**GI Graves Yield Mystery, Not DNA Remains Defy Identification**

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Saturday, March 24, 2001; Page A01

The two skeletons were in pristine condition. No water had seeped into their metal coffins since they'd been buried in cotton sheets and Army blankets fastened with safety pins 45 years before.

Though the remains were dusted with a strange, pale gray powder, scientists at an Army laboratory in Hawaii thought there would be no problem using a new DNA technique to finally identify these and other long-anonymous soldiers from the Korean War.

Thousands of families had never learned the fate of lost loved ones, had never had a grave to visit or a story to tell. Now, perhaps, they might.

But 19 months after the skeletons were exhumed from among the remains of 866 Korean War servicemen buried in a Hawaiian cemetery, scientists have failed to make identifications. And they suspect the mysterious powder might be the reason.

"There's just something, a big unknown, out there at this point, that we haven't been able to get a handle on," said Thomas Holland, the scientific director at the lab in Hawaii.

This week, after months of detective work, Holland and experts at a military DNA lab in Rockville said they think the preservative formalin, an ingredient in the powder innocently applied in the 1950s, has derailed their 21st-century wizardry.

And, for now, a once-promising effort to put names to the largest contingent of Korean War unknowns in the country has stalled.

Experts at the Department of Defense DNA Registry, in Rockville, and the Army's Central Identification Laboratory, in Hawaii, haven't given up: Testing is underway on specimens from four more sets of remains, including two from World War II, that were exhumed in January.

"So far, it doesn't look good," Col. Brion C. Smith, chief deputy medical examiner and DNA program manager at the registry, said this week.

Families of some of the 8,100 service members from the Korean War still classified as missing in action also are dismayed. Over the past few years, the Defense Department has collected in a warehouse in Gaithersburg 1,886 family blood samples for possible DNA comparison with the unknowns.

"It's the only hope we have," said Pat Wilson Dunton, of Coppell, Tex., whose father, James Wilson Jr., vanished after his B-29 was shot down. "It was a 100 percent improvement over what we had before, which was nothing."

The process uses a kind of DNA different from that used in crime investigations. It is longer lasting and, thus, highly valuable in identifying old bones and tissue.

DNA used in crime probes most often comes from the nucleus of a human cell, and two specimens of it can be almost precisely matched, experts say. DNA used in old identifications comes from the much more plentiful mitochondria that float about in the cell outside the nucleus.

While mitochondrial DNA cannot be matched as precisely as nuclear DNA, the comparisons still can be extremely close, scientists say. There is also the advantage that it is passed down the maternal side of families for generations. So identifications can be made via relatives far removed from the subject.

It was mitochondrial DNA, analyzed at the Rockville lab, that in 1998 helped identify the remains of Air Force Lt. Michael J. Blassie, the Vietnam War flier who had been in the Tomb of the Unknowns at Arlington National Cemetery.

It was also used at the Rockville facility to confirm the identity of Russian Czar Nicholas II, who had been executed by the Bolsheviks in 1918 and was unearthed in 1991.

Since its inception in 1992, the lab has used DNA to make 231 matches of specimens from the Vietnam War and 56 from World War II, as well as from several recent high-profile plane crashes, said Christopher C. Kelly, public affairs director of the Armed Forces Institute of Pathology, which oversees the DNA lab.

It also has made hundreds of exclusions, he said, in which two specimens were proved to be unrelated.

So prospects seemed good on Sept. 15, 1999, when an honor guard bore the metal coffins of the first two unknowns from what is officially the National Memorial Cemetery of the Pacific, nicknamed the Punch Bowl for its location in an old volcanic crater. "We thought we had the bases covered pretty well," Smith said.

The two were among 421 unknowns turned over by the Chinese and North Koreans in 1954, about a year after the war ended, said Richard Huston, a casualty data officer at the Army lab.

They were buried in the Punch Bowl that May, along with 445 unknowns already recovered from South Korea.

Little is known about them, said Holland, the lab's scientific director, including how or where they died.

"The information we have about where they were found is at times spotty, and when it is present, sometimes it turns out to not be accurate," he said. "All in all, it's relatively unreliable."

He said the two exhumed first had been selected because their remains consisted of almost complete skeletons, and because the lab had been able to get blood samples from people who might be their maternal relatives.

He said some of the Punch Bowl unknowns, including these, have names associated with them, but not solidly enough to make an identification. He said that in this case, the names were used to contact potential relatives for DNA comparison.

Holland said those contacted were told that "we had remains that we thought might be identifiable, and . . . that we thought they might, possibly, be associated. No assurances."

The two coffins were taken to the Army lab and opened. Inside, each contained a pristine, virtually complete skeleton. Each was wrapped, in the traditional military way, Holland said, in a cotton sheet and a wool Army blanket fastened with about 20 large safety pins.

Small samples of bone were removed from each skeleton and shipped to the registry in Maryland, where they were scoured, pulverized and subjected to the complex process in which DNA is extracted for analysis.

The first hint of trouble came about a month later, when initial scans for DNA were completed, said Smith, of the DNA registry.

When present, DNA should leave a kind of fuzzy bar across a card of special gel in these tests, which winds up looking like a bar graph. In this case, Smith said, the gel tests came back blank.

This often happens, though, Smith said, and members of his team moved on to later, more complex, stages of the process, in which attempts are made to amplify and illuminate the DNA for comparison.

But they struck out there, too. "We got nothing," he said. Smith's people were baffled. The bones were in excellent shape, much better than many of those dug out of the jungles of Vietnam or incinerated at plane crash sites. What was going on?

Smith contacted the Army lab and asked, "Is there anything unusual" about the two skeletons. "They said, 'Yeah, there's all this powder all over them,' " he recalled.

It was light gray and was believed to be "hardening compound," Smith said, but the Army wasn't sure exactly what was in it.

Holland, of the Army lab, explained that it was an antiseptic preservative "that was probably just standard Army practice at the time."

The lab sent Smith a sample, and both labs tried to analyze the powder's contents.

Though they are not positive, both labs now suspect that the powder originally contained the fixative formalin, traces of which have since vanished from the powder. And Smith said formalin has been reported in medical literature to damage DNA and prevent its extraction from tissue.

On Jan. 31, four more sets of remains were unearthed from the Punch Bowl, including two from World War II to see how they had been buried.

Holland said all four had been prepared the same way. "The Army interment practice had not changed between World War II and Korea," he said. "They were wrapped up in much the same way and appear to have been treated with the formalin hardening compound in much the same way."

Specimens from those four have been sent to Rockville, and although testing continues, Smith's team has been unable to extract DNA. It has been frustrating.

"We're not used to having to struggle this long," he said, adding that he thinks the problem can be surmounted, perhaps by taking a bone sample from a part of the skeletons less affected by the powder.

In the meantime, he said, there probably will be no more exhumations from the Punch Bowl.

"There was a time in the early '90s, also during the time of the Tomb of the Unknowns, that there was a sense of imperviousness: Mitochondrial DNA can do anything, anywhere, anytime," Smith said.

"We found out," he said, "that DNA is not magic."

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