

# The Old Bones

CH115: Science of Crime

Professor Julie Millard

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In 2015, skeletal remains were found by construction workers when digging the foundations for a housing development. The Washington State police were alerted and the case quickly became sensitive. After all, Taylor Mountain was the place where Ted Bundy, American serial killer and serial rapist from the 1970s, buried the skulls of many of his victims. The police piled its manpower into the case, but identifying the remains was easier said than done. The lower part of the skull was brutally damaged, much more so than the other bones. This meant that dental records, one of the main ways to identify remains, could not be used. If it was to be assumed that this was one of Ted Bundy's victims, the remains would be about 40 years old. The badly decomposed body left very little DNA to extract, thus also ruling out nuclear DNA analysis. However, with countless modern forensic analytical techniques available, the police aimed to identify the remains as well as establish the likelihood of the remains being the result of a Ted Bundy murder.

Ted Bundy had killed many young girls in his lifetime, ages ranging from 12 to 26 (Murderpedia, N.D.). Many of the girls he confessed to killing never had their bodies fully recovered. He was also known to have a very specific victim profile: young, petite Caucasian females who had their hair parted in the middle. He killed an estimated 37 (or more) females

before he was finally arrested and eventually executed. Were these remains one of the many unfortunates? The police were determined to find out.

A few days after the discovery of the bones, the police department received an interesting call. The call originated from the Jeffersonian Museum from Dr. Bemperance Tennan, one of the world's leading forensics anthropologists. She stated that her aunt, Janet Fair, had also gone missing around 40 years ago. At the time, Ted Bundy confessed to her murder, but her body was never found. Dr. Tennan requested a mitochondrial DNA (mtDNA) test to either confirm or deny her suspicions. The police agreed, hoping that it would bring a quick close to the case. The Doctor personally flew to Washington to deliver her mtDNA sample.

Mitochondria is an organelle found inside cells. It is what provides energy to the body for many applications. The part of forensics interest is that mitochondria has its own set of DNA. This DNA is also only passed down maternally. Unlike nuclear DNA (nDNA), where only identical twins have the same sequence, mtDNA is the same for people maternally related. As Dr. Tennan's grandmother was her aunt's mother, her claims will be validated if her mtDNA matches with the remains. MtDNA analysis is often used when nDNA is not present. In the condition the remains were found in, not enough nDNA would have been able to be extracted to run proper tests. Unlike nDNA, however, mtDNA is found in bones, teeth and hair, and thus is more useful in identifying the skeletal remains.

MtDNA analysis has three main steps: polymerase chain reaction (PCR), base sequencing through electrophoresis and comparison between sequences. Dr. Tennan gave a small sample of her hair (which was more than enough) while a small sample of bone was used from the remains. In mtDNA analysis, the sample of mtDNA is first copied millions of times in a machine (PCR). The different fragments of mtDNA are then separated through size and charge using a technique

called gel electrophoresis. The different movement of mtDNA fragments can then be used to compare the sequences of different individuals (Millard, 2015). The testing didn't take long, and Dr. Tennan soon got her answer: the remains did not belong to her aunt.

Dr. Tennan, although disappointed, agreed to give professional insight on the case after many pleads from the police department. After all, who could be better to identify the skeletal remains than a forensics anthropologist? Everyone went to work in hopes that another family could gain some peace of mind.

As a brilliant anthropologist, Dr. Tennan astounded many with her efficiency and versatility. "I do more than just identify" (Yaitanes, 2005) she stated as she worked. After the bones had been cleaned, she quickly pointed out many factors. Below is an extract taken from the statement Dr. Tennan gave to the police:

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*"Although it is in bad shape, it can be accurately seen that the top of the skull has not completely fused together. This is the "soft spot" on infant heads and it closes over time. It shows that the victim is no older than 35. I can also infer from the skull proportions that the remains were most likely that of a Mongoloid (in simpler terms, Asian). Judging by the relatively wide pelvis and the lack of marks on the cartilage, victim was female and had never experienced childbirth. Additionally, the smoothness of the joint lessens the possible age further, suggesting that she was no older than 30 (PBS, N.D.). The length of the humerus (upper arm bone) and femur (upper leg bone) are proportional to stature, and thus suggest the victim was approximately 170cm*

*tall (Mia Facts Site, N.D.). Lastly, note that there is still a slight bump on her left ulna (low arm bone). This suggests that she is in the third stage of bone remodeling. I would suggest with about 90% certainty that this fracture was inflicted within the last two years (Parkhurst Exchange, 1999)."*

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Dr. Tennan's analysis led the whole department to take a step back. Ted Bundy had a very specific victim type, one rule that has never been known to be broken in his killing spree: all his victims were Caucasian females. Assuming Dr. Tennan's analysis was correct, the body wasn't Caucasian. After much deliberation however, the department decided to continue to operate under the assumption that the remains belonged to a Ted Bundy victim. After all, the coincidence of the burial area, age, and battered skull were simply too much to overlook. The analysis also opened many new leads for the police department. They quickly followed these up, accumulating a list of young females who had gone missing in the indicated period, focusing specifically on missing Ted Bundy victims.

In the meantime, the forensics team worked to accurately date how old the remains were. As the remains were roughly estimated to be about 40 years old, lead-210 dating was a more logical choice than carbon-14 dating, which is typically used in remains over 100 years old. The half-life of lead-210 is 22 years. This means that the amount of lead-210 halves every 22 years in the human body (Radford, 2004). Using this information, the forensics team were able to narrow down the timeframe when the victim was dumped to a specific year: 1974.

It wasn't long before the police department found the story of Mary Soo. Mary Soo was an American born Korean, extremely bright and had a promising future ahead of her. Most students struggled after entering an academically rigorous institute like the University of

Washington, but not Mary. Hardworking and perseverant, Mary was a straight A student and was loved by all her peers and professors for her dedication as well as her upbeat personality.

It was finals week when it happened. According to the statement of the librarian in Mary's casefile, she had been studying in the school library until about 1 a.m. before she finally decided to head back to her apartment she shared with three other University of Washington students. It wasn't a long walk, but it did involve crossing a small park. While during the day, the park provided a serene atmosphere, it was more ominous than anything during the night. But knowing Mary, she probably wasn't worried. She had made this trip too many times to count - what could possibly go wrong this one fateful night?

When Mary didn't return for the whole night, her roommates weren't particularly worried. After all, there were previous instances in which Mary had studied so far into the early hours that she simply bought a coffee at a nearby café and went straight to her first lecture of the day. However, when Mary hadn't even returned for a change of clothes the second night, they began to worry. The police were alerted two days after Mary's disappearance and a state wide search started, but there were never any substantial leads and her body simply could not be found. The case soon turned cold and remained only to gather dust on the Washington police station shelves.

Other than her ethnicity, Mary fit immaculately into Ted Bundy's victim type. She was a petite girl, almost always wearing her hair parted in the middle. Her physical appearance along with the location of her body was found let the police draw the conclusion that she was indeed a Ted Bundy victim with fair certainty. With this new information, the police worked to find a relative of Mary's to compare mtDNA.

Jane Pan, Mary's niece, soon stepped forward after hearing about the search and readily agreed to give an mtDNA sample to test against the remains. The test came back positive. The body was finally, confidently, identified. The case was finally, confidently, closed.

The forensic techniques used in this case were vast in their variety. While previously Mary Soo's case was dismissed as a random murder, modern science has proven that, beyond a reasonable doubt, this is not true. The use of forensics anthropology, mtDNA analysis and lead-210 dating were used to support this conclusion. Mary Soo's unusual case also opens up the possibility that Ted Bundy killed much more than previously imagined; a fact that can potentially be used to identify the other unknown bones. Regardless, it can be said that future progress can warm even the coldest of cases.

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