

Forensic Aviation Archeology

Finding and Recovering American MIA Remains

Forensic anthropologists lend their skills to identifying homicide victims for the Federal Bureau of Investigation, excavating Civil War burials for the National Park Service, and recovering American war casualties for the Department of the Army. Each of these endeavors requires the implementation of scientific principles, including crime-scene investigation, forensic anthropology, aviation archeology, botany, photography, medicine, ballistics, medicine, and law. By combining an ever-evolving multidisciplinary approach, forensic anthropologists at the U.S. Army Central Identification Laboratory, Hawai'i (CILHI), are able to resolve the fate of American MIAs.

The relationship between anthropologists and the armed services has been long and productive. In particular, forensic anthropology has profited from methods and techniques developed by the Army Central Identification Laboratories for the identification of U.S. war casualties. Historically, the Central Identification Laboratories, under the direction of such notable figures as Charles Snow, Mildred Trotter, T. Dale Stewart, Thomas McKern, and Ellis Kerley, were temporary, mission-specific organizations formed after World War II, the Korean War, and the Vietnam War. Combined, these labs accounted for the identification of thousands of military and

civilian personnel, including more than 430 Americans from the Vietnam War. Many of the forensic techniques pioneered in these laboratories continue to be the mainstay of forensic anthropology.

In its present—and now permanent—incarnation, the CILHI is the largest skeletal identification laboratory in the world and is recognized as an internationally-respected leader in human identification techniques and forensic aviation archeology. Formally established in 1976, the laboratory's expanded charter includes both the recovery and identification of U.S. war dead from all past military conflicts. These identifications are achieved by traditional methods and techniques, as well as more novel approaches including isotopic analysis, scanning electron microscopy, video superimposition, and most recently, mitochondrial DNA (mtDNA) analysis.

A typical CILHI recovery effort consists of locating and excavating an aircraft crash site or less frequently, an isolated burial. The mission begins when a recovery team departs for the host country. With some variation depending on the mission circumstances, a team consists of an anthropologist, who functions as the recovery leader; an Army officer and a senior non-commissioned officer, who oversee the team's logistical needs; a medic; a photographer; a linguist; an explosive-ordnance technician, to handle the ubiquitous unexploded bombs found on old battlefields; and one to six Army graves registration specialists who provide the bulk of the sweat and muscle. If the mission is to recover a crashed aircraft, a team includes an aircraft-wreckage analyst to identify key aircraft components and aircrew-related artifacts such as flight-suit material.

Sites are excavated using standard archeological procedures and are similar in many respects to any CRM-governed site, with two exceptions. First, the CILHI teams work in some of the most remote and dangerous locales in the world, from the jungles of Southeast Asia to the mountains of the Himalayan Chain to the ocean waters of the Pacific Islands. In addition, team members function in an official capacity as quasi-diplomatic agents of the United States. The site is

The ejection seat site (clearing) upon completion of excavation. (Note the 65° slope).





The completed 12x16 meter investigation area (grave) in an old bomb crater. The pin-flags mark the locations where the recovery team found human remains and pilot-related equipment.

governed by a foreign country (often a country, such as North Korea, that is on relatively poor terms with the United States government) as are the U.S. team members. A recent recovery in western Iraq, for example, was conducted under the watchful eyes (and at times guns) of the Iraqi Republican Guard. Second, since the identification of human remains is a forensic issue, the recovery site must be treated similar to a crime scene; that is, there must be a proper chain-of-custody for any recovered remains and artifacts from the time they leave the ground to their receipt at the CILHI.

The following example highlights how standard archeological procedures, combined with experience and common sense, have led to the recovery and identification of American MIA remains.

Excavation of Site in Vietnam

One of the CILHI's more complex cases involved the 1972 loss of a U.S. A-7D Corsair aircraft shot down in a remote area of North Vietnam. As there were no American eyewitnesses to the incident, no one could "prove" whether the pilot had ejected from the aircraft or remained in it when it crashed.

In 1994, a preliminary survey team composed of U.S. personnel under the direction of the Joint Task Force-Full Accounting (an umbrella organization charged with accounting for all U.S. war casualties from the Vietnam War) and their Vietnamese counterparts interviewed several Vietnamese informants who claimed that they had found and buried the body of a U.S. pilot in 1972. The survey team located the purported grave of the pilot in an old bomb crater and excavated a 1x2 meter test pit that yielded pieces of flight suit, life support equipment (e.g. oxygen hose), and a few human bone fragments. The team, lacking an anthropologist, closed the site. The human remains were sent to the CILHI, and everything

else was forwarded for analysis at the Life Sciences Equipment Laboratory, its adjunct Life Sciences Artifact Section, and additional support laboratories at the San Antonio Air Logistics Center, Kelly Air Force Base, Texas, for detailed analysis.

In an unusual twist, one of the pilot's children paid her own way to Vietnam and visited the crash site. She interviewed a villager who allegedly found the pilot's helmet, and with a little persuasion, she obtained the helmet. She knew it was her father's helmet because she found his name written inside it (the FBI later authenticated that the name had not recently been written). Although no sophisticated equipment was needed to see the name, the survey team had overlooked this piece of evidence. That the survey team had missed such compelling evidence prompted further action by the Joint Task Force and the CILHI, and as a result, the CILHI was directed to deploy a full search and recovery team with more specialists, including an anthropologist, to the site.

In the meantime, the laboratories at Kelly Air Force Base had completed their extensive analysis of the pilot's equipment and aircraft wreckage and formulated an opinion based on reproducible evidence. According to the laboratories, the life-support equipment was torn, stretched, and burned in a manner consistent with being in an air crash. Their preliminary report stated that the pilot was in the airplane when it crashed.

In April and May 1995, a 12-man CILHI recovery team arrived at the crash site to complete what the earlier survey team had begun. Its objectives were threefold: identify the airplane; recover any associated human remains; and recover evidence to confirm or refute the Life Sciences Equipment Laboratory's preliminary determination that the pilot was in the airplane when it crashed.

The first order of business was to re-interview the witnesses. The pilot, according to the man who had found the helmet, had ejected from the airplane before it crashed. The Vietnamese later found the dead pilot, seated in his ejection seat, hanging in a tree a few hundred meters from the crash site. They removed his body, disposed of the ejection seat, and buried his remains in an old bomb crater down the mountain side.

Based on this information, the recovery team excavated the grave in the bomb crater, enlarging the project area to 12x16 meters to account for any disturbance or scattering of remains through cultivation. The team also excavated the area where villagers claimed to have found the ejection seat and lastly, the crash site itself. All three areas were dug to culturally sterile soil. Fortunately for the pilot's family, the team found more human

bone fragments (within inches of where the survey team had excavated), the pilot's dog tag, pieces of his flight suit, and life-support equipment from the bomb crater. Although the ejection seat site yielded no material evidence, the recovery team found a piece of the aircraft fuselage near the crash site stenciled with A7D 223, indicating the aircraft type and serial number. By the time the team closed its field investigations, there was nothing else to be found. All cultural material—evidence, in legal terms—had been recovered. The evidence was then used to reconstruct the circumstances of the shootdown.

Preliminary field analysis of the material evidence from the burial suggested that the pilot had actually ejected before the plane crashed. The Life Sciences Equipment Laboratory's "evidence" of tearing, burning, and stretching could be explained in another way. Specifically, witnesses told the recovery team that the bomb crater had been cleared, burned, and cultivated for many years. Thus, the interpretation offered by the Life Sciences Equipment Laboratory might be incorrect. The tearing and burning could easily have resulted from activities related to cultivation. The initial survey team didn't have this information, and the Life Sciences Equipment Laboratory's scientists' train of thought didn't entertain such cultural activities as slash-and-burn cultivation.

Anticipating the possibility that the findings of the Life Sciences Equipment Laboratory might be incorrect, the recovery team's anthropologist was careful to document everything found at the grave site. Specifically, he instructed team members to notify him the moment they found bones, teeth, flight-suit material, or a dog tag. Each of these items was photographed exactly as it was found and the anthropologist personally removed them from the ground. The dirt from the dog tag and the piece of serialized fuselage were removed and placed in separate Ziploc bags for further analysis, if so desired. Although the anthropologist didn't know exactly what tests the soil might be subjected to, he was careful to preserve each piece of evidence.

As the case evolved, one piece of evidence that proved critical was the photodocumentation of live, unbroken rootlets growing into the pilot's bones. This evidence served as legal proof that the Vietnamese had not recently "salted" remains in the bomb crater. As a matter of fact, before the excavation was completed, the team anthropologist was asked (by field radio through the U.S. Joint Task Force-Full Accounting office in Hanoi) how he knew the remains had not been recently planted at the site. The "proof," he told them, was the fact that the remains had rootlets growing through them, and along the back of the dog tag.

These items had laid in the ground for many months, not weeks. In fact, a more precise age for the rootlets (i.e., the time it took the rootlets to grow to their present lengths based on their species) could later be determined by a botanist. Similarly, a few months later the Life Sciences Equipment Laboratory analyzed the soil adhering to the dog tag and the back of the serialized aluminum fuselage to determine whether these items had originated from the same site. The possibility existed that the Vietnamese had retained these items in some warehouse and salted the site before the recovery team arrived. Soil analysis using EDX (Energy Dispersive X-ray) proved that the items originated from the same area on the mountain.

When it was all said and done, the recovery team had gathered significant evidence supporting the Vietnamese witness' statement that the pilot ejected from the airplane before it crashed. Further, a little cultural curiosity on the part of the anthropologist yielded information overlooked by the initial survey team—namely, that the bomb crater had been cleared, burned, and cultivated. With this information, the Life Sciences Equipment Laboratory reversed their preliminary hypothesis that the pilot was in the airplane when it crashed. The final report reflected this opinion. CILHI had resolved the contradictory questions by conducting a thorough "crime scene" investigation, and excavation of the grave, ejection seat, and crash sites.

The pilot's remains were later identified using traditional anthropological techniques and mtDNA analysis. Aviation archeology, combined with forensic anthropology, botany, chemistry, and photography, had been used to solve the mystery of a 23-year-old MIA death.

Thomas D. Holland is the Scientific Director at the U.S. Army Central Identification Laboratory, Hawai'i, and a Diplomat of the American Board of Forensic Anthropology. He obtained his PhD from the University of Missouri-Columbia in 1991, and served as a Curator at the Museum of Anthropology, University of Missouri, before joining the CILHI in 1992.

Robert W. Mann is the Senior Anthropologist at the CILHI. He attended the University of Tennessee, Knoxville, and worked nearly five years at the Smithsonian Institution before joining the U.S. Army Central Identification Laboratory, Hawai'i, in 1992.