Interpretation of Haplogroup H in an Enslaved Individual

by

Miranda Hahn

A thesis presented to the Honors College of Middle Tennessee State University in partial fulfillment of the requirements for graduation from the University Honors College
Spring 2018

Interpretation of Haplogroup H in an Enslaved Individual

Miranda Hahn

APPROVED:

_____
Dr. Shannon Hodge
Department of Anthropology

_____
Dr. Brandon Wallace
Department of Sociology and Anthropology

_____
Dr. Andrew Wyatt
Department of Anthropology

_____
Dr. Philip Phillips
University Honors College Associate Dean

Abstract

In the summer of 2014 excavations took place to recover the remains of twenty individuals from an unmarked cemetery at the Nashville Zoo. After recovery these remains were then examined by Dr. Shannon Hodge who created a biological profile of each individual buried in the cemetery. The twenty individuals in the unmarked graves were likely enslaved African Americans, evidenced by their skeletal ancestry, the antebellum date of their burial, and their presence on a property known to have been a slaveholding. DNA analysis revealed that one individual from this cemetery, Burial Three, belonged to haplogroup H, which is common among those of European ancestry. Though this haplogroup is associated with Europeans, it is also found in northeastern Africa. It is likely that this individual's maternal ancestry was not European, but rather that her ancestors were likely from northeastern Africa or Madagascar.

Table of Contents

List of Figures

List of Tables

I. INTRODUCTION

I was born and raised in the middle Tennessee area and I grew up going to the Nashville Zoo. I have attended many events throughout my life at the plantation house at the zoo, including Easter egg hunts and trick or treating, but I have never given much thought to the history of the Zoo. This thesis explores the antebellum history of the zoo at Grassmere, and specifically explores the history of those who tend to be overlooked in history, enslaved individuals. History tends to be written by white males which introduces many biases. The main goal of this thesis is to shed light on a population who was forgotten or overlooked for so long. This project not only sheds light on the origin of the enslaved African Americans in the cemetery at the zoo, but it also changed my entire perspective on a place that I have been a visitor of since I was a toddler.

In 2013 the Nashville Zoo, sited on the property of an antebellum plantation, planned to undergo renovations to expand its ticket booth to accommodate guests of the zoo due to its growing popularity. In 2014 they began to work on this expansion. During this expansion, an unmarked cemetery previously discovered in 1989 containing twenty individuals was removed by a cultural resource management firm, TRC, Inc., and the subsequent examination of the remains in the lab was directed by Dr. Shannon Hodge. For those individuals whose biological profile could be established, their ancestry is consistent with African descent. This, in conjunction with the antebellum date of the burials, is evidence that the individuals buried in the cemetery were enslaved. Historical records of the plantation owner at the time record that he brought enslaved individuals to

Tennessee from Virginia, though he did not purchase any more enslaved individuals upon arrival in Tennessee.

The remains were examined by Dr. Hodge and stable isotope work was completed by Dr. Tiffiny Tung (Department of Anthropology, Vanderbilt University), who discovered that the individuals were not originally from the Tennessee area which corresponds with historical records. DNA analysis was conducted on a small sample of suitable remains. Results of these analyses indicate that Burial Ten's maternal ancestry is of African descent, haplogroup L, while Burial Three's haplogroup H is geographically associated with a European maternal ancestry.

This research explores the two DNA haplogroups associated with the Grassmere populations and specifically aims to discover why someone from an enslaved population exhibits an ancestry marker that is associated with European populations. I not only explore the haplogroups and their geographical locations as a way to look at Burial Three's life history, but I use historical information as well as the stable isotope data to explore the ancestral origins of Burial Three in order to look at why haplogroup H is present in an individual buried in a grave associated with an enslaved population. This research will help identify this anomaly and explores the history of enslaved populations which tend to be overlooked.

II. METHODS

I used literature pertaining to ancient DNA and the techniques used in analyses, haplogroups in general and their role in genetics, and haplogroup H specifically. I also

researched historical information about the enslaved population at Grassmere. I also researched the history of ancient DNA and enslaved populations to find out if there is evidence of a commonality in the haplogroups among the enslaved of the New World. After researching the haplogroup and history of Grassmere, I used the resulting information to interpret the DNA results of the woman in Burial Three with haplogroup H. I then formulated a hypothesis as to why one individual from a known cemetery containing enslaved individuals presents a haplogroup that is not typical of Sub-Saharan West Africa and how the genetic ancestry of the woman in Burial Three is relevant to slavery in the New World.

III. HISTORY AND ARCHAEOLOGY AT GRASSMERE

During the 1800s middle Tennessee was home to various plantations and farms. Though middle Tennessee's land was fertile, the climate was not conducive for large plantations like in other parts of Tennessee, but there were farms around middle Tennessee whose food products were exported to larger plantations in the lower south (Sproul 2017:19). Unlike larger plantations, there were typically five to 20 enslaved persons per farm in Middle Tennessee. The main crops were wheat, oats, rye, tobacco, cotton, and timothy, and their livestock included cattle, hogs, horses, donkeys, and mules (Sproul 2017:19). Because of the smaller size of the farms and therefore the higher frequency of farms, middle Tennessee had the largest number of slaveholders in the state (Sproul 2017:19).

In 1810 Michael and Elizabeth Dunn used enslaved laborers to build their now historic home, Grassmere, in Middle Tennessee on property that is now home to the Nashville Zoo. Michael Dunn, originally from Virginia, became sheriff of Davidson County from 1808 until 1817. Though there are plenty of records pertaining to Michael and Elizabeth Dunn, there is very little information regarding their purchase or acquisition of enslaved individuals, and there are no records from the enslaved themselves, which is typical of the antebellum period (Sproul 2017:6). From 1812 to 1865 there were anywhere from nine to 33 enslaved at Grassmere who maintained the farm, livestock, and household (Sproul 2017:30). Typical of farms in middle Tennessee, there were multiple crops grown and livestock maintained at Grassmere (Sproul 2017:30).

Though there are no letters or diaries recovered from the Dunns, historical records such as deeds and court records are used to interpret the history of this site. From court records it is known that Michael Dunn brought his enslaved persons with him to Nashville when he moved from Virginia, and it seems that once in Nashville he ceased to purchase more enslaved, except on one occasion in 1809 (Sproul 2017:77). There are records of Dunn splitting up enslaved families and using enslaved individuals as commodities to be bartered with. As sheriff, he was also tasked with auctioning enslaved persons as property, much how modern day foreclosures take place, only instead of houses they were auctioning human beings, which speaks to his attitude towards slavery: slaves were property and were to be handled as such. In his will, Michael Dunn left a detailed record of which of his family members were to receive enslaved individuals as

their inheritance further supporting that he thought of these people as commodities and not as human beings (Sproul 2017:78).

In 1989, over a century after Michael and Elizabeth Dunn resided at Grassmere, and unmarked cemetery of enslaved individuals was discovered (Sproul 2017:4). Though zoo construction began in 1997, this cemetery was not disturbed until 2014, when the remains were uncovered, analyzed, and reburied in a new cemetery location. In 2013 the Nashville Zoo's popularity was growing, which called for expansion. Rick Schwartz, the zoo president, obtained permission from the proper authorities to expand the ticket booth, meaning the remains in the cemetery needed to be recovered and relocated, respectfully, and placed closer to the house (Sproul 2017:4).

The intent of exhumation and reburial was made public knowledge four weeks before excavations would begin to allow the descendant community to contact the zoo if their ancestors were buried there; however, nobody came forward (Sproul 2017:4). Since there was no contact from the descendant community, excavations began in early 2014 by a cultural resource management firm, Travelers Research Corporation (TRC), who had experience with excavating cemeteries. The firm was charged with respectfully exhuming, documenting, and reinterring the individuals in the cemetery. Precautions were taken by the zoo staff to ensure that visitors could not view the remains or the work of the archaeologists. Zoo employees were permitted to view the efforts of the archaeologists on a specific day at a certain time (Sproul 2017:73).

In all, twenty individuals were recovered from the once-unmarked cemetery including nine adults and ten children or infants; and one set of fetal remains was found

after excavation, during examination in the lab (Sproul 2017:70). Artifacts found with the remains include pins, buttons, and beads, and 17 individuals were buried in hexagonal coffins, which is uncommon in enslaved populations. These individuals were likely buried between 1820 and 1850, as evidenced by grave goods including clothes and the remnants of the coffins they were buried in (Sproul 2017:73). Upon exhumation, Dr. Shannon Hodge volunteered her time to create a biological profile, including age, sex, and ancestry, as well as documenting any skeletal or dental pathologies. Upon request, the DNA analysis of the individuals was completed with funds provided by the Nashville Metropolitan Historical Commission, the nonprofit group Historic Nashville, and the Nashville Zoo (Sproul 2017:74). Though all of the remains were recovered, many were severely decomposed due to the acidity of the soil, so Dr. Hodge examined nine sets of remains from the twenty discovered.

Of the adult remains, five were estimated to be male, while the other four were estimated to be female, seven of which were under the age of forty; however none of the nine individuals survived past the age of fifty (Sproul 2017:73). Dr. Hodge found that the enslaved individuals were fairly healthy and there was no evidence of malnutrition or developmental delays, though some remains did have healed injuries that were attributed to accidents. One set of remains aged 17 to 21 exhibited signs of sickle cell disease, common to Africans or African Americans as an adaptation to combat malaria. Evidence of arthritis of the spine or knees was present in six individuals indicating that the individuals were doing physically laborious activities (Sproul 2017:74). Though there is evidence of physical labor, the remains do not exhibit evidence of extremely strenuous physical labor that would have been damaging. This indicates that while labor was being

done, the labor was not too much for the body, as is in some cases where enslaved individuals were tasked regularly with activities that their body physically would not withstand, resulting in repetitive fractures or muscle tears (Sproul 2017:74).

Dr. Tiffiny Tung of Vanderbilt University completed stable isotope analyses of the remains to determine where the individuals lived during childhood. Her analyses indicate that five individuals were not originally from Grassmere, or Tennessee in general, and they were likely from West Africa, Virginia, or Mississippi, and three individuals were from the area, but did not live in the area before their burial at Grassmere (Sproul 2017:75). Dr. Hodge's biological profile indicates that the individuals uncovered from the unmarked graves at the Grassmere cemetery were of African ancestry. The DNA results however indicate that one individual's maternal ancestry does not appear to be from areas traditionally associated with the slave trade and are most prevalent in European populations (Fratpietro 2014).

IV. ANCIENT DNA

Ancient DNA is a field of molecular evolutionary biology where DNA is taken from poorly preserved specimens and analyzed to obtain genetic information regarding the specimen (Shapiro 2013:475). Nuclear DNA, the DNA most commonly thought of due to its applications in forensic and medical settings, is not used for the analysis of ancient DNA. Mitochondrial DNA is used in ancient DNA analyses because this type of DNA traces matrilineal kinship through many generations (Nesheva 2014:5). Notably, this type of analysis is how researchers discovered Mitochondrial Eve, humanity's

earliest maternal ancestor from around two hundred thousand years ago in Sub-Saharan Africa (Nesheva 2014:6).

Though some believe ancient DNA techniques have been used for a long time, the concept of ancient DNA and its applicability to multiple fields outside of biology has developed in the past three decades. The 1980s yielded great breakthroughs in the field of ancient DNA, including the discovery that amplifiable DNA sequences have the potential be recovered from preserved tissues (Shapiro 2013:475). Though these tissues contained very little DNA postmortem, it was also discovered that very few changes occur to the DNA over ample amounts of time postmortem (Shapiro 2013:475). In 1985 these newfound methods of ancient DNA analyses were used to extract DNA from a 2400 year old Egyptian mummy (Shapiro 2013:476). Ancient DNA, a method of extracting and manipulating data from old or decaying samples, had an even bigger breakthrough with the application of the polymerase chain reaction, more commonly known as PCR (Shapiro 2013:476).

Ancient DNA is used, with a high level of precision, to identify genealogy including genetic structure, origins, changes, and migration. These types of analyses also allow for a comparison of the living with their ancestors (Nesheva 2014:7). Mitochondrial DNA is used because the variation that occurs is due to high mutation rates versus the convergence of two parent chromosomes causing variation, such as with nuclear DNA (Nesheva 2014:5). The mutations in mitochondrial DNA are grouped together to form haplotypes, which themselves form haplogroups (Nesheva 2014:6). Haplogroups tend to be geographically restricted and are used to distinguish populations

from each other geographically (Nesheva 2014:6). For example, the first genome sequenced was that of haplogroup H, which is indicative of European ancestry (Nesheva 2014:5).

One of the first cases of ancient DNA analysis was completed by cloning the DNA on a quagga, an extinct animal related to the horse (Shapiro 2013:476). Though excited about the discovery, it was also discovered that very little DNA existed post mortem, and what does is likely degraded to come extent. The 1980s yielded great breakthroughs in the field of ancient DNA, including the discovery that amplifiable DNA sequences could be recovered from preserved tissues (Shapiro 2013:475). Though these tissues contained very little DNA, it was also discovered that very few changes occur to the DNA over ample amounts of time postmortem (Shapiro 2013:475). In 1985 these newfound methods of ancient DNA analyses were used to extract DNA from a 2400 year old Egyptian mummy (Shapiro 2013:476).

Though ancient DNA is an extremely useful tool across multiple fields, it is not without its problems. Because DNA has the tendency to be degraded, scarce, and/or fragmented, contamination is a threat to analyses (Slatkin and Racimo 2016:6381). Exogenesis, or any introduction of external DNA, originates from many different places, and contamination potentially occurs from anywhere including the microbes in the environment, excavators, curators, or researchers in the lab (Slatkin and Racimo 2016:6381). Modern DNA is the most common contaminant due to the need for handling of human remains and the samples taken from them. The contamination of ancient DNA

of hominins with modern human DNA is especially cumbersome because our DNA sequence is similar to our hominin relatives (Slatkin and Racimo 2016:6381).

Other than exogenous contamination, the DNA may be damaged or degraded due to regular postmortem damage, errors in the amplification or sequencing of the sample, general degradation due to time or burial environment, or a low copy number during amplification (Lee et al. 2009:2806). Heat, wind, humidity, ground water, the sun, chemicals naturally occurring in the soil, and even X-rays can cause damage to DNA and/or accelerate the rate of degradation of the sample (Shapiro 2013:476). This damage leaves the DNA more susceptible to contamination with exogenous DNA from a variety of sources including microbial contaminants (Shapiro 2013:475). The introduction of exogenous DNA could overwhelm the ancient DNA during PCR, and this amplification of exogenous DNA is more likely to occur if the exogenous DNA is modern (Slatkin and Racimo 2016:6381).

Though contamination appears likely to occur, there are precautions as to how a sample is treated from excavation to sequencing. The DNA lab environment maintains completely sterile UV light irradiation of all surfaces, the use of bleach as a sterilization agent, and the filtering of air in the lab (Shapiro 2013:476). Modern and ancient DNA labs are also separate as modern DNA is harder to contaminate than the fragile aDNA (Nesheva 2014:7). Posterior controls are taken from excavators, lab personnel, and anyone who has handled the remains, which are used to identify contamination (Nesheva 2014:7). When sampling the skeletal remains, two separate samples are taken from either teeth or from larger, denser bones such as the femur, as these tend to preserve well due to

their durability (Nesheva 2014:7). The samples are taken to ensure repeatability of the results from either sample (Nesheva 2014:7). The most common method used to amplify samples is polymerase chain reaction (PCR).

Polymerase chain reaction allows millions of copies of DNA to be replicated from a single or a few molecules of DNA. PCR allows specific sequences of DNA to be targeted, and helps shed light on evolutionary research, because it allows for a more thorough assessment of ancient DNA sequences (Shapiro 2013:476). Though PCR was a great addition to the field of ancient DNA analysis, this method repairs damage to DNA molecules, which has the capability to lead to errors in the DNA sequences, another form of contamination (Shapiro 2013:476). Following excavation, the bones are brushed either dry or damp, but are not washed, and to ensure that there is no cross contamination, swabs of DNA are taken from researchers (Lee et al. 2009:2806). The samples are analyzed in a sterile facility, as noted above, to reduce cross contamination, and the researchers completing the analyses, as well as anyone else who enters the sterile environment, must wear disposable gloves, gowns, shoe covers, face masks, and goggles in an attempt to eliminate contamination of the specimens (Lee et al. 2009:2806).

Once the environment is completely sterile and the specimens selected for sampling, sample preparation begins (Lee et al. 2009:2807). In order to obtain a sample, the exterior surfaces of the sample are decontaminated with bleach to remove any DNA present from the excavation process (Lee et al. 2009:2807). Then the bone or tooth is drilled creating a fine power which is used for DNA extraction. The bone powder is decalcified, then water and Proteinase K are added to remove contaminants from the

nucleic acid (Lee et al. 2009:2807). The sample is essentially unchanging at this point. The samples are then centrifuged multiple times with multiple substances in order to obtain a viable DNA sample, which then undergoes PCR.

Unfortunately, even under the best of circumstances, contamination is inevitable. Contamination is sometimes evident and can be removed or an estimate of the amount of contamination can deduced. For instance, endogenous DNA, or the ancient DNA sample, is likely to be shorter than modern DNA because of taphonomic degradation or deterioration. Post mortem chemical damage in the form of fragmented ends, cytosine deamination, is also used as a way to identify endogenous DNA from exogenous DNA after sequencing (Nesheva 2014:7). If all procedures are followed, the PCR should result in enough ancient DNA for analysis. This DNA is then used to explore and support questions among many fields. I use the results of these lab techniques from two individuals recovered from the Grassmere historic cemetery in Nashville, Tennessee to place these individuals and their overall population in the context of genetic ancestry and its relation to enslavement in the new world, including the place of origin of the individuals.

V. HAPLOGROUPS

In ancient DNA analysis using mtDNA, haplogroups are maternal lineages, similar to the branches of a tree, and are characterized in the order they were discovered and classified using alphabetical lettering (Schurr 2015:73). These branches are differentiated by mutations that are unique to each branch, and which distinguish

branches from one another (Schurr 2015:73). Using these branches, researchers obtain both spatial and temporal information regarding the origin of the lineage (Schurr 2015:73). Haplogroup L is the first haplogroup and is the root that all of the other branches are derived from, which is seen in the phylogenetic tree on the following page (Figure I) (Schurr 2015:73).

Haplogroups are used to trace human migration and human lineage origins. For the purpose of this study, I focus solely on haplogroups H and L as both of these haplogroups are present in Grassmere individuals. Haplogroup L, as seen in figure one, is associated with Africa and is therefore pertinent to studies relative to forced migration and the transatlantic slave trade in the New World, while haplogroup H is more dominant in European populations, but can be found in African populations. The introduction of haplogroup H into African and southwest Asian populations occurred due to climate change in the Paleolithic (Ennafaa et al. 2009:1). This early introduction of haplogroup H into Africa by far predates colonization of African populations, therefore it is unlikely that the introduction of haplogroup H into Burial Three's maternal ancestry occurred anytime in the recent past.

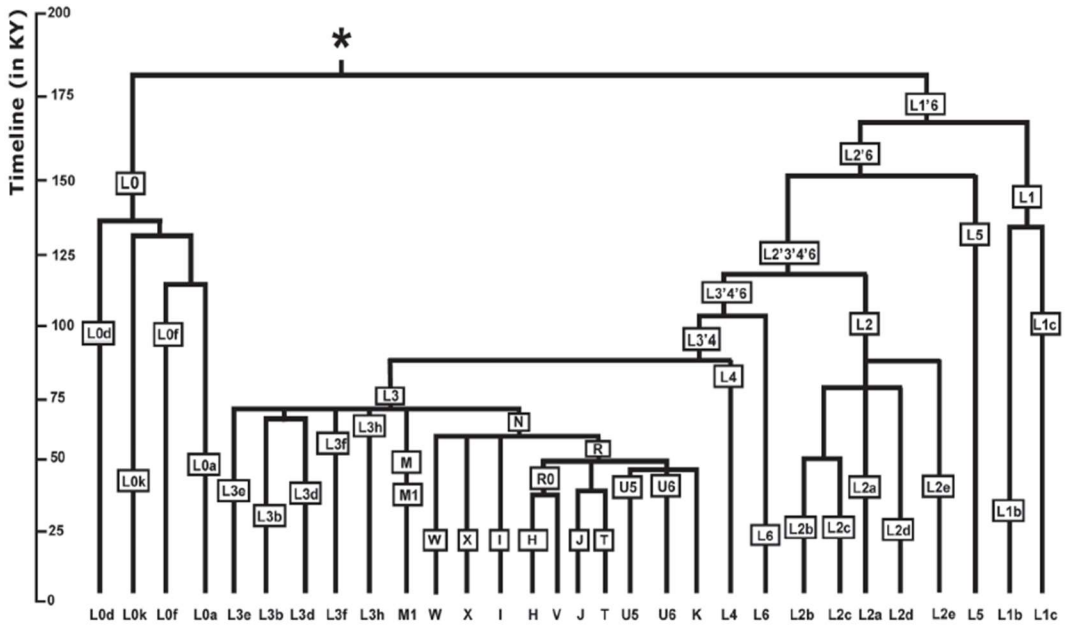

Figure I Haplogroup Tree (Rosa and Brehm 2011:32)

VI. BIOLOGICAL PROFILES

DNA was extracted from burials three, ten and eighteen. Each adult individual has a biological profile including age, sex, and ancestry, which are estimated based on morphological and metric measurements. Burial three is estimated to be a young adult female between ages 20 and 35 (Hodge 2014). There is no ancestry estimation included in this biological profile due to the impact of taphonomic processes and the fragile state of the remains (Hodge 2014). Ground pressure caused the skull to be warped, which is what would be used to estimate ancestry. Burial Three is also the burial whose DNA came back with haplogroup H present (Fratpietro 2014).

Burial Ten is a young female estimated to be twenty to thirty years old and while there was some damage and water logging of the remains, Dr. Hodge was still able to estimate the ancestry of this individual (Hodge 2014). She came to the conclusion that the individual is of African ancestry due to the morphological features of the skull (Hodge 2014). Burial Ten represented haplogroup L which is most prevalent in African populations (Fratpietro 2014).

Burial 18 is estimated to be a female between the ages of twenty to 35 and fetal remains were found with the burial upon examination in the lab (Hodge 2014). Her preservation is better than that of the other two burials mentioned, however her results from the DNA analysis came back as inconclusive (Hodge 2014). She is probably of African descent due to the traits present, however her skull was impacted by ground pressure. By using the metric method of calculating the nasal index, it is estimated that she is probably of African descent (Hodge 2014).

Though these are only three of the twenty biological profiles, they do not represent the whole populations. The muscle attachments on the remains of the entire population indicate that the population was doing hard physical labor which is further evidence that the population is that of enslaved African Americans likely owned by Michael Dunn, the property owner of Grassmere during the antebellum period.

VII. DISCUSSION

While the DNA from the individuals from Grassmere indicate that the Burial Ten is of African descent, haplogroup L, and Burial Three is not of what is normally

considered African decent and is more so associated with Europe populations, haplogroup H, there have been studies where haplogroup H and L are both present in enslaved populations, but haplogroup L is most common. In an enslaved African population uncovered at a cemetery in New York, 93.75 percent of the population presented haplogroup L, 45 out of 48 individuals, however, it is not stated what the other three individuals haplogroups are (Jackson et al. 2004:89).

Another study from New York was able to extract DNA from four individuals, a small sample size much like that of the Grassmere sample size. They estimated all of their ancestries to be African based on morphological features of the cranium. The DNA results were that only two individuals were haplogroup L, one individual was haplogroup X, associated with Native Americans, and the last individual was haplogroup M, associated with Malagasy populations (Lee et al. 2009:2807). This is interesting because one of their individuals is ancestrally from Madagascar and two individuals are from areas in Africa (Lee et al. 2009:2807). This compliments the likelihood of Burial Three being from either African or Malagasy descent versus European descent. I also found a lack of literature regarding individuals of either European descent or with haplogroup H being buried in cemeteries associated with African Americans.

Haplogroup H has been found in some populations found to be enslaved or African American individuals. In Georgia, DNA samples were taken from twenty individuals found in an unmarked cemetery. Of these twenty individuals ninety percent were of African descent, 17 were haplogroup L and one was haplogroup U which is also associated with African populations (Ozga et al. 2015:115). However, ten percent of the

population presented haplogroup H, though this occurrence is not further elaborated on, rather the authors' note that it was "predominantly" a cemetery containing African American remains (Ozga et al. 2015:115).

In yet another study using modern DNA samples from populations in South Carolina to explore the amount of European admixture in current African America populations, it was found that out of 714 individuals, only 6 were haplogroup H, 0.84 percent of the sample population (Parra et al. 2001:22-23). This article does not explore the various ways that haplogroup H could have been introduced to the population, but rather deems this occurrence of haplogroup H as a strictly European trait and a sign of European admixture. Because of the research I have done, I am not entirely sure that the occurrence of haplogroup H in the Grassmere population could be strictly attributed to European admixture, though it is a possibility. While the Burial Three from Grassmere does present haplogroup H, I am not comfortable saying that she has European maternal ancestry to the exclusion of all others.

Haplogroup H, as previously discussed, is most prevalent in European populations, which prompts the question of how and why this haplogroup was found belonging to an individual of an enslaved population. While researching the haplogroups and the geographic regions they are associated with I discovered that while haplogroup H is considered to be a marker of European ancestry, this haplogroup is not exclusively found in European populations. Haplogroup H is also found in populations located in the Near East as well as northwestern Africa (Figure Two). While there is very little literature on haplogroup H and its prevalence in enslaved populations, this is likely due to

the fact that the haplogroup is indeed found in some northwestern African populations, and even in very small percentages in West African populations.

However, the percentage of haplogroup H is fairly low according to figure two, and I was not able to find any data regarding the exact percentages of haplogroup H in West African countries. This is likely why other articles with enslaved individuals presenting haplogroup H are rarely delving into that haplogroup and its significance within enslaved populations. Haplogroup H has been in Africa since the Holocene as a result of post glacial expansion from the Iberian Peninsula allowing admixture from people belonging to the Iberian Peninsula (Ottoni et al. 2010:4).

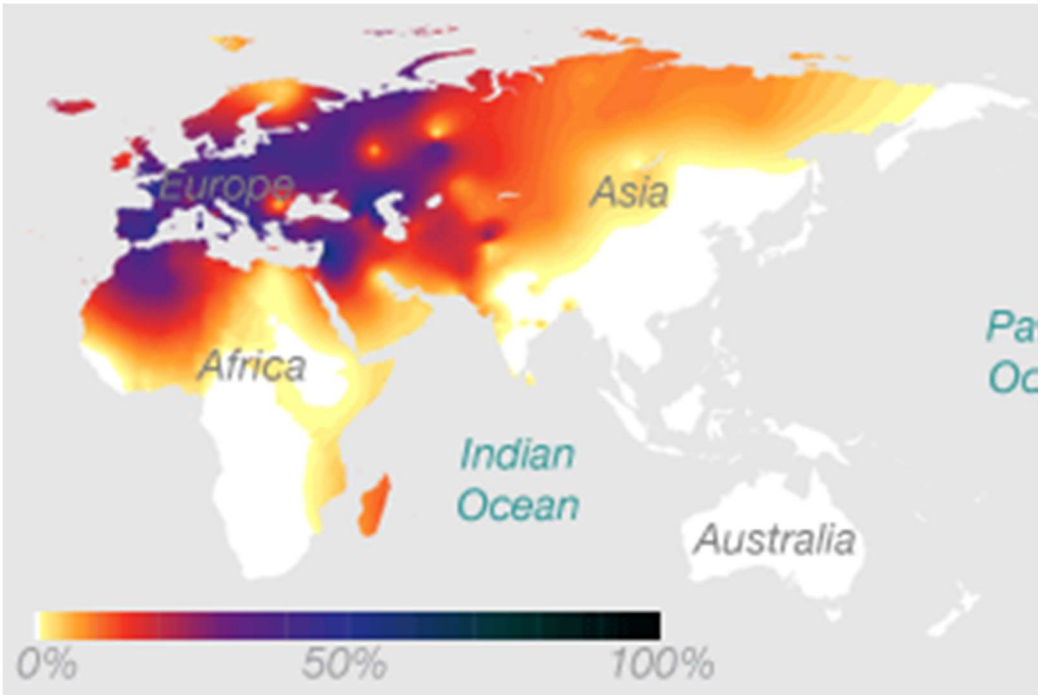

Figure II Map of Haplogroup H Percentages in Africa and Eurasia (Unknown 2018)

At the start of this project, I thought that Burial Three's maternal line was of European descent. However, based on the aforementioned stable isotope analysis completed by Dr. Tiffiny Tung regarding the geographic origins of the individuals, along with the DNA results and historical information, I now believe that this haplogroup is probably originating from North Africa or Madagascar. Though I cannot be sure of if the DNA came from North African ancestors versus Near East or European ancestors, because of the geographic distance and historical records from these three locations to areas associated with the Transatlantic Slave Trade, Madagascar is likely the origin of the DNA due to the close proximity to areas associated with the illegal slave trade between East African pirates and New York merchants (Lee et al. 2009:2809). Please see below for percentages of haplogroup H in various areas of North Africa.

Area in Africa	Number of Individuals	Percentage of Haplogroup H
Morocco	125	36.8
Algeria	82	25.6
Tunisia	83	26.5
Egypt	71	1.4

Table I Percentages of Haplogroup H in Various African Populations (Achilli et al. 2004:913)

Haplogroup H is also found in a small percentage of Malagasy DNA (Table II). There are historical records of enslaved individuals being brought to Virginia, the birthplace of Michael Dunn, from Madagascar between 1719 and 1721 (Wilson-Fall 2015:19-20). It is possible that someone who was forced to relocate from Madagascar to Virginia is an ancestor of the woman in Burial Three, though there is no way to know with any degree of certainty. There are also records of illegal trading of enslaved individuals from Madagascar between merchants in New York and East African pirates (Lee et al. 2009:2809). Therefore, it is also possible that the individual in Burial Three is a descendant of an individual who was from Madagascar and then sold to New York merchants by pirates. Again, there is no way to know with any degree of certainty at this time. If historical records of Michael Dunn's enslaved were found, as well as where they were born and traded to and from, then it would be possible to narrow down from where Burial Three is descended.

Area in Madagascar	Number of Individuals	Percentage of Haplogroup H
Southwest (Mikea)	127	13.4
Southwest (Vezo)	101	21.8
Central Highlands (Merina)	38	50

Table II Percentages of Haplogroup H in Various Malagasy Populations (Razafindrazaka et al. 2010:576)

CONCLUSION

The enslaved population found in an unmarked grave at the Nashville Zoo, which used to be the home of Michael Dunn, was a remarkable find. The remains were found unexpectedly in 1989 and preserved there until the Zoo expanded its ticketing booth beginning in 2014. DNA samples were taken from three individuals, yielding results for two of them, while the thirds was inconclusive. One individual's haplogroup is that associated with African ancestry, Burial Ten, but the other individual's haplogroup is associated with European or northeastern Africa ancestry, Burial Three.

This project hit home for me because I have been going to the zoo since I was a child I do not think I ever viewed the zoo as a historical site despite knowing that it was indeed home to a plantation. This does speak to how we view history and how our perceptions of places can change throughout time because we become more aware of the history behind the places we frequent. My perception of the Nashville Zoo has changed and I appreciate the zoo now more than ever. The zoo is not only a fun place to bring children, but it is a place where children, and even adults, can learn about the history of the plantation and those who spent their lives there, including enslaved individuals who were reburied closer to the house after examination by Dr. Hodge. We may never know the complete history of Grassmere and its inhabitants, but with new technologies we are getting closer to uncovering the history behind those who tend to be left out of the history books.

Through my research I discovered not only about the place that I have called home for so long, but I also learned about this specific enslaved African American population and the lost history of where they came from. This struggle is still real in this nation

today as there are not very good records documenting enslaved individuals and their family histories. This uncertainty of identity and ancestral origins is still alive for some African Americans today. The technology may never be able to tell people where they came from specifically, but researchers are becoming more and more capable of determining the general regions that an individual's ancestors may have come from, and historical records are available to aid in this effort up to a point. The truth is, some people may never know their true origins.

VIII. BIBLIOGRAPHY

Achilli, Alessandro, Chiara Rengo, Chiara Magri, Vincenza Battaglia, Anna Olivieri, Rosaria Scozzari, Fulvio Cruciani, Massimo Zeviani, Egill Briem, Valerio Carelli, Pedro Moral, Jean-Michel Dugoujon, Urmas Roostalu, Eva-Liis Loogva¨li, Toomas Kivisild, Hans-Ju¨rgen Bandelt, Martin Richards, Richard Villems, A. Silvana Santachiara-Benerecetti, Ornella Semino, and Antonio Torroni
2004 The Molecular Dissection of mtDNA Haplogroup H Confirms That the Franco-Cantabrian Glacial Refuge Was a Major Source for the European Gene Pool. *American Journal of Human Genetics*; 75:910–918.

Ennafaa, Hajer, Vicente M Cabrera, Khaled K Abu-Amero, Ana M González, Mohamed B Amor, Rym Bouhaha, Nduna Dzimiri, Amel B Elgaaïed, and José M Larruga
2009 Mitochondrial DNA Haplogroup H Structure in North Africa. *BMC Genetics*; 10(8):1-10.

Fratpietro, Stephen
2014 SER028-14 Final Report. March 26, 2018.

Hodge, Shannon
2014 Nashville Zoo Cemetery: 40DV255 Burials 3, 10, and 18. March 26, 2018.

Jackson, F., Mayes, A., Mack, M., Froment, A., Keita, S., Kittles, R., George, M., Shujaa, K., Blakey, M.L., Rankin-Hill, L.M.
2004 Origins of the New York African burial ground population: biological evidence of geographical and macroethnic affiliations: using craniometrics, dental morphology, and preliminary genetic analysis. In: Blakey, M.L., Rankin-Hill, L.M. (Eds.), The New York African Burial Ground Skeletal Biology Final Report. Howard University, Washington, DC, pp.85-93.

Lee, Esther J., Lisa M. Anderson, Vanessa Dale, D. Andrew Merriwether
2009 MtDNA Origins of an Enslaved Labor Force from the 18th Century Schuyler Flatts Burial Ground in Colonial Albany, NY: Africans, Native Americans, and Malagasy? *Journal of Archaeological Science;* 36:2805-2810.

Mulligan, Connie J.
2006 Anthropological Applications of Ancient DNA: Problems and Prospects. *American Antiquity*; 71(2):365-380.

Nesheva, Desislava V.
2014 Aspects of Ancient Mitochondrial DNA Analysis in Different Populations for Understanding Human Evolution. *Balkan Journal of Medical Genetics;* 17:5-14.

Ottoni, Claudio, Giuseppina Primativo, Baharak Hooshiar Kashani, Alessandro Achilli, Cristina Martı´nez-Labarga, Gianfranco Biondi, Antonio Torroni, Olga Rickards
2010 Mitochondrial Haplogroup H1 in North Africa: An Early Holocene Arrival from Iberia. *PLoS ONE*; 5(10):1-7.

Ozga, Andrew T., Raúl Y. Tito, Brian M. Kemp, Hugh Matternes, Alexandra Obregon-Tito, Leslie Neal, and Cecil M. Lewis Jr.
2015 Origins of an Unmarked Georgia Cemetery Using Ancient DNA Analysis. *Human Biology*; 87(2):109-121.

Parra, E.J., R.A. Kittles, G. Argyropoulos, C.L. Pfaff, K. Hiester, C. Bonilla, N. Sylvester, D. Parrish-Gause, W.T. Garvey, L. Jin, P.M. McKeigue, M.I. Kamboh, R.E. Ferrell, W.S. Pollitzer, and M.D. Shriver
2001 Ancestral Proportions and Admixture Dynamics in Geographically Defined African Americans Living in South Carolina. *American Journal of Physical Anthropology*; 114:18–29.

Razafindrazaka, Harilanto, Franc¸ois-X Ricaut, Murray P Cox, Maru Mormina, Jean-Michel Dugoujon, Louis P Randriamarolaza, Evelyne Guitard, Laure Tonasso, Bertrand Ludes, and Eric Crube´zy
2010 Complete Mitochondrial DNA Sequences Provide New Insights into the Polynesian Motif and the Peopling of Madagascar. *European Journal of Human Genetics*; 18:575–581.

Rosa, Alexandra and Antonio Brehm
2011 African Human mtDNA Phylogeography at-a-glance. *Journal of Anthropological Sciences;* 89:25-58.

Schurr, Theodore G.
2015 Human Genetic Diversity in a Global Context. *In* Globalization: The Crucial Phase. Brian Spooner, ed. Pp. 71-114. Philadelphia: University of Pennsylvania Press.

Shapiro, Beth
2013 Ancient DNA; *Princeton University Press*, Princeton, NJ. Pp. 475-481.

Slatkin, Montgomery and Fernando Racimo
2016 Ancient DNA and Human History. *Proceedings of the National Academy of Sciences of the United States of America;* 113(23):6380-6387.

Sproul, Kate
2017 Interpreting Grassmere's Enslaved Community: Archaeological Approaches to Public History at the Nashville Zoo. Unpublished Master's Thesis, Department of History, *Middle Tennessee State University*, Murfreesboro, TN.

Unknown Author
2018 Ancestry Composition. Electronic Database, 23andme.com. https://www.23andme.com/ancestry-composition-guide, accessed March 25, 2018.

Wilson-Fall, Wendy
2015 Memories of Madagascar and Slavery in the Black Atlantic. Ohio *University Pr*ess, Athens.