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SOME OF THE TOPICS IN THIS ISSUE

- Worthwhile tips on managing digital images
- How to begin planning for your new lab
- UV and IR injury photography
- Interview with David Knoerlein, photographer
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, 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—

**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.**

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

Written by Dale Garrison • Photos by Edward Robinson
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.
REHYDRATION

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, 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...
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 reju-venating 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 net-working 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.

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.
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 of the I.D. Enhancer Solution when he hit what seemed like a roadblock in recovering prints from the Alaska remains. Coincidently, 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 photographed and cast with two different brands of silicone rubber.

After preserving those initial results, Robinson removed the finger-pad 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,
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 impossible degraded remains opens dramatic opportunities for law enforcement. This ability may redefine the term cold case, suggested Robinson.

“No 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.”

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**About the Author**

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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.