tr>
<tr>
<td>50-59</td>
<td>5.0</td>
<td>11.5</td>
<td>0.433</td>
<td>13.5</td>
<td>4.3</td>
</tr>
<tr>
<td>60-x</td>
<td>6.5</td>
<td>6.5</td>
<td>1.000</td>
<td>10.0</td>
<td>3.1</td>
</tr>
</tbody>
</table>

d[x] = percentage dying at age x among all deceased  
l[x] = survivorship to the beginning of the age category x  
q[x] = probability of dying in the age category x  
e[x] = life expectancy at the beginning of the age category x  
c[x] = proportion of persons aged x in the total living population, assuming zero natural increase.  
R[pot] (Potential Gross Reproductive Rate) = 0.68  
I[bs] (Biological State Index) = 0.33
necessity to build new necropoleis or that settlement patterns were changing which can be further evidenced by changes in tomb types (Carter 2011b:758).

Table 2  Distribution by Sex (Adapted from Carter 1998a:Table 6.4).

<table>
<thead>
<tr>
<th>Sex</th>
<th>pre-515</th>
<th>515-461</th>
<th>460-426</th>
<th>425-381</th>
<th>380-326</th>
<th>325-275</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>male</td>
<td>3</td>
<td>7</td>
<td>16</td>
<td>18</td>
<td>9</td>
<td>18</td>
<td>71</td>
</tr>
<tr>
<td>female</td>
<td>4</td>
<td>16</td>
<td>23</td>
<td>29</td>
<td>20</td>
<td>36</td>
<td>128</td>
</tr>
<tr>
<td>child</td>
<td>1</td>
<td>5</td>
<td>16</td>
<td>23</td>
<td>12</td>
<td>9</td>
<td>66</td>
</tr>
<tr>
<td>adult</td>
<td>1</td>
<td>1</td>
<td>7</td>
<td>14</td>
<td>7</td>
<td>16</td>
<td>46</td>
</tr>
<tr>
<td>no bones</td>
<td>1</td>
<td>5</td>
<td>4</td>
<td>6</td>
<td>3</td>
<td>9</td>
<td>28</td>
</tr>
<tr>
<td>unknown</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Around the same time period there is a change in tomb types. From around 515 B.C. up until 425 B.C. stone tombs are used at higher percentage than tile tombs, earthen tombs, and cremation (Hall 1986:74-76; Carter 1998b:61). The frequency of tile tombs steadily rises overtime until 380-375 B.C. where it is the most frequent type of burial (Carter 1998b:61). In the years 425-381 B.C. the frequency of stone tombs sharply drops while the frequency of earthen and tile tombs increases greatly (Carter 1998b:61). Changes in the style of tombs over time could indicate a shift in beliefs about burial practices, availability of resources, or the result of changes in population (Hall 1986:77-78). As mentioned above there could have been a shift in demography to increasingly permanent settlements which could indicate changing politics within the colony (Carter 2011b:758).
Disease

Analysis of dentition can show a lot about an individual. Linear hypoplasia was present in 78% of the population (Henneberg at al. 1992:453). There could have been multiple causes for linear hypoplasia such as infectious disease, malnutrition, or a high fluoride concentration in the water. Malnutrition would probably not have been that big of a problem. Metaponto was famous for its vast amount of wealth through the farming of barley. To help support this, calculations were completed to estimate the kilocalorie (kcal) output from a plot of land for a family and the average consumption (Henneberg et al. 1992:449-452). What was found was that the land yielded more food than what the family could consume even when the assumption of low yield was calculated (Henneberg et al. 1992:449-452).

Research by Renata Henneberg has shown that the frequency of dental caries among the population of rural Metaponto is similar to other agricultural societies in Europe before the middle ages (Henneberg 1998:128). The frequency of dental caries was also lower than agriculturalists in America because Europeans had an increased variety of grains in their diet (Henneberg 1998:128). This finding also supports the notion that if the people of rural Metaponto were similarly healthy as to other European agricultural cultures overwhelming malnutrition would not have been the cause for 78% of the population to have linear hypoplasia (Henneberg et al. 1992:453).

The other two options left for the cause of linear hypoplasia are infectious disease and a high occurrence of fluoride in the drinking water. Analysis was done on fluoride concentrations in the water within the area of Metaponto (Henneberg 1998). The occurrence in the water was 1 ppm (part per million) in natural springs in the area of Metaponto; this would have helped prevent the spread of cavities (Henneberg 1998:130-131). The Bradano River which was one of
the main sources of water for the urban population was analyzed for fluoride content, but because of contamination of modern farming was found to be inconclusive (Henneberg 1998:131). The optimal range that doctors recommend for optimal efficiency in cavity prevention is 1-5 ppm so in order for fluoride to effect the development of the enamel of the teeth fluoride content would have had to have been greater than the optimal range recommended by doctors (Henneberg 1998:130-131). When a person has too much fluoride it often presents itself as a molting of the enamel instead of the linear form, but it is important to note that molting is caused by other stressors as well (Henneberg 1998:131). Molting of the enamel causing pitting was present in 13.6% of the rural population and 30.0% in the urban population (Henneberg 1998:174). The main source of water for the urban area was the Bradano River, but as mentioned before the results were inconclusive, but it is possible it could make up for the difference between the rural and urban population. Most of the people that did show pitting on the teeth were also affected by linear hypoplasia (Henneberg 1998:174).

There was a higher frequency of cavities as well as linear hypoplasia in the urban population than in the rural (Henneberg 1998:131). The rural population had a better diet than that of the urban population because of a greater access to not only the food they farmed, but wild animals as well to help balance out their diet. Residue analysis on ceramic vessels has found that the city imported sugary food such as honey and fruits which would have caused an increase in cavities and would have been more readily available in the urban areas due to its location as a port city (Henneberg 1998:132).

The high percentage of linear hypoplasia could have been due to infectious disease causing high fevers in children and disrupting the growth of permanent teeth between the ages of 2.5-4.5 years of age (Henneberg 1998:160). According to Renata Henneberg (1998:158) of all
the people that showed signs of linear hypoplasia 94% also showed other pathologies on the bones. Renata Henneberg suggests that the disease could possibly be treponematosis meaning syphilis, bejels, or yaws (Henneberg 1998:158,175; Henneberg et al. 1992:455). In two cases among juveniles the pitting showed itself on the occlusal surface meaning the biting surface of the tooth which could indicate congenital syphilis (Henneberg 1998:175).

Pathologies on bones at the Pantanello necropolis indicate multiple diseases that were affecting the population. Determining diseases can be difficult since teeth and bones are not always affected by many types of diseases whereas soft tissue is (Henneberg and Henneberg 1998:527; Roberts and Manchester 2005:13). Soft tissue however is very rarely available if at all. Analysis has also been difficult in burials due to the lack of preservation due to the chemicals that farmers have used (Carter 1983:22). People can die of infectious disease very rapidly before there are changes to the bone to help analyze the cause (Roberts and Manchester 2005:12).

A likely culprit of the linear hypoplasia was treponematosis. Other signs for treponematosis are from thickening of bones which in the spine can be mistaken for arthritis (Carter 2011a:618-619). Malnutrition and high fluoride concentrations were already ruled out as main causes for linear hypoplasia leaving infectious disease. A disease causing high fever affecting children at a young age would have caused the high percentage of linear hypoplasia. Linear hypoplasia and pitting was more common in the urban population than in the rural population which could have been the result of crowding and unsanitary conditions of the urban population resulting in a higher rate of disease. A disease, possibly treponematosis, if it was affecting the population and causing 78% of the population to have linear hypoplasia would have
most likely been present affecting most of the population of Metaponto at a young age (Henneberg et al. 1992:453).

Treponemal diseases include diseases such as endemic syphilis, pinta, venereal syphilis, and yaws (Roberts and Manchester 2005:206). Bacteria are the cause of the disease which in the case of venereal syphilis and maybe even yaws being transferred congenitally (Roberts and Manchester 2005:208-209). When venereal syphilis is transferred from mother to child it is often given the name congenital syphilis, but can also be transmitted sexually between individuals through the bacteria known as *Treponema pallidum* (Roberts and Manchester 2005:208-211). All diseases fall under the genus *Treponema* and have similar manifestations of inflammation of skin (Roberts and Manchester 2005:207). Pinta would have had only the manifestation of the skin whereas endemic syphilis, venereal syphilis and yaws would also have the presence of lesions on the bones (Roberts and Manchester 2005:207-209). Pinta will therefore no longer be discussed due to the lack of evidence seen pathologically and Yaws will no longer be discussed further since it is located geographically in tropical area (Roberts and Manchester 2005:209). There are different stages to the spread of the disease. The first stage is categorized by mild lesions, the second by changes in skin and soft-tissue, and the third by an increased severity of lesions that causes destruction of bones followed by regeneration (Roberts and Manchester 2005:208).

Manifestations of epidemic syphilis come in the form of saber shin on the tibia which is the thickening of the walls of the bone and may look bent (Henneberg and Henneberg 1998:531; Roberts and Manchester 2005:211). Another sign is malformation of the enamel in the form of pitting on the occlusal surface of teeth (Henneberg and Henneberg 1998:531; Roberts and Manchester 2005:211). Manifestations of venereal syphilis are slightly different in that the skull
is affected through *caries sicca* in which the skull develops an appearance of having been eaten by worms and sclerotic thickening of the skull (Henneberg and Henneberg 1998:530; Roberts and Manchester 2005:210). The worm eaten pattern can be seen in the top two skulls of Figure 6 and sclerotic thickening is a cross section of a skull on the bottom. Another indicator is Charcot joint that affects the joints of people most commonly in the knees where sensation is lost affecting gait (Roberts and Manchester 2005:210).

Figure 6  Skulls showing *caries sicca* and sclerotic thickening (Henneberg and Henneberg 1998:Figure 11.14 and 11.15).
Thickening of the cranial vault through advanced stage treponemal disease have been found on 18 skulls which is different from porotic hyperostosis due to the lack of empty spaces in the bone giving an appearance of almost solid bone (Henneberg and Henneberg 1998:530). The cause of the thickened vaults is thought to be from sclerotic healing of gummatous lesions caused by the third stage of treponemal disease (Henneberg and Henneberg 1998:530). Possible evidence for gummatous ulcers were found on three out of the 18 skulls which showed a worm eaten like appearance, but due to the poor preservation of the skulls it was difficult to determine for certain (Henneberg and Henneberg 1998:530). In addition to individuals that did display lesions on bones, 25% displayed more than one (Henneberg and Henneberg 1998:531). Other indicators include two juveniles with occlusal pitting one of which also showed evidence for enamel hypoplasia and saber shin. Two children showed signs of physeal osteochondritis which can affect the humerus and femur through excess bone deposition on distal ends of the long bones (Henneberg and Henneberg 1998:531). Two individuals had characteristics of saber shin which manifests itself through thickened walls making it appear bent which would be a manifestation of endemic syphilis (Henneberg and Henneberg 1998 532; Roberts and Manchester 2005:209).

Periosteal bone deposition is the excess growth of bone on bones due to systemic infections such as treponematoses or non-infectious diseases such as trauma or cancer (Henneberg et al. 1992:455-456; Henneberg and Henneberg 1998:529-530). Other diseases such as tuberculosis, fungal infections called mycoses, and leprosy have been ruled out due to lack of other pathological changes on the bones (Henneberg et al. 1992:456). Henneberg and Henneberg 1998:529-530). Bones showing periostitis can include the tibia, fibula, humerus, radius, ulna, and skull (Henneberg et al. 1992:455-456; Henneberg and Henneberg 1998:530).
Table 3 shows percentages of long bones affected by periostitis. Percentage wise the table shows that just over 10% of the population were affected in their tibia femur, radius, and ulna which when compared to the percentage of people affected by linear hypoplasia is not that great.

Table 3  
(Adapted from Henneberg and Henneberg 1998:Table 11.18).

<table>
<thead>
<tr>
<th>Bones</th>
<th>Total</th>
<th>No. Affected</th>
<th>% Affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tibiae</td>
<td>132</td>
<td>15</td>
<td>11.4</td>
</tr>
<tr>
<td>Femora</td>
<td>48</td>
<td>6</td>
<td>12.5</td>
</tr>
<tr>
<td>radii and ulnae</td>
<td>48</td>
<td>5</td>
<td>10.4</td>
</tr>
<tr>
<td>Fibulae</td>
<td>81</td>
<td>4</td>
<td>4.9</td>
</tr>
<tr>
<td>Humeri</td>
<td>45</td>
<td>2</td>
<td>4.4</td>
</tr>
</tbody>
</table>

The amount of individuals that were affected by different manifestations of treponematosis was great when compared to looking just at periostitis (Table 4). The term unknown in the table refers to individuals that had either long bones or skull for examination so analysis could not be done on the full skeleton (Henneberg and Henneberg 1998:531). Table 4 gives a suggestion to the number of individuals that were possibly affected by treponematosis through analysis of multiple traits of the disease. There were quite a few people that showed multiple signs on different parts of the body to help further support evidence for Metaponto having been affected by treponematosis.

Tooth formation can be affected with people that have congenital syphilis as was mentioned before with pitting on the occlusal surface of teeth. Since congenital syphilis is transferred from mother to child it means that another indicator found in the tooth enamel could be linear hypoplasia (Henneberg and Henneberg 1998:532). Of the number of people that had signs that could have been attributable to syphilis with teeth that were preserved 94% had signs
of linear hypoplasia (Henneberg and Henneberg 1998:532). In addition 47 individuals out of 272 were affected by at least one lesion and 15 individuals showed multiple lesions (Henneberg and Henneberg 1998:532). This means that anywhere from 5.5-17.3% of the population showed signs of congenital syphilis and the number could be higher (Henneberg and Henneberg 1998:532). Before signs of syphilis are shown pathologically two to ten years can pass (Roberts and Manchester 2005:210) and people that are in the third stage of treponematosis that show pathological signs are only 10-30% of the population (Henneberg and Henneberg 1998:532). These numbers show just how difficult it can be to find congenital syphilis in a population due to the chances of the disease being shown pathologically.

Table 4  Signs of treponematosis on long bones and skull vault (Adapted from Henneberg and Henneberg 1998:Table 11.19).

<table>
<thead>
<tr>
<th>Signs on long bones:</th>
<th>Signs on the skull vault:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>thick</td>
</tr>
<tr>
<td>certainly bilateral</td>
<td>1</td>
</tr>
<tr>
<td>saber-shin</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
</tr>
<tr>
<td>Unknown</td>
<td>11</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>18</strong></td>
</tr>
</tbody>
</table>

*Other means subperiosteal bone deposits or localized scars. One button osteoma on a skull vault is also included.

Maciej and Renata Henneberg (1998:532) have concluded that the population of Metaponto was affected by congenital syphilis. People that are affected by congenital syphilis do not always show pathological signs. Being able to identify and determine how endemic the disease was to the population can be difficult made even more so about whether or not syphilis is pre-Columbian or not. Evidence on the bones however does indicate congenital syphilis so it
will be analyzed for a possible cause of stasis within the population. Another argument present is whether or not endemic syphilis, pinta, venereal syphilis, and yaws are of the same species of bacteria just different manifestations based on geological location or different species all together (Henneberg and Henneberg 1998:532-533; Roberts and Manchester 2005:206-207).

Anemia has been found to be present in the area of Metaponto and in particular thalassemia an indicator of malaria (Carter 2011a: 618-619; Henneberg and Henneberg 1998:527-528; Henneberg et. al 1992:455). Anemia is a disease that causes an iron deficiency where red blood cells have a shorter life span than the normal 120 day life cycle (Roberts and Manchester 2005:226). Iron is needed to form new red blood cells that bind to oxygen and carry it from the lungs to the rest of the body (Henneberg 1998:527; Roberts and Manchester 2005:226). Excess iron in the body is used up and the body requires more to help carry oxygen, nerve impulses, and the immune system (Roberts and Manchester 2005:226). Non-genetic anemia is usually caused by poor nutrition (Henneberg and Henneberg 1998:528).

In response to this the body tries to produce more red blood cells through excess growth on bones (Henneberg and Henneberg 1998:527). The most common place for excess bone growth is on thin bones such as the skull (Henneberg and Henneberg 1998:527). When the thickening is present on the vault of the skull it is called porotic hyperostosis and in the area it can appear porous (Henneberg and Henneberg 1998:527; Roberts and Manchester 2005:229). Figure 7 shows a skull from Metaponto that was affected by porotic hyperostosis. Another area of the skull that shows signs of anemia is the eye orbit and is referred to as cribia orbitalia (Henneberg and Henneberg 1998:527; Roberts and Manchester 2005:229).
People that are resistant to malaria also may suffer from anemia that is transferred genetically to offspring in the form of the disease thalassemia or sickle cell anemia (Henneberg and Henneberg 1998:527; Henneberg et. al.1992:455; Roberts and Manchester 2005:232-234). Thalassemia and sickle cell anemia can be devastating to people that are affected by the disease, but they are then immune to malaria due to the short lifespan of red blood cells (Roberts and Manchester 2005:234). In areas affected by these diseases mortality is high among infants and children (Roberts and Manchester 2005:233). Malaria has affected areas such as southern Italy in both contemporary and recent times which researchers believe the area was affected by malaria (Henneberg and Henneberg 1998:527; Henneberg et. al.1992:455). It also appears that
Metaponto was affected by the anemia known as thalassemia which can be seen through porotic hyperostosis (Henneberg and Henneberg 1998:527). Climatic conditions would have been perfect for the anopheles mosquito to thrive with an increased water table and warm conditions where the average temperature was around 63°F (Folk 2011:17). The incidence of anemia increases in a population overtime in an area affected by malaria due the trait being promoted through immunity to malaria.

Environment

Changes in the environment could have had a profound impact on the colony of Metaponto. Sándor Bӧkӧnyi suggests through the analysis of zoological evidence that Metaponto was more heavily forested in the past than today (Bӧkӧnyi 2010: 32). The Metaponto assemblage contained a higher amount of wild animals than what is seen with similar agricultural cities (Bӧkӧnyi 2010:6). In Europe between 850-350 B.C. there was a fluctuation of the amount of rainfall (Folk 2011:16). This fluctuation can be specifically seen in the years between 550-500 B.C. where an increase in rainfall which led to an increase in the water table along with a cooler climate was present (Carter 2011b:727). A drainage system was put in place around the mid fifth century to help drain the fields and allow for farming (Carter 2011b:727). The increased water table caused a shift in residence patterns away from lowlands due to some areas being swampy during the initial rise in the water table (Carter 2011b:727). The increased water table would have produced a prime condition for the breeding of mosquitoes. An increase in the amount of anopheles mosquitoes would have also brought up the potential for people to get malaria; and a related increase in thalassemia which causes severe anemia (see discussion above). Demography shows that during stasis there is in fact an increase in population in the lowlands near the urban center of Metaponto (Carter 2011b: 793).
A shift in demography due to economic needs can be seen between 600-550 B.C. (Carter 2011b:703-704). There was a shift from river valleys to marine terraces due to a greater demand for barley that grows easier in the marine terraces (Carter 2011b:703-704). Between the years 450-400 B.C. there is a migration out of what is known as the Central Plateau and more specifically the area known as Lago del Lupo that can be seen circled in Figure 8 (Carter 2011b:793,809). Despite the fertility of the land for farming barley there is a decrease in farmhouses where one might expect to find an increase (Carter 2011b:793,796). Joseph Carter (2011b:828) has suggested that the reason for what appears to be almost an abandonment of the central plateau was due to tensions within the colony and the redistribution of the land. During this time period there is only a 3% increase in the number of farmhouses in the region showing stagnant growth (Carter 2011b:809). Areas of growth are nearer to the urban center of Metaponto with areas around Lago del Lupo remaining stagnant. By the time of 350 B.C. population levels in the Central Plateau reached what they were in 450 B.C. prior to the migration out of the region (Carter 2011b:809). The changes in demography during this period could be a sign for political unrest within the colony itself causing the migration of people out of the area.

Analysis has been done by Lorenzo Constantini (1983) to analyze remains at the sacred spring within the Pantanello area. The area was very swampy which while making work difficult also allowed an anaerobic environment meaning an environment without oxygen allowing the preservation of organic materials (Carter 1983c:23). A pump was used to drain the area of water to make excavation possible (Carter 1983c:23-32). Data was recovered from three levels from the mid-fourth to the early third century B.C. (Constantini 1983:35-37). The first level dated to the mid-fourth century B.C., the second level dating to the early third century B.C. contained
compact floral seeds suggesting that at this time the spring became swampy, and the last level also dating to early third century B.C. was a layer of loose dirt containing carbonized floral material (Constantini 1983:35-37). Unfortunately the data does not cover floral data from before the mid-fourth century B.C. in order analyzed a wider change over time, but the data still presents useful information to see how different plants were utilized. Other data must be discerned from changes in settlement patterns and which crops were best farmed where.

Figure 8 Region of Lago del Lupo (Adapted from Prieto 2011:Figure 3.6).
Table 5 shows the different levels and abundance of a certain type of plant present. According to Table 5 during the mid-fourth century B.C. there is less of an abundance of cereals than in the early third century B.C. There is a higher instance of fruits being present indicating that there were probably a higher percentage of fruits being grown than cereals at least in the area of the spring sanctuary in the Pantanello region. In the mid-fourth century B.C. there appears to be a lack of legumes which appear more in the early third century B.C. level. Legumes would have been important for nitrogen fixation to help other plants grow (Carter 2011a:625). The lack of legumes could indicate that the people of Metaponto in the Pantanello area were not concerned about planting multiple crops to keep the soil fertile.

Analysis of the demography as mentioned before shows an almost abandonment of the region known as Lago del Lupo where the farming of Barley would have been the best suited for the land. There is also an increase in the area near the urban center of Metaponto where the land would have been in the lowlands which would have been better suited for wheat. If this is taken into account it would appear that during the time of stasis the farming of wheat would have become increasingly important. Why exactly such good farmland in Lago del Lupo is almost abandoned will be analyzed further in the next section.

Increased agriculture since the colonization of Metaponto would have had an effect on the landscape. Trees and grasses that would have normally protected the soil from eroding would be diminished during colonization (Carter 2011a:572). Plowing of large areas of land plus deforestation would have led to the opening up of the top soil causing erosion (Carter 2011a:572). Erosion would have led to decreased productivity of crops and with a growing population and pressures from other colonies there would have been an increased agitation for more or other areas for farmland.
Table 5 Pizzica-Pantanello Distribution of Seeds (Adapted from Constantini 1983:38).

<table>
<thead>
<tr>
<th></th>
<th>Level I Base level (mid-4th century B.C.)</th>
<th>Level II Compacted organic material (early 3rd century B.C.)</th>
<th>Level III Carbonized organic material (early 3rd century B.C.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x-present \ xx-numerous \ xxx-abundant</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cereals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Triticum dicoccum/emmer</td>
<td>x</td>
<td>xx</td>
<td></td>
</tr>
<tr>
<td>Tricitum compactum/wheat</td>
<td>x</td>
<td>x</td>
<td>xxx</td>
</tr>
<tr>
<td>Hordeum vulgare/barley</td>
<td>x</td>
<td>x</td>
<td>xxx</td>
</tr>
<tr>
<td><strong>Legumes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cicer arietinum/chick pea</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Lens culinaris/lentil</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Pisum sativum/field pea</td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Vicia faba/broad bean</td>
<td></td>
<td>x</td>
<td>xx</td>
</tr>
<tr>
<td>Vicia ervilia/bitter vetch</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td><strong>Forage Crops</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicago [sp]/alfalfa</td>
<td></td>
<td>xx</td>
<td>x</td>
</tr>
<tr>
<td>Avena sativa/oats</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Lolium temulentum/ rye grass</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td><strong>Wild and Spontaneous Plants</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carex [sp]/sedge family</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Euphorbia elioscopica/spurge</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Galium [sp]/bedstraw</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Lathyrus [sp]/vetchling</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Polygonum [sp]/knotweed</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Ranunculus [sp]/buttercup family</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Rubus [sp]/blackberry</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Sonchus [sp]/sow thistle</td>
<td>xxx</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Cerotaphyllium demersum/ coontail</td>
<td>x</td>
<td></td>
<td>xxx</td>
</tr>
<tr>
<td>Zannichellia [sp]/horned pond weed</td>
<td>x</td>
<td></td>
<td>xxx</td>
</tr>
<tr>
<td><strong>Fruits</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ficus Carica/fig</td>
<td>xxx</td>
<td>xx</td>
<td>x</td>
</tr>
<tr>
<td>Olea europaea/olive</td>
<td>xxx</td>
<td>xx</td>
<td>x</td>
</tr>
<tr>
<td>Vitis vinifera/grape</td>
<td>xxx</td>
<td>xx</td>
<td>x</td>
</tr>
</tbody>
</table>
Warfare and Political Unrest

Strabo as mentioned earlier recounted the founding of Metaponto that resulted in warfare among the Greek settlers and the indigenous population (Strabo:6.1.15). The Greeks when founding Metaponto displaced the indigenous population who fought very hard to keep their fertile agricultural land (Carter 2011a:622; Carter 2011b:663). Possible evidence from this is from the sites of Incoronata and Andrisani which both show sudden abandonment around 630 B.C. a couple of decades after the founding of Metaponto (Carter 2011a:622). What is interesting about this early period is the lack of fortifications around the urban area of Metaponto (Carter 2011:663). This meant that the people of Metaponto did not perceive the indigenous population as a threat after gaining a foothold on the land.

After 450 B.C. Metaponto began to feel pressure from the colony of Taras (Carter 2011b:785). As mentioned earlier the founding of Metaponto had to do with the Greek colony of Sybaris wanting to stop the expansion of Taras so that is why Metaponto was founded where it was (Strabo:6.1.15). The Sybarites must have been rivals with the people of Taras to not want them to gain the rich farmlands of Metaponto and stop their expansion and in the process the Sybarites would have gained an alliance. In 432 B.C. the colony of Herakleia was founded with help from Taras (Carter 2011b:785). The colony of Herakleia was slightly to the south of Metaponto. The colony of Taras to the north and Herakleia to the south would have cut off the colony of Metaponto from expansion especially after Metaponto had such a huge period of growth causing increased tensions.

In the urban area of Metaponto growth stood still between 450-350 B.C. and the only building projects was a drainage system project and fortifications around the city (Carter 2011b:798). Within the city there is also the apparent reuse of stone that indicates that the urban
population had been experiencing difficult times (Carter 2011b:804). The drainage system project was to help drain the urban area from the rise in the water table in the previous century would have caused flooding due to the urban centers location in the lowlands (Carter 2011b:798). The problem of flooding in the urban area would have caused an increase in the amount of disease present due to unsanitary conditions along with perfect conditions for the anopheles mosquito.

Fortifications were built around the urban area during this time with the fortifications on the north and south sides being built very quickly and the east and west sides much more slowly (Carter 2011b:799-780). People were beginning to feel the threat of the colonies of Herakleia and Taras with how quickly the north and south fortifications were built (Carter 2011b:799-780). The fortifications were finished by 400 B.C. (Carter 2011b:799). As mentioned earlier that around 400 B.C. there is an increase in the population near the urban center and with fortifications built around the city there would have been the opportunity of the people in case of an attack to flee into the fortified city. The people of Metaponto had to feel some sort of threat to build the fortification which could possibly explain the increase in population near the city center. Figure 9 shows a portion of the north wall fortification in the urban area in reference to part of the site. The north wall protects many temples in the urban area of Meatponto.

The second Sicilian expedition was noted by the Greek historian in his account of the year 413 B.C. in book seven (Thucydides:476-540). Thucydides (7.33.5) makes mention of the colony of Metaponto during this time providing some valuable clues about what was occurring at the time.

“Here they persuaded their allies the Metapontines, to send with them three hundred darters and two galleys, and with this reinforcement coasted on to Thurii, where they found the party hostile to Athens recently expelled by a revolution…” (Thucydides:7.33.5).
What Thucydides meant by the people of Metaponto having been “persuaded” in order to provide the Athenians with assistance for battle is that Metaponto had become isolated by being surrounded by Taras and Herakleia and by supporting the Athenians the Athenians in return would help support Metaponto (Carter 2011b:805). Thourioi, an ally of Metaponto, also gave its support to Athens (Carter 2011b:805). The acceptance of helping Athens was in part due to pro-Athenian parties that also earlier helped neutralize the threat of encroaching Herakleia (Carter 2011b:805). Thucydides does mention another reason as to why the people of Metaponto helped the Athenians out by saying “Of the Italiots, there were the Thurians and Metapontines, dragged into the quarrel by the stern necessities of a time of revolution” (Thucydides:7.57.11).

Tensions were heightened in Metaponto when Poseidonia fell to the Lucanians around 400 B.C. through a takeover of the city where the Lucanians were able to gather knowledge about the working of the Greek colonies before moving on to takeover other cities (Carter 2011b:806). There does appear to be however a slow integration through grave good examination beginning around 500 B.C. until the decline of Metaponto (Carter 2011b:806). The Greek colonies formed an Italiote League uniting the colonies against the common enemy of the Lucanians whose presence was increasingly felt (Carter 2011b:807). A new enemy soon arose causing increased cause for concern was Dionysios I of Sicily who began conquering territory to expand his empire into southern Italy (Carter 2011b:807). As can be seen from this illustration of the social and political relations of Metaponto to other groups of people changed between the founding of Herakleia to around 350 B.C. causing considerable tension within the colony. Previously around 450 B.C. it appears as if there is considerable tension within the colony as Thucydides and archaeological data eludes (Carter 2011b:828; Thucydides 7.33.5,7.57.11).
Figure 9  Image of north defensive wall in the urban area of Metaponto (Carter 2011b:Figure 24.9).
DISCUSSION AND CONCLUSIONS

The people of Metaponto were in a period of stasis starting around 425 B.C. and ending about 375 B.C. as can be ascertained from both archaeological and historical data. As mentioned previously there were different theories as to what resulted in the stasis being 1) epidemic disease, 2) environmental degradation, 3) political unrest, and 4) a combination of factors. Data was first analyzed by first creating a profile of the population overall from which it was deduced that besides the female to male ration the population of Metaponto was similar to other simultaneous cultures in surrounding areas. There was during the period an increase not only in burials, but necropoleis as well. During this time period demographic stasis was shown through analysis primarily of the urban center where there was a lack of building projects, buildings fell into disrepair, and there is evidence of the reuse of stone indicating that there was not enough money to be harvesting more stone.

The primary cause I believe for the demographic stasis was due to political stressors. The colony of Metaponto became surrounded by both Tara and Herakleia around 430 B.C. which would have prevented further expansion to the north and south for a growing population. This issue was exacerbated by internal unrest within the colony that in 500 B.C. rose up against the rich to demand better distribution of land. There was the debate about which land plots belonged to who whether it is the colonizers that initially founded Metaponto or newcomers from Greece. There would have fighting over the best farmlands in the area known as Lago del Lupo located in the central plateau a perfect place for the farming of barley. Between the years 425-375 B.C. the migration out of Lago del Lupo which has been interpreted as the land being redistributed (Carter 2011b:727,740).
In addition Thucydides in his recount of the year 413 B.C. and the Sicilian expedition lead by the Athenians mentions the conflict within the colony of Metaponto (Thucydides:7.33.5, 7.57.11). The threat of Taras and Herakleia would have ended when in a united effort through the formation of the Italiote league tried to prevent the invasion of the Lucanians and eventually Dionysus I of Sicily into Southern Italy which would have also put stress and anxiety onto the colony of Metaponto.

Fortifications were built towards the end of the fifth century B.C. and finished by 400 B.C. indicating that Metaponto was feeling threatened. Metaponto lacked fortifications when originally conquering the indigenous population meaning that they were not afraid of them trying to gain back their land. This means that Metaponto wanted protection from an enemy greater than those from whom they originally took such fertile farmland away from. There is also an increase in population during this time closer to the urban center from which the people would have felt safer being nearer to a fortified city rather than farther away.

The tensions caused by the colonies of Tara and Herakleia, the Lucanians, and Dionysus I could have caused considerable conflict within the colony about what is the best action to take against the enemy as each enemy changed. During this time there is evidence through the redistribution of land, change in burial types, and increase in necropoleis indicating a more sedentary life style that changes were taking place in the colony.

Another problem that would have increased stress in the colony would have been disease. The population was affected by congenital syphilis where between according to bone pathologies anywhere from 5.5-17.3% of the population was affected and those were the only people that showed pathologies meaning that the percentage was most likely much higher (Henneberg and Henneberg 1998:532). As mention previously only between 10-30% of the people affected by
treponematosis show pathological changes of the disease and also that it was transferred congenitally means that young children could have had the disease during the formation of permanent teeth in the form of linear hypoplasia (Henneberg and Henneberg 1998:532). It was also noted that 94% of the people that showed signs for treponematosis also had linear hypoplasia. The population of Metaponto was most likely afflicted by treponematosis during its entire occupation, but during times of stress would have been increasingly difficult to deal with.

A more likely disease to have an effect on the population particularly during the time of stasis would have been malaria, as evidenced indirectly by heightened levels of anemia in the burial populations. During the time of stasis the water table would still have been high increasing the amount of anopheles mosquito carrying the disease and the possibility of becoming infected. Malaria would have also promoted the anemia known as thalassemia which can be seen through porotic hyperostosis since people that have thalassemia will not be affected by malaria. This would have increased the chances of someone carrying thalassemia to live on to the next generation as opposed to someone without the disease. The urban population during the time of stasis had among its only building projects the building of a drainage system meaning that the urban center was having difficulties with flooding. In a crowded center with flooding and stress there would have been an increase not only of malaria, but other diseases as well.

In order to better examine the cause for stasis four theses were drawn up including 1) epidemic disease, 2) environmental degradation, 3) political unrest, and 4) a combination of factors. In conclusion the thesis that best fits the cause for stasis is a combination of factors including epidemic disease, environmental pressures, and political unrest. The colony was affected by political unrest in the form of encroaching colonies such as Tara and Herakleia and invading peoples such as the Lucanians and Dionysus I of Sicily. This considerable amount of
strain was even mentioned by Thucydides (7.33.5, 7.57.11). Environmental degradation was probably not a problem in Metaponto at the time, but more importantly the division of land and who had rights to the best farmland whether it be Greek colonists already living on the land or newcomers from Greece. There would have been increased tension about land with the other colonies of Herakelia and Taras so nearby. Epidemic disease would have been an increasing problem with increased stress. Malaria and venereal syphilis would have affected the population and been more pronounced in the urban center due to crowding and wet conditions as evidenced from the construction of a drainage system.
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