

## **Podcast Transcript: “Secrets of the Campus Cadavers”**

**Narrator:** From the University of Utah, “Secrets of the Campus Cadavers.” I’m Paul Gabrielsen.

### **Episode 3 – The Remains**

**Narrator:** This is the Rio Grande Depot in Salt Lake City. This stately building dates back to 1910. As the rail hub for the Denver and the Rio Grande Western Railroad, it’s a part of Salt Lake’s history. Arriving immigrants and departing World War II soldiers passed through the building through the first half of the 20<sup>th</sup> Century.

It’s only fitting that the building now houses the Utah State Historical Society. Off the cavernous lobby is a research library, with warm woods and the rich smell of old paper. Through a door, another door, and another door, and you’re in Derinna Kopp’s lab. Here is where the bones have been brought. They were found in April 2016 at a construction site at the University of Utah. Now they’re here, laid out carefully on tables covered in brown paper. Each bone is neatly labelled, with masking tape marking the groupings of different bone types. There are clearly-recognizable long bones, ribs, feet and a few skulls. Several jaws, each with only a few teeth. Many pieces are just fragments.

Kopp’s job as the Utah State Forensic Anthropologist is to turn these fragments into a story.

**Kopp:** There’s so much that we can learn from looking at skeletal remains of individuals. Whether they’re 45 years old, a recent modern person, or they’re 5,000 years old. We can learn so much about the life of that person by looking at their bones.

**Narrator:** It’s a working laboratory, but it’s also a place of respect. Photos would be inappropriate. There’s a feeling of reverence and quiet.

**Kopp:** And it actually gets me rather upset when people think about “bones are so cool, I just think they’re so cool” – yeah, they’re cool, but they’re a person and you have to always remember that that was somebody that was just like you and me and we have to treat them with the same respect that we would want to be treated with, or we would want our grandparents or our loved ones to be treated with.

**Narrator:** One of her first tasks when looking at the remains found at the U is to determine the minimum number of individuals represented in the collection.

**Kopp:** So in this case we had 11 right proximal femurs. So, that’s the ball of the ball and socket of your hip joint. And we had 11 of those that were on the right side. And we know that each person only has one right proximal femur, so if we have 11 of those we know we have at least 11 people that are represented by this set of remains.

**Narrator:** Then she needs to determine which bones might have belonged to the same person. That’s based on the principle of articulation, or how well the bones fit together.

**Kopp:** When I’m teaching this to undergraduates and graduate students, I actually say “What you need to remember is the foot bone attaches to the ankle bone, the ankle bone attaches to the shin bone, the shin bone attaches to the thigh bone. . .”

**Narrator:** Some other clues: symmetry between bones from the right and left sides of the body. Staining on bones that result from the circumstances of the burial. In this case she can tell that the cadavers, when they were buried, still had flesh attached.

In addition to figuring out how the bones fit together, though, she also had to figure out how they were taken apart. It was immediately apparent that the remains were anatomical cadavers, used for dissection by medical students. She recognized the marks of saws and chisels.

**Kopp:** And so I wanted to - I know what the modern processes of anatomy are, but I wanted to see how they might be different or changed in the early 1900s. I did - I went to the internet archive and I just did a search for an early anatomy text. The one that I picked up on was actually called Holden's Anatomy and it was published right around the turn of the century in 1901.

**Narrator:** Kopp is going to describe how that textbook instructed students in dissection procedures. For comparison, you'll also hear Kerry Peterson. He's the director of the body donor program at the University of Utah, and he'll describe how students perform the procedure now. Fair warning: they're going to talk about dissecting human bodies. If that kind of thing isn't for you, you might want to skip the rest of this episode.

Still with us? The first procedure is removing the calvaria, or the top of the skull, to gain access to the brain.

**Kopp:** They talked about using the saw and sawing around right above the ears,

**Peterson:** We circumscribe or draw a line around the bone and take a, it's a cast-cutting saw, they're also known as bone saws, it oscillates, and then we cut along that line . . .

**Kopp:** . . .but not sawing all the way through the bone because you could cut the dura and you could cut into the soft tissue inside. . . And so then what the anatomy text suggested that once you get almost through the bone you get a very fine chisel . . .

**Peterson:** . . .we take a chisel and a mallet and we crack that inner surface of bone to be able to lift the calvaria off without destroying or damaging the brain in any way.

**Kopp:** And on these calvaria samples, we can see that.

**Narrator:** The next procedure is called a laminectomy.

**Kopp:** This was really interesting because, what it is - it's called a laminectomy. So the lamina are the - If you think about the bumps down the middle of your back, those are the spinus processes, and down each side of them are the lamina, they're kind of like little plates that connect your spinus processes to the round part or the body of your vertebra.

**Peterson:** What we're doing when we cut through the lamina is we hope to expose the spinal cord itself.

**Kopp:** Bend the back of the person so it's bent and use a saw that's not a straight saw, it's more of a curved saw. . .

**Peterson:** . . .we take that same autopsy or bone saw and we cut through these lamina, from top to as far down as we can go.

**Kopp:** Once we got this spinal column back together we could definitely see how they did it and how the cuts matched up from the upper to the lower vertebrae.

**Narrator:** Looking at the curriculum the U Medical School used at the time and the remains found reveals an exact correlation. Here's Kate Hovanes from SWCA, the archaeological firm that excavated the remains. Hovanes is a historian. She scoured records to lend some context to this story. As part of her research, she found lists of courses from the medical school's early days.

**Hovanes:** The spine, which matches up with Anatomy class number 4 which is the Head, Neck, and Spinal Column. Similarly, the fact that we found feet might relate to Anatomy 2, which is The Lower Extremity. Usually we don't get as close correspondence as that. Usually it's a little more speculative, but that just – going "Huh! I guess that probably matches up pretty nicely!" is an unusual experience with history.

**Narrator:** So, the bones tell us that anatomical dissection hasn't changed much in the past hundred years. We can see those procedural clues. But the bones also tell more personal stories about people's lives.

**Kopp:** Another one that it really, actually, touched me quite a bit was a hand that we had.

**Narrator:** Touch the bones on the back of *your* hand. They're straight. The bones on this hand are smashed, broken, bent and warped.

**Kopp:** The individual had had some sort of horrific, probably crushing injury to their hand. And the fact that they were deformed when they healed really showed me that this person couldn't keep the hand immobilized all the time, so it wasn't cast like we think when we get broken bones now. If someone had such a crushing hand injury today they'd definitely have multiple hand surgeries, and they would have fine screws and plates and everything in their hand to reconstruct it. You just look at it and you can see the pain and the suffering that this person went through.

**Narrator:** It's a dramatic example of the things the bones can teach us about the people they belong to. There are others here too – there's a set of forearm bones with a partially-healed break called a parry fracture.

**Kopp:** It has long been identified as a possible fracture that is caused by a defensive posture. If someone's being hit or especially about their head, they're being hit, they might put their arms up to protect their head. When you do that, when you put either your left or your right arm up to protect the head, the ulna is the bone that is facing outwards, facing towards your possible aggressor. And often you would think if someone's falling or trying to break a fall, you would most likely see both bones fractured or have some sort of injury, but this individual just had their ulna fractured. And so, again it's suggestive to me that this individual was probably trying to block blows in a defensive mechanism. It's what we call *antemortem*, which means it happened before the person died, but it wasn't completely healed. So that lets me know it happened not a few weeks before but could be a few months before.

**Narrator:** Kopp says that many of the bones showed signs of arthritis.

**Kopp:** There are very high levels of osteoarthritis, especially for the age. We have younger individuals, people in their 20s and 30s with very high levels of osteoarthritis, and we have older individuals with very severe osteoarthritis. Older individuals would be in their 50s and 60s. So that lets me know that these people were doing a high amount of activity, probably labor, especially based on the amounts and types of arthritis we see in some of the joints. These were workers. These weren't people who sat at home all day long. They were out either in the field or in the mines or in the factories, working every day.

**Narrator:** We have a few other details: as far as Kopp can tell, all of the bones belonged to men. One, possibly, was an older teenager. It's amazing how much we can learn about these people from their bones. Without a name, without any record of any other detail of their lives, we know that they were probably laborers, maybe with hard lives and not much access to medical care. Their life histories, their hardships and pains, their growth, are all preserved in their bones. They've told us part of their life story without uttering a word.

It's likely that the medical students who dissected these cadavers learned all of this and more about the bodies they worked with. So what else can medical students learn from a human body?

That's coming next time, on Secrets of the Campus Cadavers.

This podcast is a production of University of Utah Marketing and Communications, produced, written and edited by Paul Gabrielsen and Brooke Adams.

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Web assistance by David White and Scott Troxel.

Marketing assistance by Collin Barrett and Jason Jiang.

Our music is "Procession," by Puddle of Infinity.

Special thanks to Christopher Nelson, Maria O'Mara, Lindsay Kester, Alice Whitacre, and Bethany Gabrielsen.

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