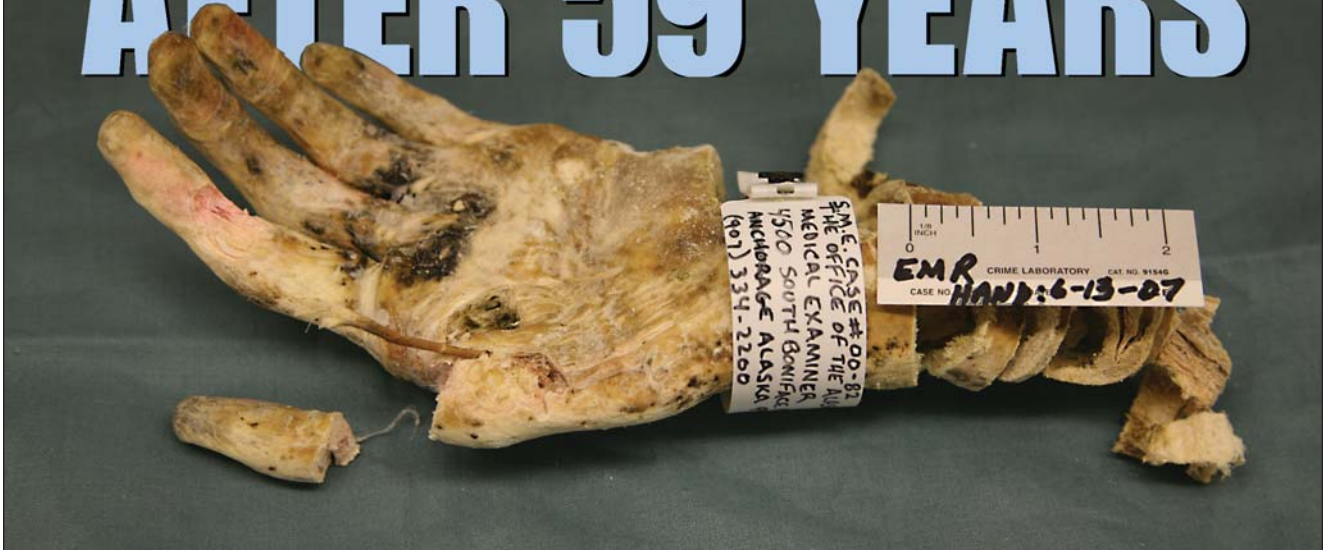


IDENTIFIED AFTER 59 YEARS



Recovering prints from a badly deteriorated hand defied the odds...but they managed to do it

Written by Dale Garrison • Photos by Edward Robinson

FORENSIC INVESTIGATIONS often turn on unexpected events, but few cases can match the many twists of fate and chain of events that were involved in a military flight that crashed in Alaska in 1948. Because of the persistence of previously unrelated people from different backgrounds and disciplines, forensic science now has a groundbreaking case study for its reference books:

The use of a new product that was designed to be used in the fingerprint-rejuvenation process helped identify one of the victims of that 1948 plane crash 59 years later. To date, this case is thought to represent the identification of the oldest embalmed remains in the world.

Forensic specialists involved in this case utilized a new tool that offers the ability to identify severely decomposed and desiccated tissue belonging to individuals who would otherwise remain unnamed. The account also illustrates the value of collaboration,

**On March 12, 1948,
a DC-4 crashed into
the face of Mt. Sanford
in eastern Alaska.
Everyone on board died
...and their bodies
were never recovered.**

including partnerships that occur when strangers connect to solve a problem that had challenged others for years.

This case involved the coincidental meeting of several sets of professionals from across the country, beginning in laboratories in Mississippi and Virginia. But in the beginning, there was the plane itself.

30 Victims Buried on a Glacier

The mystery began at 9:14 p.m. on March 12, 1948. Northwest Airlines

Flight 4422, a chartered DC-4, was demolished by impact and fire when it hit the western face of Mt. Sanford in eastern Alaska. The flight's 24 passengers were Merchant Marine sailors who were returning from China after delivering an oil tanker with the name SS Sunset. The 24 passengers and six aircrew members perished. All were veterans of World War II.

The Civil Aeronautics Board declared that the wreckage of the aircraft was "inaccessible from either the ground or the air"—a serious understatement, considering that the unstable glacier sat below massive cliffs subject to frequent avalanches. Within days, the wreckage was covered in snow and ice. It would not be seen again for half a century.

The unfortunate event required no exaggeration for dramatic effect. Not only did it involve the loss of 30 lives on a military flight at the dawn of the Cold War, but there were also stories—stories that were never confirmed—

that the plane was carrying gold, possibly from some international intrigue involving China. All that was known for certain, however, was that the plane had hit the side of a mountain just minutes after refueling and taking off from the airport in Anchorage.

“Everyone loves a treasure hunt,” said Edward Robinson, assistant professor with the Forensic Science Department at George Washington University in Washington, D.C. “This story has all of that.”

Five decades passed but, despite the rumors of lost gold and multiple searches, the wreckage had not been found. Then, in 1997, two pilots who had been intrigued by the story of the downed plane set out on their fourth expedition to relocate the wreckage—and they finally found it. Because of the flow of the massive glacier, what was left of the plane had traveled nearly two miles in just under 50 years. In 1999, the pilots returned to the site and located a few personal objects—including a cigarette lighter and a knife. More significantly, however, they also found a human forearm with the hand still attached.

Early Efforts to Identify the Victim

No external identifying marks were present to help identify the human remains, which were later recovered by an Alaska State Trooper. It would take an additional nine years to find a name to attach to these scant remains.

The arm and hand were flown from the crash site to Anchorage where the medical examiner obtained inked fingerprints from the hand and compared them with ten-prints from 22 of the victims on board. No match could be made. The arm and hand were subsequently embalmed and stored.

A few years later, the medical examiner’s successor sent a few small pieces of the arm to a commercial DNA laboratory, but no genetic profile could be obtained. By 2002, the Alaska laboratory’s chief researcher was forced to report, “The biological material of the four samples has been degraded to a point where the DNA strands are too small to get [legible] results. General weathering, especially moisture in older samples, causes the strands of

In 1999, the arm of one of the passengers was found...and efforts began to identify the victim. But nothing worked until they used a new rehydration solution.



Missing fingernails (top photo) indicated that the epidermis was missing from the fingers—making it particularly difficult to generate good, legible fingerprints from the hand. In order to rejuvenate the tissue and enhance the friction-ridge skin on the dermal layer, the fingers were soaked in the I.D. Enhancer Solution (bottom photo).

DNA to break down into smaller pieces, making them unreadable.”

Although this occurred fewer than ten years ago, the science of DNA identification in 2002 had yet to reach a point where a sample this highly degraded could produce a suitable DNA profile.

Facing this roadblock, the pilots who discovered the arm and hand sent out a plea for help from the relatives of the people killed in the plane crash. One relative, the son of a man killed on that flight, contacted paleo-DNA expert Dr. Ryan Parr at Genesis Genomics in Thunder Bay, Canada. Parr agreed to help, and over the next four years he and his team worked to collect DNA samples from relatives of the victims and made further attempts to get a usable DNA profile from the arm and hand.

Four years later, though, the DNA was still proving too degraded to help provide an identification. Using one of the many networking links in this story, Parr contacted Dr. Odile Loreille—a scientist at the Armed Forces DNA Identification Laboratory (AFDIL) in Rockville, Maryland—who was in the process of developing new techniques for use in identifying the remains of Korean War veterans, that were nearly as old and embalmed using a similar method as the arm and hand found in Alaska.

The Alaska remains were sent from the laboratory in Canada to the laboratory in Maryland with the hope that this more advanced, specialized DNA technology might help identify at least this one victim of the 1948 plane crash.

Using new techniques, Loreille was able to obtain the arm and hand’s mitochondrial and nuclear DNA. But seeking samples from possible family members of the airline victims proved to be tedious, difficult work. Several of the passengers and all of the crewmembers had been eliminated as possible matches for the surviving arm and hand. But more than half a dozen of the crash victims still remained, and each one was a possible match for the recovered remains. Something had to be done to narrow the field.

REHYDRATION

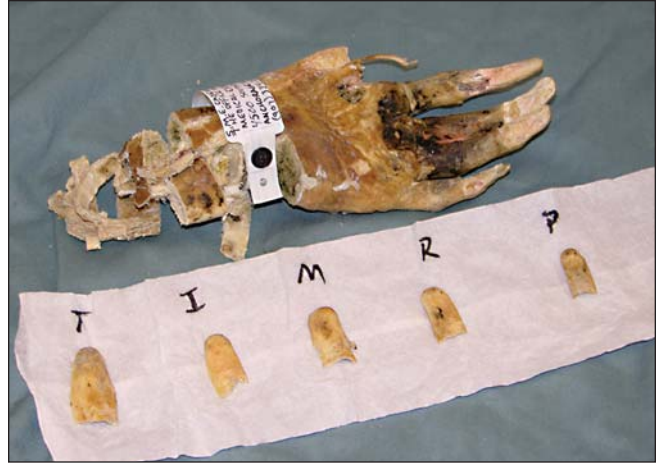


After the fingertips were soaked in the I.D. Enhancer Solution for one day, the tissue had greatly improved. Edward Robinson then photographed the results and preserved them with two different brands of silicone rubber.

Using Fingerprint Technology to Identify the Remains

In April 2007, the investigators tried taking a new direction. Loreille at the AFDIL contacted Robinson, who works at George Washington University. She asked if he would re-analyze all

of the fingerprint data. Together, the two contacted the National Maritime Center in Arlington, Virginia and photographed all of the official fingerprints from the personnel files of 17 out of the 24 Merchant Marines on board the plane. Almost immediately,



Additional enhancement of the friction-ridge skin was achieved by removing the finger-pad tissue and re-soaking each section of removed tissue in the I.D. Enhancer Solution. The resulting tissue was then photographed and cast again.


they ran into challenges. Because of age, exposure to elements, embalming, and other factors, the remains provided little in the way of usable fingerprints. Only the dermal layer (the layer of skin beneath the outer layer of skin) remained, meaning that the tissue

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REHYDRATION



After soaking in the I.D. Enhancer Solution, the finger-pad tissue from each of the five digits was used to create a silicone-rubber cast of each fingertip. These silicone-rubber casts could then be filled with a hard casting material such as Castone to create a positive of each enhanced fingertip.

was almost completely smooth and fingerprints were non-existent in the traditional sense.

“The epidermis, the outer layer of skin, was basically missing,” said Robinson. “The friction-ridge patterns just were not there. There were very faint remnants of that pattern, but nothing close to being identifiable.”

Robinson traveled to Loreille’s office at the AFDIL and examined the remains with the hope of finding a way to get a clearer set of fingerprints for comparison. The tissue was dry and hard—far from optimal conditions for rolling a clear print. It would be necessary to rehydrate the fingertips. After extensive research and consideration, Robinson decided to try a newly developed procedure for rejuvenating desiccated tissue.

Just a few weeks before, Robinson had been at the 2007 International Association for Investigation (IAI) Educational Conference in San Diego, California. There, he was given a sample of a new rehydration solution sold by Evident, Inc. The company’s product, marketed under the name *I.D. Enhancer Solution*, and the way it was developed is a story in itself.

Depending on the level of decomposition and condition of the human remains, obtaining identifiable fingerprints is often nearly impossible. It can even be difficult to get legible prints from some living subjects who work in certain labor-intensive industries

that tend to create a high level of wear on the friction-ridge skin.

But in mummified remains, the challenge of getting clear fingerprints is nearly insurmountable. Restoring the pliability of the friction-ridge skin requires various techniques of soaking and hypodermic injection of different solutions and chemicals. In many cases, these procedures are slow and tedious work—sometimes requiring several days of soaking—and some of the chemicals used in the procedure are toxic and volatile, making them hazardous to both scientists and the delicate tissue of the remains.

It was against that background that another instance of coincidental networking and information sharing occurred in 2004. Kimberly Wright, a histotechnologist at Forrest General Hospital in Hattiesburg, Mississippi, was asked to prepare a poster session for an upcoming conference. For her poster session, Wright decided to research a solution that helps hydrate and relax tissue samples in order to reveal better nuclear detail in the cells. In the course of her research, she took the idea to the University of Southern Mississippi (USM) to get a reference for her poster session. There, she met Dean Bertram, an instructor at the university’s Forensic Science department, who suggested that she try her solution externally, on the ridges of fingerprints.

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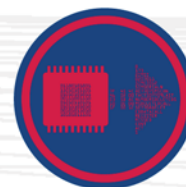
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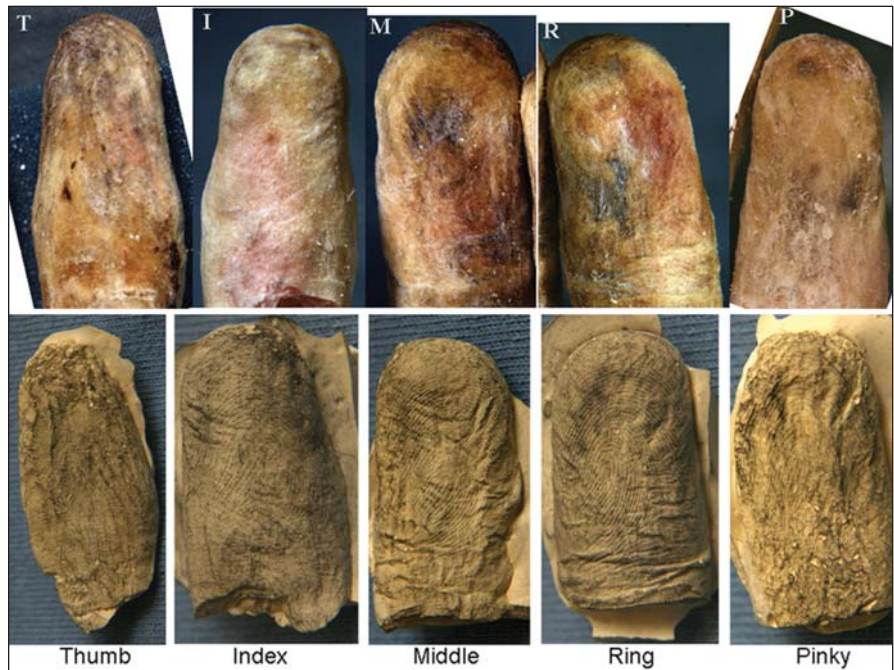
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REHYDRATION

The silicone-rubber casts were used to create a positive of each enhanced fingertip using Castone casting material. Each hard cast was then dusted lightly with black fingerprint powder to bring out the friction-ridge detail for easier comparison. The before-and-after images show the dramatic difference between the desiccated tissue Robinson started with (top) and the hard casts he ended up with (bottom) that show remarkable friction-ridge detail.



Working together, the two began to experiment with the application of Wright's solution to the friction-ridge skin of cadavers. One benefit offered by this solution that became immediately clear was that it is nontoxic and nonvolatile. In other words, it is easier to work with and will not explode or burst into flames. As a result, they were able to experiment with heating the solution to see what effects temperature might have. Heating the solution made it work even better, producing results in just 30 minutes on a fresh cadaver. Wright and Bertram, joined by a third partner, formed the company KDL Solutions and patented the product as *I.D. Enhancer Solution*.

The first test for the *I.D. Enhancer Solution* was to help identify victims of Hurricane Katrina in 2005, including several who had been washed out into the Gulf of Mexico and decomposed extensively in the saltwater. The results using the *I.D. Enhancer Solution* were overwhelmingly successful. By chance, a father and son who have a forensic-supply firm in the Roanoke, Virginia area were operating nearby. The father-son team—Michael Grimm, Sr. and Michael Grimm, Jr.—agreed to make their company, Evident, Inc., the exclusive distributor of the product.

Two years later and halfway across the country, Robinson thought

**In mummified remains,
getting clear prints
is considered impossible
unless you can
restore the pliability of
the friction-ridge skin.
In this case,
they decided to try the
I.D. Enhancer Solution.**

of the *I.D. Enhancer Solution* when he hit what seemed like a roadblock in recovering prints from the Alaska remains. Coincidentally, he had just come back from the 2007 IAI Educational Conference where he met with the Grimms and was given a sample of their *I.D. Enhancer Post-mortem Kit*.

The timing could not have been better. Less than a month later, the ability of the *I.D. Enhancer Solution* to operate at higher temperatures proved critical in restoring usable fingerprints to the Alaska remains. All five fingers were soaked in this reagent overnight at a temperature of 122°F (50°C). It worked: Friction-ridge detail was visible on all five fingertips. The friction-ridge detail was photo-

graphed and cast with two different brands of silicone rubber.

After preserving those initial results, Robinson removed the fingerpad tissue from each finger on the hand and re-soaked the removed tissue in the *I.D. Enhancer Solution*. The friction-ridge detail improved even more after this step. Robinson repeated the photographing and casting in order to preserve this set of results.

60-Year-Old Ten-Prints and 60-Year-Old Remains

Michael Grimm, Sr.—who retired several years ago as forensic-science supervisor of the Latent Print Section at the Virginia Department of Forensic Science—agreed to compare the prints Robinson had taken from the mummified remains with those from Merchant Mariners' records. Robinson, who lives in Fairfax, Virginia, agreed to meet the Grimms at a point roughly halfway to their Roanoke, Virginia location. The meeting place was an unassuming IHOP restaurant in Charlottesville, Virginia. All arrived with great expectations and the hopes were that Michael Grimm, Sr. could identify the prints.

"We thought that Mike Sr. would sit down and make a quick identification," Michael Grimm, Jr., recalled. "Well, over waffles and pancakes, we realized it was not going to be simple."

Part of the problem was that the quality of the prints obtained from the remains treated with the I.D. Enhancer Solution were generally better than the nearly 60-year-old ten-prints pulled from the government records. Areas of detail that were clear on the ten-print cards were unfortunately less clear on the prints from the remains, and vice versa. In an attempt to aid the comparison process, Michael Grimm, Jr. took Robinson's silicone casts, laid them flat and, using a flatbed scanner, created digital images of the prints. Those digital images could then be imported into Adobe Photoshop and enhanced in order to reveal more details with greater clarity.

The group returned to the National Maritime Center in Arlington to see if any additional prints were in the Merchant Mariners' files. Robinson noted that he had asked for the "official" records—and that is what he was given. However, the group learned that subsequent fingerprints were often taken as Mariners traveled between ships, and those were often kept in the files, as well.

"You have to be careful what you ask for," Robinson laughed. "I had asked for the official prints and that is what they gave me." As it turned out, there were several other prints in each file, and their quality was far better than the originals.

The victim was positively identified by fingerprints as Merchant Marine Francis Joseph van Zandt ...and this identification was later confirmed by DNA testing.

The team—Robinson and the two Grimms—traveled to the National Maritime Center to look at the other prints in person. "It was one of those times when the hair on the back of your neck stands up," Robinson recalled. "Michael Grimm, Sr. bent down and looked at one of the files for only about ten seconds. Then he sat up and started to grin."

"We were able to make the identification right at the Center," Michael Grimm, Jr. said. "It was very exciting."

The fingerprints were those of Francis Joseph van Zandt, a native of Vermont who had been in the Merchant Marines since 1943.

That day was September 6, 2007, which was just over a month after their initial meeting at the IAI's annual Educational Conference. It was also

quite appropriate that the formal announcement of the findings were made in August of 2008 when the IAI held its Educational Conference.

Forensic Genealogy and DNA Technology

While the fingerprint experts were working on their part of the identification, the DNA side of the search continued. Members of the research team included the two pilots who initially rediscovered the remains and who had become dedicated to the cause of solving the case: Kevin McGregor and Marc Millican, pilots for Delta and Northwest Airlines, respectively. They traveled around the globe to find DNA samples from possible relatives. For one family alone, they located more than 150 relatives spanning five generations. But while the genealogical research helped narrow the field from 30 individuals to just two, it had yet to result in the kind of clear identification the researchers had hoped they would find.

Then the fingerprint breakthrough occurred. Following that lead, the team was able to focus its efforts on locating the relatives of just one of the victims. They soon obtained DNA from an Irish maternal relative of the Merchant Mariner whose fingerprints on file matched the remains. During one of many telephone calls to Ireland,

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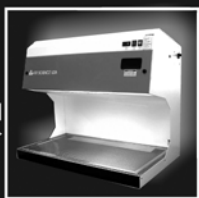
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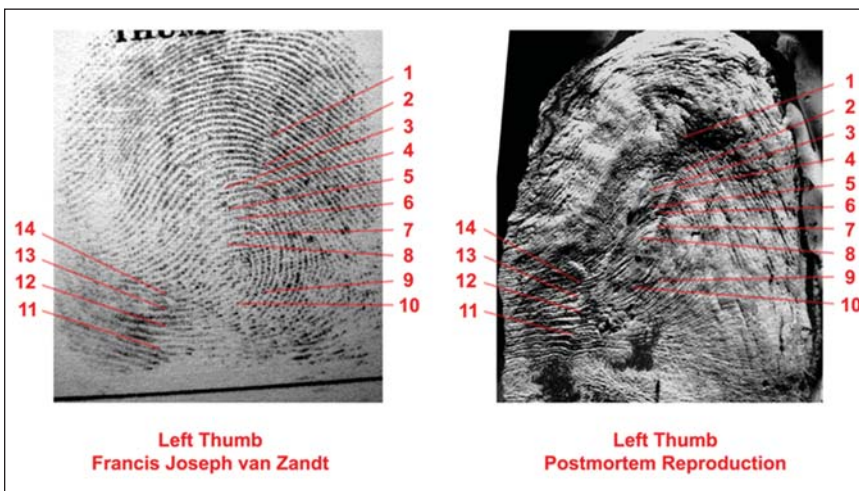


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REHYDRATION



Michael Grimm, Sr., a retired latent-print examiner, was able to positively identify the remains as belonging to Francis Joseph van Zandt by comparing the casts of the enhanced tissue to ten-prints on file at the National Maritime Center.

forensic genealogist Colleen Fitzpatrick spoke with that maternal relative, a man named Maurice Conway. Conway thought he recognized the names Fitzpatrick provided. More in-depth genealogical research proved Conway was a second cousin, twice removed from the Merchant Mariner identified through fingerprint technology. Finally, sample testing proved that Conway's mitochondrial DNA was a match for the remains that had been found on the Alaskan glacier.

The single human remain recovered from the resting site of Flight 4422 has been identified. It took a tremendous multinational effort by people from numerous backgrounds and disciplines. The nearest relative to the Merchant Mariner decided to leave the arm and hand in the care of Loreille for more scientific research. Based on all of this forensic data, Alaska's medical examiner, Dr. Stan Kessler, was able to officially make an identification of this long-lost veteran.

The coincidences were not over, however. The identified Mariner's last known address was in Roanoke, Virginia, just a few blocks from where the Grimms live. The Grimms also had another interesting tie to the fatal plane crash: Michael Grimm, Sr.'s father had been a truck driver in Alaska at the time of the accident, and had often spoken of what had

been the worst airline accident of that time in Alaska.

Application of an extreme case to everyday cold cases

The newly proven ability to identify seemingly impossibly degraded remains opens dramatic opportunities for law enforcement. This ability may redefine the term *cold case*, suggested Robinson.

"Now we have the possibility of identifying people by two new techniques," Robinson said. "Just the silicone cast and use of the flatbed scanner is significant. All of this is a pretty dramatic step forward."

On the human-interest side of the story, the two pilots who would not let the case rest are now raising funds for a memorial in Anchorage to the people lost in the 1948 plane crash. They have already given 30 miniature flags that were flown over the crash site to family members of the victims.

"There were some things about this case that were dramatic," Robinson concluded. "There were some bizarre things that shouldn't have happened—but they did." ☺☺

About the Author

Dale Garrison is a freelance writer and regular contributor to the magazine. He is based in Liberty, Missouri and can be reached by e-mail at:

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