



HOWARD UNIVERSITY

Department of Biology and W. Montague Cobb Research Laboratory
2419 Sixth Street, NW
Washington, DC 20059
USA

PROPOSAL

Reconstruction of early population history of Africans in the Americas through St. Helena Island (South Atlantic) and New York City

Gretchen Z. Johnson, MSc., Fatimah L.C. Jackson, Ph.D.

Overview

This proposal assesses human skeletal remains of previously enslaved mid-19th century Africans who were liberated by British anti-slavery efforts, but subsequently died on the South Atlantic island of Saint Helena (SHP). The overall objective of planned investigations is to combine forensic anthropometry, molecular genomic analyses, and archaeological/historical contexts to reconstruct a snapshot of the lives and surrounding environment of the mid-19th century individuals originally buried at Saint Helena. These results will then be compared with data from the enslaved individuals from the 17th and 18th century New York African Burial Ground (NYABG). The early population history of Africans in the Americas will be reconstructed using these two important source populations.

Improved sequencing technologies allow for ancient DNA research of historic remains of underrepresented groups, which can provide riveting insights into their biological history. The combination of molecular genomic analyses, archaeological and historical contexts, allow for a more accurate perspective on the significant events that occurred in the past such as St. Helena's role in the transatlantic slave trade.

Objective

This proposal requests support for my doctoral dissertation on the historic St. Helena population. The mid-19th Century Africans deposited on St. Helena as a result of British anti-slavery efforts will be investigated and compared to enslaved individuals from the 17th and 18th century New York African Burial Ground (NYABG). A goal is to determine any similarities observed among individuals found in the New York African Burial Ground (NYABG). It is hypothesized that skeletal remains on SHP show evidence of disease and trauma similar to the skeletal remains found on the NYABG. Furthermore, the range of ancestral genomic variability found in the South Atlantic African remains is suggested to be similar to the range of genomic diversity observed in the NYABG. Together, these sites provide a continuum of insights into the early population history of these African peoples.

As a possible descendant of the historic St. Helena population, I am looking forward to begin the journey of unveiling the island's history. Little is known about the identity of the previously enslaved Africans, where in Africa they originated, and what events characterized their lives prior to their internment at St. Helena. In this regard, the population recently excavated on the island of St. Helena is very important and has the potential to provide great insight into the regional biological history.

Intellectual Merit

The results of this research will greatly expand our knowledge of the lives of these early Africans, provide insights into their experiences just prior to their demise, reveal key aspects of their human genomic variation, molecular sex, and ancestral origins, and provide first-ever data comparing one historical trans-Atlantic African population with another. The techniques proposed are intentionally interdisciplinary and integrative within a biological anthropological research paradigm.

Broader Impacts

Very little is known about the anthropometry and molecular genomics of this unique population from St. Helena Island. Accessing and analyzing these data will allow important insights into genotype-phenotype interactions. This research adds to the existing knowledge on SHP and NYABG; also provides an important comparative approach that will fill in the gaps as well as provide new knowledge. Activities associated with ensuring the broader impact of this project beyond academia and scientific pursuits include outreach to existing African American communities in New York such as the dissemination of results to groups and organizations with interests in the history of Africans and African Americans of the trans-Atlantic Diaspora.

Research activities and plans:

- I. May 2017 - Development of novel technique for retrieval of the petrous bone.
 - The human skull has two temporal bones that are positioned on the sides and base of the skull. Research has shown that the petrous portion of the temporal bone is a rich source of DNA in archaeological samples. The petrous bone essentially holds much greater amounts of DNA compared to other human bones. Thus, it is an excellent source for ancient DNA studies.
 - The petrous bone is a small bone located in the interior of the skull. Since each skull has two petrous bones, only one petrous bone will be removed from the skull for DNA extraction and the other petrous bone will be left intact. This small bone in the interior of the skull will be used to extract high quality DNA from each individual.
 - Through a recent collaboration with Dr. Anne Agur and her research team at the University of Toronto, Canada, a new technique was designed to extract the petrous bone from the human skull with minimal damage. This technique is planned to be utilized on the African skeletal remains in St. Helena to obtain the most usable quantities of high quality DNA from the remains of each individual. Data gathered will allow for human identification and ancestral origins of this historic population on St. Helena.

Presentations:

- My initial research hypothesis was presented as a poster at the European Human Genetics Conference in Copenhagen, DENMARK.
- This upcoming July, I will present a poster on my research at the Society of Molecular Biology and Evolution Conference in Austin, Texas (USA).

II. Trip to St. Helena

- I am anticipating to spend approximately 4 - 5 months on St. Helena Island. I am committed to stay as long needed to ensure complete and thorough data collection and fulfill my outreach commitment.

Tentative Timeline

Month 1: Establishment of archaeological/historical contexts

- Initial collection of historical/archaeological context - will conduct interviews with locals to acquire perspectives on the mid-19th Century Africans deposited on St. Helena as a result of British anti-slavery efforts.

Months 2 & 3: Sample collection

- Visit burial sites
- Collect anthropometric information on St. Helena and through published sources (NYABG) to contextualize the populations morphologically, reconstruct, and compare their biological histories.
- Begin sample collection process – only one small petrous bone will be collected from the skull. Also, photographic documentation will be performed.
- Assess skeletal remains for paleopathology. Compare SHP pathologies with reported NYABG pathologies.
- National Geographic may be interested to bring a film crew to the island to document my work and tell the story of the St. Helena's African heritage.

Month 4: Dissemination of results and ancillary information at St. Helena

- Results of this research will be integrated into education and training in St. Helena. Communities in St. Helena will have the opportunity to learn more about the mid-19th Century Africans deposited on the island, their culture, heritage, and linkage to the contemporary population.

Month 5: Molecular Genomic Analyses

- DNA extraction, quantification and sequencing will be performed on samples obtained from St. Helena at Howard University and the Centre for Geo Genetics in Copenhagen, Denmark.
- Genomic samples will be sequenced utilizing Illumina MiSeq.
 - These samples will be archived and stored in the African Diversity Genomic databank are kept under high security.
 - Samples will be stored at -80°C in a reserved freezer for African genomic diversity.
- Bioinformatics search for genomic variants found in high frequency in West Central Africa will be conducted. Ancestry Informative Markers (AIMS) will be used for comparisons of SHP and NYABG genomic profiles

III. Funding & Support/Networking acquired:

- I was recently awarded funding by National Geographic and by the Just-Julian Fellowship.
- I am in communication with Dr. Andy Pearson at the University of Bristol; Dr. Hannes Schroeder at the University of Copenhagen's Center for Geo-Genetics; and they are supportive of my research.

IV. Specific Benefits for St. Helena:

- Of special importance are the direct and indirect benefits of the research for the people of St. Helena. I anticipate that these studies will make a significant contribution, expand the educational opportunities for residents of the island and the general public in many specific ways:
 - The results of this research will be integrated into education, training and seminars in the communities of St. Helena. Individuals will be able to acquire, learn more about how various biological samples are analyzed and the results interpreted. The research results may inspire local citizens to consider additional training in this field.
 - With colleagues at Howard University, we will design and conduct a series of workshops on human genetics, the historic African population and African-American history that we will make available to the people of St. Helena.
 - The genomic and forensic analyses of this historic African sample will attract more academic tourism to the island. With more visitors, the economy of the Island will expand. As residents, including students, educators, and visitors see the evolving and unveiling of their rich history, culture, and heritage of these

early African residents, they will be made aware of their central role in the abolition of the south transatlantic trade in enslaved individuals.

- A scholarship will be provided for a student from St. Helena to acquire training and work in the Cobb Research Laboratory at Howard University under the tutelage of Dr. Fatimah Jackson, professor of biology and director of the Cobb Research Laboratory.
- Professional skeletal boxes from Howard University can be donated and shipped to assist with the memorialization services on St. Helena.
- Also, USA support and monetary funds can be acquired and donated to the memorialization efforts in St. Helena. I am in the process of creating a GoFundMe webpage to facilitate this process. This will assist in acquiring USA support in the form of bringing monetary funds for the memorialization efforts in St. Helena.