



Physical Anthropology Section - 2012

H107 Identification of a United States Airman Using Stable Isotopes

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After attending this presentation, attendees will become familiar with a recent identification of an individual using stable isotopic analysis of his dental remains.

This presentation will impact the forensic science community by raising awareness of the possibility of employing isotopic analysis in the identification of human skeletal remains.

In February 1969 a U.S. Air Force pilot was attacking an anti-aircraft artillery position in Savannakhet Province, Laos, when his F-100D Super Sabre was struck by enemy fire and crashed. Crewmen of three other American aircraft involved in the mission reported seeing no parachute or any other indicator that the pilot of the F-100 had successfully exited the aircraft or survived the impact. He initially was placed in the status of Missing In Action; however, a military review board subsequently amended his status to Killed In Action.

In 1991, 1992, 2005, and 2009 joint U.S./Lao People's Democratic Republic teams located and excavated the 1969 crash site, which was located within 100 meters of the reported historic map coordinates for the incident. Over 450 m² was excavated using standard archaeological procedures and the site yielded human remains, pilot related material evidence, and aircraft wreckage. The U.S. Air Force Life Sciences Equipment Laboratory (LSEL) confirmed that the life-support equipment found at the site was consistent with the pilot being on board at the time of impact, and in the LSEL's opinion, the crash was non-survivable. The remains consisted of a single crown fragment from a human left maxillary canine (tooth #11). The tooth was unrestored and lacked any morphological characteristics that would allow for individualization.

Analysis of stable isotopes in the enamel from the tooth fragment—specifically, carbon and oxygen—revealed typical Western values consistent with those seen in individuals raised in the United States. The permanent maxillary canine completes its crown formation by approximately age six; thus, isotopes present in the enamel reflect exposure (through diet) to these isotopic ratios during this early period of growth. Conversely, the isotopic values differed significantly from those seen in indigenous Southeast Asians. Based on this analysis, it was inferred that the human tooth fragment was that of a Westerner (e.g., American) and did not derive from an indigenous native to Southeast Asia.

In sum, the pilots of other U.S. aircraft involved in the same February 1969 mission witnessed the F-100D aircraft crash into a mountainside in Savannakhet Province, Laos. No parachute was observed and they believed the crash was not survivable. An aircraft crash site that was located within 100 meters of the incident map coordinates was located and excavated from 1991 to 2009. The site yielded wreckage exclusive to that of an F-100D aircraft; historical records indicate that there is only one F-100 that crashed within 40 kilometers of that location. Identification media purportedly found at the site by Laotian nationals living nearby consisted of two military identification tags that correlated to the pilot by name, service number, blood type, and religious preference. Based on aircraft type and location, the site was correlated to the 1969 loss of a specific F-100D aircraft to the exclusion of all other reasonable possibilities. Analysis of the tooth fragment found amid the wreckage field revealed it to be human. Isotopic analysis of the enamel excluded the reasonable supposition that the tooth was that of an indigenous Southeast Asian and thus precluded the probability that the tooth fragment was a site contaminant. Given the totality of the evidence, including the exclusion of all reasonable alternatives, the human remains found at the crash site were identified as those of a U.S. serviceman who died in 1969 when his aircraft was shot down over Laos.

Forensic Science, Stable Isotopes, U.S. Military Identification