G11   Profiling an Unknown Castaway: "The Philly Cocoa Man"

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Learning Overview: After attending this presentation, attendees will be able to outline how dental adult age assessment and georeferencing through chemical and elemental isotope analysis contribute to an unknown victim profile.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by discussing how emerging anthropological isotope science can be used alongside time-tested dental age estimation techniques in some unknown decedent cases.

On May 11, 2015, the container ship *Sian-C* transporting cocoa beans from Côte d'Ivoire (Ivory Coast, Africa) docked in the Port of Philadelphia, PA. An unidentified black male was discovered in the cargo hold by United States customs during inspection and fumigation. Foodstuffs, water, and a set of clothing were adjacent to the body. No forms of identification were found within the cargo hold, and personal effects were limited to a jumpsuit and non-descript metal rings. Fingerprint processing was completed and run through both the Integrated Automated Fingerprint Identification System (IAFIS) and United States Homeland Security databases for undocumented workers, terrorist watch lists, and foreign nationals with no hits. The National Missing and Unidentified Persons System (NAMUS) submission has not produced a positive match to date.

The dental examination revealed no restorations or untreated gross decay. However, maxillary and mandibular acrylic, removable partial dentures were found. The results of three adult age estimation methods were in accordance with one another. Method 1, the Kvaal 1995 study, determined the decedent's age as 26.57 years with a standard error of estimation of 8.6 years.[1] Method 2, the Cameriere 2007 study, determined the decedent's age as 24.95 years with a standard error of estimation of 3.62 years.[2] Method 3, the Bang and Ramm 1970 study, determined the decedent's age as 33.48 years with a 95% confidence interval of 9.46 years.[3]

A comparison of the isotope ratios of enamel verses bone samples can yield patterns of migration when an individual moves from one geographic region to another region through their lifetime.[4-8] This analysis was undertaken to confirm that the decedent was likely from the ship's port of departure, to rule out the possibility that he gained access to the ship's hold while in Philadelphia and further define his places of residence. Samples of teeth, mandibular bone, and rib were collected for georeferencing.[9,10] Both stable and heavy isotope analyses were completed for the following elements: Carbon ($\delta^{13}C$), Oxygen ($\delta^{18}O$), Strontium ($^{87}Sr/^{86}Sr$), and Lead ($^{206}Pb/^{204}Pb$ $^{207}Pb/^{204}Pb$, $^{208}Pb/^{204}Pb$).[11,12] The chemical and elemental isotope testing indicates the decedent was likely born outside of the United States. The enamel and bone data are consistent with an origin of birth in the African continent, as well as living in Africa the last several years of life.[13] When the strontium and lead isotope values are plotted on a bivariate graph, they fall closest to the known range of values from Nigerian enamel samples in comparison to data from the United States and Europe.[14] The $\delta^{18}O$ values for the bone sample also fall within the West African region. Additionally, the $\delta^{13}C$ values for decedent USF17-041C are consistent with the mixed C3 and C4 food crops found within West Africa. Overall, the findings are consistent with origin in West Africa, which includes Côte d'Ivoire and other countries in the region.[15]

A victim profile was compiled that consisted of reconstructive facial drawings, sketches of several tattoos found on the body, an anthropological examination, the dental age assessment, and isotope analysis results.

In conclusion, this case shows a multi-modal victim profile generated utilizing several technologies and forensic specialties.

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Dental Age Assessment, Isotope Analysis, Profiling