

TheCrimAcademy_40_Corrado

Sat, 3/5 7:57PM 1:00:41

SUMMARY KEYWORDS

dna, people, forensic science, person, sample, dna profile, crime scene, database, evidence, cases, disciplines, called, forensics, analysts, crime lab, forensic scientist, question, forensic, match, left

SPEAKERS

Kathy Corrado, Jenn Tostlebe, Jose Sanchez



Jose Sanchez 00:00

Hi everyone, welcome back toThe Criminology Academy podcast where we are criminally academic. My name is Jose Sanchez.



Jenn Tostlebe 00:21

In my name is Jenn Tostlebe.



Jose Sanchez 00:23

And today we have Dr. Kathleen Corrado on the podcast to speak with us about forensic investigation, forensic science and DNA evidence. Kathleen is currently the director of the Forensic and National Security Sciences Institute at Syracuse University. Prior to joining the University, she worked for over 25 years as a forensic scientist. She began her career in forensics at the Texas Department of Public Safety Crime Laboratory in Austin, Texas, where she specialized in crime scene investigation, biological fluid identification and various forms of DNA analysis. In 1989, she left Texas and moved to Syracuse, New York, to head the forensic biology DNA section of the Onondaga County Center for forensic sciences. She then spent the next 20 years as director of laboratories at the CFS, where she managed the ISO-17025 accredited laboratory including oversight of the forensic biology, DNA, firearms, latent print, drug chemistry, and digital evidence disciplines. She has testified as an expert witness in the state of Texas, the state of New York, and in US federal court. She has served on numerous regulatory and oversight committees, including New York State Commission on forensic science, the state of Virginia Scientific Advisory Committee, the National Institute of Science and Technology Organization of Scientific Area Committee, and the American Society of Crime Laboratory Directory Directors' Laboratory Accreditation Board. Thank you so much for joining us today, Kathy.



Kathy Corrado 01:50



Kathy Corrado 01:59

Well, thank you for having me.



Jose Sanchez 02:01

And I hope that's the last time I have to say laboratory today. Tough one for me.



Jenn Tostlebe 02:13

Alright, so before we get started, just a brief outline of where this episode is headed. First, we're going to start with a section on criminalistics and forensic science, broadly speaking, and then from there, we're going to move into DNA evidence, which we're pretty sure that's your specialty. Right, Kathy? Okay. Yes, yep. So Jose, I will let you get started with criminalistics.



Jose Sanchez 02:36

Right, but just some quick background. So I'm like, this is one of those areas where I'm pretty interested in mostly because I came out of a Criminalistics and Criminal Justice Department. And part of our undergrad studies, or major requirements were three forensic classes. So, Intro to forensics, Crime Scene Investigation, and I forget what the other one is but anyways, but we'd like to start with something broad like we generally do. So can you tell us exactly what forensic science is?



Kathy Corrado 03:07

Sure. I mean, in its broadest definition, forensic science is basically the application of science to the enforcement of laws. In other words, what we try to do is use science and technology to help provide accurate and objective information that might help us understand what occurred in the commission of a crime or what could have happened at a crime scene.



Jose Sanchez 03:29

So, does that mean that forensic science is only used for, like the legal side of things?



Kathy Corrado 03:36

Well, so some people you know, you're most familiar with it being used in the criminal investigations. However, it also can be used in civil cases, such as workplace drug testing, or automobile reconstruction, or also in, you know, mass disasters, helping to identify bodies, or why a building collapsed, things like that.



Jenn Tostlebe 03:54

Okay, and I don't know if this is the right word, but what disciplines are included under this umbrella of forensic science? And correct me if that was not the right word to use?

 Kathy Corrado 04:04

No, that actually is the exact right word to use and we call them disciplines. And you know, basically, it's sort of never ending and you could apply forensic science to any disciplines. But typically what we talk about, you're thinking about the normal Crime Lab, which would have you know, fingerprints, and firearms and DNA testing, toxicology, trace evidence, which would be, you know, hair, paint fiber, drug testing, like controlled substance testing. That's typically what we consider the disciplines. But there's also you know, broad disciplines that include forensics which would be forensic psychology, forensic linguistics, pathology. And then of course, there's digital evidence, which is like the fastest growing field and you know, you just started with computers, and now we're talking about cell phones and all the many things that we can use that for it. It's not just that it could be digital evidence can be using car forensics or home security system. So, really, it encompasses a lot of different things.

 Jenn Tostlebe 04:57

What is forensic linguistics? Never heard of that before.

 Kathy Corrado 05:01

Forensic linguistics and we actually at the college, we just have a seminar last week from a forensic linguistics professor. So it's very interesting. It's using speech patterns and words and how people put words together to be able to decipher things about them. So, in other words, they might take like a suicide note to determine is it real or not, they might take you know, when someone's been kidnapped, and someone might write a manifesto about why they did it or something. And they can take pieces of information from that type of work and kind of give investigators information about the person, you know, where they might have been from different parts of the country, or, you know, if they've had certain amount of schooling or not things like that.

 Jenn Tostlebe 05:39

So, my mind goes to like the Zodiac Killer with the deciphering, would that fit under?

 Kathy Corrado 05:45

Absolutely. Okay, so you could do a whole nother podcast on that I can give you the person to talk to Yeah.

 Jenn Tostlebe 05:53

Yeah, that'd be really interesting. So we have seen forensic science get criticized in and out of courtrooms. Example, in court lawyers may try to downplay the science leading to events like the FBI forensic scandal a few years ago, were a quarter of 329 cases since 1989, had issues surrounding subjective pattern based forensic techniques like hair and bite mark comparisons. We also know that techniques like fingerprinting have been called into question. So, can you talk to us a little bit about these criticisms surrounding forensic science and how the field has tried to address the criticisms?

K

Kathy Corrado 06:34

Yeah, certainly, I think a lot of the criticisms revolve around how results are reported. So whether that's an analyst generating a laboratory report or how they're testifying, it's really important that a forensic scientist is very clear about what the results mean, so that they can't be misinterpreted, whether that's misinterpreted by law enforcement, or lawyers, or juries, a good example would be hair comparisons. You know, in many, many years ago, a person performing hair comparisons may have reported that something like this hair from the crime scene is consistent with the hair from the suspect, or they may have said, you know, this particular suspect cannot be excluded as a possible contributor to that hair. And while that's an accurate statement, you know, what does that actually mean that it's consistent? I mean, does that, you know, if we look at the number of characteristics, does that mean that, you know, one in 10, people also would have hair consistent or couldn't be excluded? Or if we look at, say, DNA, where we have a lot of characteristics we can look at, you know, it might be in the one and 100 billion that might have similar characteristics. So, you know, it's really the question of when we give our results, are we being clear as to what the limitations are? And, you know, is it very clear what we mean, when we're saying there's a match, how significant is that match. And so, we're really making some good strides in making sure that we report it more clearly, so that people can understand it, and also that we express the limitations. And also, we're there's a lot of studies going on now, a lot of empirical studies to allow us to understand more about these different characteristics. So we can actually give a really clear numerical value as to the significance of that match.

J

Jose Sanchez 08:10

Speaking of, you know, evidence being presented in courtrooms, and we know, you've probably been asked this hundreds of times, and you're probably like, sick of it at this point. But I think we'd be remiss if we didn't ask it. And so I took my interest in forensics class back in 2015. And I just kind of never really thought about it again. But we one of the things we discussed was the CSI effect. And for those of you that have never watched CSI, it stands for crime scene investigation. It's basically a police procedural like law and order, where crime scene investigators basically act like cops collect the evidence, analyze it in about 20 minutes and solve the case. But in preparing for this episode, I kind of dug into it a little bit again, since it's been so long for me. And I saw that there's some people that say it's something that we should worry about, but also some people saying it's kind of overstated, and not really as big a problem as some people say it is. Can you tell us maybe a little bit more about the CSI effect? And so where does the field stand concerning this issue these days?

K

Kathy Corrado 09:12

Sure, you know, as you said, we've talked about the CSI effect for a really long time. It's CSI NCIS Criminal Minds. I mean, every show now talks about forensics. And then one nice thing is it's brought to light to forensics, you know, which is good. But the idea of the CSI effect is that it may be setting up unrealistic expectations. So, basically, people in particular, juries might assume that every single crime that's committed has evidence that forensic science can help shed light on in reality, it's a pretty small percentage of cases that go to trial that have significant forensic evidence. And so the CSI effect was this concern that people would expect to see it and when they didn't see it that they might not convict. They might say, I'm not willing to convict someone without forensic science. And there's just as you say, I mean, there's been sort of a back and forth. Some people say it exists that they tried to study, some people say no, it's really not. I think the bottom line is that we don't really know how much it affects. But what I do know is that, because it's been talked about, and because it's been talked about so much, there's a lot of now, information out there saying, to make people aware that it doesn't always exist. And in particular, you know, prosecutors and defense attorneys often put, like, we would have scientists go and testify when they didn't get results. And they'd have to explain well, why is it you know, that you didn't find fingerprints on this gun? And how often do you find fingerprints on gun? So I think we've done a good job of being able to explain to the juries why it doesn't exist. And I think there's been enough written about that now that hopefully, more people understand that it's not always there.

 Jose Sanchez 10:39

Yeah, I think a little known fact, Jenn and I were actually both at one point, wanting to be CSIs, until we realized what that actually meant.

 Jenn Tostlebe 10:50

And there's no private jet involved, which is really sad.

 Kathy Corrado 10:55

No, I always, when I give presentations often show a picture of their nice car. And then I have a picture of my car, which is an empty parking space. Like we don't have a car. You know, it's funny, because it's very true. But also, you know, people don't realize it's very interesting work. I'm not gonna lie. It's very interesting. But it's also tedious. I mean, you're often spending a large amount of time looking at really small things and not making a lot of progress. So it's not all glamorous by any stretch.

 Jenn Tostlebe 11:20

Patience. I'm sure you have to have a lot of it.

 Kathy Corrado 11:23

Yeah, absolutely.



Jenn Tostlebe 11:25

All right. So let's move then into the DNA specific portion of this episode. And as Jose mentioned, in your introduction, we know that you started at the Texas Department of Public Safety Crime Laboratory in Austin, Texas, doing crime scene investigation, can you tell us about your position that you held in Texas, and then walk us through what the evidence collection process looks like after a crime has been committed?



Kathy Corrado 11:52

Sure. So as you said, I started in Texas. So prior to my working in a crime lab, my schooling, my degree was in molecular biology DNA. So, I was hired in Texas to be a DNA analyst. So that was my main focus was DNA analysis. But in the Department of Public Safety, we had a crime scene team, that we would be called out for major crimes like homicides, or mass disaster, things that the normal regular police agencies maybe weren't equipped to handle. And so what they would do is, whenever there was a crime scene, they would call a team out and we would have specific experts, like I would go as a DNA expert and then you'd have like a fingerprint person, a firearms person and a photography person, we would make up the crime scene team. So, when we would be deployed out to crime scenes, which in Texas, you know, was always interesting, I can tell you that. Crime scenes are always interesting and hot. But in terms of walking you through the evidence collection process, I mean, really, that could be a whole nother podcast, as well. But, you know, basically, the most important things are, you know, first secure the scene, make sure no one's going in and out, no one's touching anything, it's really important to document everything, you have to take explicit notes and photograph everything. And then the hard part really is going through, you know, the crime scene and trying to recognize what is evidence, what could be evidence, so you know, obviously, you're going to look for blood or weapons or something that's moved out of place, or firearms bullets, you know, spent cartridges. But there's other things that you don't know. And the challenge really is you can't collect everything, we don't have enough space to just collect everything you see. So, it's really challenging, determine what is potential evidence and making sure you recognize it. And then of course, the last part of it is also really important is documenting the evidence. So you know, logging it, making sure you seal it properly, that you're putting it in a container, that's going to preserve it, that's not going to harm it. And then also making sure it's sealed and then having a chain of custody, because the chain of custody is going to tell us from the minute you collect it, who had custody of evidence at all times. And that's really important if you need the evidence to stand up in court.



Jose Sanchez 13:52

So, when you're doing this, you basically like on call and you just get called out whenever something happens, and they need you or do you have like a set schedule for going out?



Kathy Corrado 14:03

So, in that particular job, yeah, we were on call. So, you were on call. And you know, usually crime scenes happen in the middle of the night. So, you often would get called out. But you

know, it also, there's a part of crime scenes people don't realize is, you know, it also takes them a while if they need to get a search warrant or things like that. So, there's some time there's a lot of waiting involved. But you know, that was that particular agencies in other agencies like here locally in Syracuse, where I worked, it was the police departments themselves that had their own crime scene teams, and they were just dedicated crime scene people, that's their only job, or I shouldn't say only but it's their major job. And so, you know, they were basically being deployed, they could go to a car break in and have to fingerprint it, or they could go to a homicide. I mean, there's many different crimes that they would be deployed out to. And that was there. A lot of them. That's their specific training was in crime scene collection, recognition of evidence.

J Jose Sanchez 14:53

All right, and then when you see those, like the whole team go out all at once, or do you maybe send out like one or two people kind of see what's happening then calling everyone else?

K Kathy Corrado 15:02

Yeah, it depends on the scene, you know, on a smaller scene, like I said, a car break in or something like that, you might just send one person, but in a major scene, usually you want a team. I mean, it's really important that, you know, you really have to make sure that you have a good chain of command as well. So that, you know, when you're sending the team out, it's it has to be very clear what everyone's specific role is. So that, you know, last thing you want to do is get back to where you came from, and who collected this? Oh, I thought you were doing that. No, I thought you were doing that. So, you know, making sure that everyone knows their role is really important.

J Jose Sanchez 15:33

Okay, well, and then we touched on this a little bit in one of our previous questions. And you talked about how a lot of times forensic evidence isn't really present. How often is DNA actually collected at crime scenes? And how has DNA collection evolved over time?

K Kathy Corrado 15:51

Yeah, that's a great question. So when I started, you know, 25 years ago, or so, it was not as common to collect DNA because you basically needed a large amount. So, we were really focusing on blood, or semen, or saliva, you know, obvious amounts of body fluid that we could get a large amount of DNA. So, we would need a stain, you know, blood, say maybe the size of a dime. That's about how much we needed in order to get a DNA profile. But over time, our tests have become so much better and so much more sensitive, that we can get DNA now from really, really small amounts of sample. For instance, you know, clothing, something that clothing that people wear hats, or gloves, or cigarette butts or something that someone dropped like a lighter, something they handle normally, that they left at the crime scene. And even just, we call it touch DNA. So basically, you know, someone just handling an item, or briefly touching an item, they might leave just a few cells. And that's enough for us to get a

DNA profile, which is good, but it's also a double edged sword. Because we are so sensitive, it means were in the old days, you know, we're just looking at blood, we were basically getting the DNA of a single person, right? But now, because we're so sensitive, we can get DNA from multiple people. So, if multiple people touched something, or handled something, we're going to get a mixture of 2, 3, 4 or more people. And that's a little bit confusing. So all their DNA is mixed together. And it's a little harder for us to tell each individual apart. Luckily, currently, we have algorithms that help us, you know, tease individual DNA donors apart. So we can do that. That's one disadvantage. I sort of the other one is that there's something called transfer. So secondary, tertiary transfer. So when we're talking just touch DNA, you know, if I walk into my office, or I walk into a brand new place, and I touch a pair of scissors, you know, my DNA is left on those scissors. Well, if you come in Jenn behind me, and you touch the scissors, you're gonna leave some of your DNA on the scissors, but you might pick up some of my DNA, and then you go and touch the stapler. Well, now my DNA is in the stapler, but I never touched the stapler. So, we're so sensitive that now we're picking up DNA that may have been transferred from one location to another when the person actually was never there. So, that's something that the field is really struggling with right now is, you know, making sure that we understand that. And so, you know, just because someone's DNA is somewhere, if we don't have a body fluid associated with it, you know, depending on how much DNA is there, and depending on the situation, they may or may not have actually handled it. And that's something we're trying to take into account.



Jenn Tostlebe 15:52

Yeah, that sounds like it can get really confusing and hard to differentiate. I mean, the algorithm is cool to help separate out DNA. But like you were saying, how do you figure out that that person didn't actually touch something when their DNA is there?



Kathy Corrado 18:35

Yeah, it's definitely a challenge. Like I said, it's sort of a double edged sword. I mean, the more sensitive we go, it's good, because you know, smaller and smaller amounts of DNA are needed. But, you know, at some point, it's getting a little bit difficult to understand.



Jenn Tostlebe 18:48

Yeah.



Jose Sanchez 18:49

Since we're talking about DNA, do you have maybe have like a quick and dirty way of telling us? How exactly its analyzed? Like, what are you looking for? How do you consider something a match to somebody? I probably worried that terribly.



Kathy Corrado 19:06

Well, I can first tell you how we do the test, and then talk a little bit about that question. I think

well, I can first tell you how we do the test, and then talk a little bit about that question, I think so you know, basically, what we do when we do DNA analysis is, you know, we either swab the sample, whether it's a blood sample or touch, we take a swab and take it or we take a cutting of a clothing, or cigarette butt or something. And we basically put it, undergo three different steps. And the first step is we put it into a test tube with some chemicals and heat that actually break open the cells and releases the DNA, and then we purify the DNA away from all the other parts of the cell. So, that's the first thing. The second thing we want to then do is determine the amount of DNA there, we want to quantitate it because if we have too much DNA in our analysis, it might overflow the system. And also, we want to know if we have a really small amount, but we only have one chance to use it. We want to make sure we pick the right test. So, we kind of need to know how much is there. And then the third thing we do is what's called PCR which before COVID, probably no one ever heard of these? Yeah. But now with COVID, everyone knows what PCR is, polymerase chain reaction. And that's basically a process where we make multiple copies of the DNA in order for us to analyze it. And in particular, this is, I think, goes to your question, Jose, we're not basically copying the person's entire DNA, we're basically choosing specific regions of the DNA that we know differ between individuals. So for instance, about 99% of our DNA is the same. And it wouldn't make sense for us to be looking at that, because we're not going to tell us apart. But we're looking at specific regions of DNA specific markers that we know, people have differences in their DNA sequence differences, until by looking at those regions, we know that, you know, there's maybe at this particular region, there might be 20 different types that a person might have there. And so we can look at those different regions. And what we do is we then we analyze the DNA after it's been through the PCR process, we determine the types of those different regions, and then we just compare the crime scene DNA with individual DNA we have at each of those regions, and we see, are they the same? Are they different? And if they're different, then we say that person's excluded. That's they didn't contribute the DNA, if they're the same then the question really is, okay, their DNA is just like I said, In the beginning, their DNA is the same, it's a match, how significant is that match? And so basically, by the more regions of DNA that we look at, makes it more specific. So, for instance, you know, if I were to describe someone to you, and I said, you know, they had brown hair? Well, you know, a lot of people have brown hair, they have brown hair and blue eyes, well, that narrows it down. But if I were to give you 10, 20 descriptions of that person, you could probably narrow it down. Same with DNA. So the more markers we look at, the more specific it becomes to an individual. And right now, the testing we're doing looks at about 22 markers or so. And it's ridiculously specific. It's basically, for all practicalities. It's to the individual basis with the exception of identical twins. So identical twins have identical DNA. Did that answer your question? Hope?

J Jose Sanchez 22:06

Yes. Yeah. And you know, we talked about CSI, but we're guessing that it takes more than 20 or 30 minutes to analyze DNA evidence, right? Yeah.

K Kathy Corrado 22:19

Yes and no. So it's kind of a loaded question. So yes, so let's say if you know, the actual time it takes us to do the test. And, you know, when I started again, it would take us six to eight weeks to basically analyze one sample. These days, it's a lot faster than that. So, if we were to take one sample, and I were to run it through each of the steps I have to do immediately, I'm not doing anything else, I'm standing there, running it through each step, it could maybe take eight

to 10 hours, there are instruments now called rapid DNA instruments that they take all those steps that I talked about, and they can do them in a cassette. And so if you have a very simple sample, like a saliva sample, a cheek swab, say, for an arrestee, or border patrol, or something wants to test that, they can take that sample, put it in this machine, and they'll get a DNA profile in 90 minutes, which is pretty amazing. But that's just the actual test. But what you really need to think about is that it's really not that simple. Because I don't have just one sample, I'm not working just one piece of evidence. So, you know, when a case comes in, say a case with a bunch of clothing, I mean, I have to take each one of those items out, I have to document, I have to photograph, I have to cut my samples, then I have to clean everything because we don't want to contaminate anything, and then start on the next sample. And then I do it again. And we don't really just run one sample at a time, we batch samples. So, we kind of have to, it's not really efficient for us to just do one sample at a time, we kind of need to run them together so that we can be a little more efficient. But we also are very careful to not run, like casework samples, forensic unknowns, at the same time that we would run a sample from a person because we don't want any chance of cross contamination. So, we're gonna run the question samples at one time, and then the noise at another time. So, again, that's more time. And then there's also the interpretation. So yeah, the results are there. But now we have to do the comparison. Now we have to see what does that mean? So we have to compare it, we write a report, and then labs, accredited labs, most labs have a technical review process. So, it's not just that one person looking at data, they have another second qualified person comes behind you, and really looks at all the data makes their own decisions and says, you know, do our results agree, do I think this person did the test? Right? And secondly, do I agree with their results? So that's a whole nother person to interpret it, and then a report gets approved. And so, you know, in reality, it's going to take probably, you know, 12-16 weeks before you might get a result for an average case, you know, that's being going through the system. And that would be if the lab doesn't have cases back up. So, it could also be longer than that.



Jenn Tostlebe 24:49

What's the most difficult part of that process? Or does it depend based off of the crime scene?



Kathy Corrado 24:56

I think it depends based on the country probably depending on who you ask. You'd probably get different answers. So, some people might say, you know, the interpretation part is difficult. For me, the most difficult part was the first part was analyzing the evidence and finding the body fluids or the things to run. So, for instance, you know, in a sexual assault case, like a home invasion, sexual assault or something, you might get bedding, you know, from, you might get sheets and blankets. And as far as and you know, you're being asked to find a really tiny amount of DNA on there. So you know, you're spending a lot of time looking at it, because you don't want to miss anything. You know, we have a lot of we've alternate light sources in different chemical tests. But still, you want to be thorough. So, to me, I always found that the most difficult because I always wanted to go the extra mile to make sure that I didn't miss something.



Jenn Tostlebe 25:40

Right. So speaking of that, you already mentioned that when you're at a crime scene, you can't

just collect everything, because you don't have enough space, and it's overwhelming, and so on. Are there some samples that are more preferable over others when it comes to DNA?

K

Kathy Corrado 25:57

Yes, absolutely. You know, again, were the best things are things that are related to body fluids. So, a blood swab, blood sample is great. Saliva, so that could be you know, a swab of a cup, or a bottle that someone drank out of, it could be a piece of gum that someone spit out, cigarette butts have saliva. So those are all really good. Those are number one things because they're usually there's a lot of DNA, and they're single source, one contributor. The next tier down would be probably clothing or wear DNA, you know, something that's more hat, gloves, shirt, coat, things like that, because those are usually pretty good. We have like about a six year or so percent chance of getting a good DNA profile from that. And then last would be the touch DNA, again, because one, there's going to be mixtures. And, you know, a lot of times I mean, you know, there's a bank robbery and the person touched the door, well, probably hundreds of people have touched that door. So you know, that's gonna be harder. But you know, definitely we're looking for anything with blood or saliva is usually our number one go to.



Jenn Tostlebe 26:57

And I imagine, I mean, from watching TV, movies, and just my imagination that you've probably run into some strange samples over time. Do you have any examples for us?

K

Kathy Corrado 27:10

Yeah, I mean, it's been crazy that things that you get, but I say probably the funniest are things that we always joke about the most are the food items. We had a case where someone was actually shot at a poker game. And, you know, they submitted like a happy ham sandwich and we were able to get a DNA profile from that. A Milky Way bar, someone taking a bite out of left in a car. We had one case where there was a pizza delivery driver that was delivering pizza and wings. And he was robbed of his money and also of the food and so the police actually found down the street, they found that the pizza box, it has some pizza crust left in it, and the eating chicken wings. And so of course they submitted those to us and we were like, Okay, this is crazy. We went ahead swab the pizza crust, went ahead swab the chicken wing bones, wouldn't you know, we get two different profiles. You know, one person on the pizza crust, one person on the chicken wings, we put them in the database, we get a match basically found who those people were just on that. So, you know, that's certainly interesting. I'll say one of the weirdest things I think we got one time was someone had broken into a person's apartment. And for whatever reason, he like, looked like must have been he sat on the couch and eat some food, watch TV, and he clipped his toenails. And so the police brought us a bag of toenails. And we were like, Okay, this is going too far. But we got DNA from it. So I can't really say, no, when you're in those situations, you know, so you never know.



Jenn Tostlebe 28:33

I never even would have thought about food ever.



Kathy Corrado 28:37

But it's Yeah, yeah. Probably shouldn't be telling everyone because people committing crimes will know not to do that. But yeah, honestly, the food is a lot of times we just, you know, that ham sandwich really blew me away. I just didn't think it would work. But it did.



Jose Sanchez 28:51

I guess it makes sense. Just probably not something I would have done. But I mean, I guess that's probably why I'm not in the business. So, you mentioned entering DNA into a database. I'm guessing that's CODIS. Could you maybe tell us a little bit more about that?



Kathy Corrado 29:11

Sure. So CODIS stands for the Combined DNA Index System. It's basically the national DNA database. It's been around since about 1995 or so. And it has multiple databases. But the two that we typically talk about are the convicted offender database. So, that's people that have been convicted of crimes. And due to that conviction, they are required to give a DNA sample. And then there's another database that's called forensic or the crime scene database. Basically, DNA profiles are developed from crime scenes. So, we have those two databases, and so in the crime scene database, but I should also say that CODIS is it's at three different levels. So you have the local level, the laboratory that's generating the DNA has a database, and then all those profiles from the crime scene go up to the state database, and then those profiles go up to the national database that has All 50 states and DC and some other labs in there. And so with the casework database, what it is, is you take the DNA profiles that are in there, we can compare them against each other. So we can find, you know, the same perpetrator that's committing multiple crimes like a serial rapist or serial killer or something like that. That gives us that information. But the bread and butter of it is really when we take this crime scene samples, and we compare them to the convicted offender database. And so when we do that, we can get a match. And we can, you know, tell the police, okay, yeah, this DNA matches this person, it doesn't necessarily mean they committed a crime, but it gives them a really good investigative lead to go with. And so currently, the databases are they've grown immensely from from when I first started, and the convicted offender database currently has about 14 million DNA profiles in it. And forensic casework database has about little over a million profiles in it. And so combined, the database is provided about over 500,000 leads to help solve crimes. So it's a very, very powerful tool that we have.



Jose Sanchez 31:01

That's interesting. Something that just popped into my mind was, who was it wasn't the Golden State killer?



Jenn Tostlebe 31:07

Yeah.



Jose Sanchez 31:08

How common is it to run a DNA sample, and then sort of have it match up to someone that's familiar to them and kind of start tracing that path.



Kathy Corrado 31:18

So, I mean, really, what they did with the Golden State killer was use genetic genealogy. So, the databases that I was just talking about are the, you know, federal state controlled databases, and there are a lot of laws and regulations surrounding them, what you're talking about something that actually is being used quite a lot lately, and that is investigative genetic genealogy. And this is where we're using the public direct to consumer databases that people use for like ancestry or to find relatives. So, like ancestry.com, or 23andme, people have given them their DNA profiles are in the system. And law enforcement has started to use those databases, when they basically they use them when they've tried the CODIS database and it doesn't work, there's no matches, there's really nothing left for them to do, they don't have any more suspects, they don't know what to do. So, they're really only using it on cases like homicide or major crimes like that. But they can take their DNA profile, it's not the same DNA types that we use in that crime lab, it's different types of markers are looking at, but they can get them typed at a private lab, and then compare them against those direct consumer databases. And you're right, so they're not necessarily getting a direct match. But there's enough similarities between the person in the database who could be a relative to the perpetrator of a crime. And, actually, I mean, whereas in our databases, we can only maybe see first degree relatives in in these direct consumer databases, you can see, you know, third, fourth, fifth up till I think ninth degree relatives in there, so they find these potential relatives, and then you have actually a genetic genealogist who, so you've got this DNA match, but they then take those names, and they go through like public records, like birth certificates, and marriage licenses and news releases are pressed, you know, things in the newspaper, and they actually can narrow it down to a specific individual. So this is kind of one of the newest things that's happening in DNA analysis, forensic DNA analysis, and it's really meant to be used when there's no other resources available. And I think the Golden State killer is one of the first ones you've heard about that was about in 2018. My understanding since that time, there's been about 145 Different suspects identified through this type of analysis, which is about one per week. So it's pretty interesting. It also brings up you know, privacy issues. And are people aware, when they sign up for these databases? Are they aware that it could be used that way? So, now, they're kind of playing catch up on putting some regulations in place, you know, there are some databases, you have to opt in if you're want your DNA to be allowed to be used that way. Other ones, you have to specifically opt out. So there's a lot of issues being brought up about that now. But it's certainly another powerful tool that's being used.



Jenn Tostlebe 33:59

Clearly, it must be pretty accurate considering how many people have been identified. I'm assuming it's maybe less reliable than like the stuff that you do, or is it about the same?

K

Kathy Corrado 34:12

That's a good question. So, it's sort of basically what it's doing is it's very reliable in the sense that it's giving you an indication of this person is a possible relative of the perpetrator. Right, and that's pretty good. But in the end, that's not going to be enough to say that person did. So after they generate those leads, they'll give you know that name to a police agency say, what's going to happen then is they're going to have to get a warrant or a court order to actually they're not just going to arrest the person based on that, they're going to go ahead and get their DNA sample and then they're going to submit it to the crime lab and we're going to compare one to one their sample with the evidence. And so now we're back to doing the one to one comparison, which is extremely accurate. And then they're going to go from there. So they don't just go from the lead to arresting them. There's that step in between.

J

Jose Sanchez 34:59

Right Yeah, I guess I'm yeah, the only one I ever heard of was the Golden State killer. I didn't realize I knew that there had been some backlash or like some concern over it. But it was really interesting when it happened. Okay, so we mentioned from your introduction, you've given expert testimony in court. And at least from how I understand it, DNA seems to be pretty scientifically sound. But you know, like, say, a defense lawyer, right? Their job is to try and build a defense case. So they might not want for your results to be scientifically sound if they're not favorable to the client. Can you tell us a little bit about how this might go down? How have some lawyers tried to maybe downplay DNA evidence?

K

Kathy Corrado 35:48

Yeah, I mean, with the technologies that we're using today, and the statistical evaluations that we use, you know, the significance of the matches are really big. So, for example, we might say it's 10 million times more likely, we would see this evidence if John Doe, or the donor that if a random person, were the donor, so this really solid and honestly, it's very hard for the defense to refute that. They typically don't, they're typically not saying no, that's not my guy, what they are going to bring up typically is, well, that's his DNA. But can you say how, or when it got there? And currently, you know, we really can't. So, for example, one case we had early on, but it was a break in again, to a house, there's blood, you know, left at the scene broke through a window, and there's some bloodstains on the floor, and DNA matched. And so what the argument was defense attorneys argument is, well, do you know, when that blood got there, when that DNA got there? And no, my test can't tell me how long it's been there. Well, would it surprise you to know that, you know, my client actually works for furniture deliver a company and he had delivered that, I don't know what it was honestly, refrigerator, let's say to this person's house the week before, and he cut himself, and that's how his blood got there. So, you know, if I can't say, when that blood got there, then how can you prove you know, that that's how it happened? So, you know, that's kind of the typical go to, you can't say when or how it got there. And now, as we talked about earlier, with this, you know, transfer of touch DNA, they're able to say that more, you know, can you say for sure that my client DNA that he was there, that's how his DNA got there? And typically, you know, at this time, we can't really say, when how it got there. So, that's usually where they're going, it really comes down to the jury. That doesn't make sense in my head, you know, I mean, the refrigerator repairman. I mean, he

did deliver the furniture, probably how he scoped the place out before he decided to rob it, right? So, you know, it's really up to the jury to decide, you know, does it make sense of their DNA would be there. And that's usually what it comes down to?



Jenn Tostlebe 37:46

How many different avenues that they can go. But is there any work being done to try and be able to figure out when a sample may have arrived at a scene? Or is that something that's still just difficult to do? And it's kind of up in the air?



Kathy Corrado 38:02

So, there's always work being done, because we're always right, we're always trying to improve, and it actually gives, you know, the scientist things to study, which is great. So yeah, I mean, there's a lot of studies being done that problem is they're trying to look at instead of DNA, they're looking at perhaps mRNA, messenger RNA or proteins have different ways to see if we can determine you know, how long that sample basically has been there. There's other studies being done if we can age the sample, you know, can we tell how old the person was left the DNA to that's a whole nother thing. So there's definitely studies like that. There's also studies to try to determine this touch DNA, you know, how often do we expect to see transfer? How much DNA would we expect to see in the transfer? There's a lot of studies about that, but it's not at the point yet where it really can be used in the courtroom.



Jenn Tostlebe 38:48

And so something that we've talked about in a prior episode is exoneration, especially when it comes to death row, and a lot of people have been exonerated, and primarily because of DNA evidence. Some of these exonerations have happened, like years and years after the initial crime occurred. And so it also ties in with what we were just talking about how long is a sample viable to be analyzed properly?



Kathy Corrado 39:17

Yeah, so honestly, there really is no limit, you know, the issues are was the evidence kept stored, you know, properly want to make sure it's dry, and it's room temperature. So, if there's humidity and a sample that will allow bacteria or mold to grow, which will destroy the DNA, for sure. And you know, any high amount of heat can destroy the amount of DNA. But outside of that, you know, we're able to, in our lab, you know, we had worked on some cold cases that were 30 years old, and the DNA still viable. Now, over time, there's going to be some degradation. So, there's gonna be a little less DNA. And you might have the DNA might be chopped up a little bit. So, it might be in smaller fragments. But the beauty of the tests that we use today are that again, they're more sensitive, so we don't need to as much, and also they work with a lot smaller samples, more challenging samples. So, you know, we're able to use it pretty far. And that's really the benefit for the cold cases as well as the exonerations. Because you know, a lot of these exonerations are cases, that happened quite a while ago, probably before the advent of DNA, or they weren't using DNA in those cases at that time. And so, you

know, like, what we typically what we would say now is that in most current cases, if DNA is available, we're going to go ahead and compare and you know, about 1/3 of the time or so we actually exclude a person, so that person is going to already be excluded from the DNA. So, hopefully, they're not going to end up being wrongfully convicted. But, you know, back 30 years ago, they weren't using DNA very often. So there's, you know, a higher likelihood that unfortunately, that might happen. And you're right, there's been a large number of exonerations that have been due to the DNA, you know, it's another really great use for it in general, just in general, excluding people, it's not just to, you know, convict the guilty, it's also to exclude the innocent.



Jenn Tostlebe 41:00

And you mentioned this briefly, but what are some of the things that can like, destroy or harm a sample? You said heat, and mold, I think, are there other things too?



Kathy Corrado 41:13

I mean, there's chemicals, you know, certain chemicals might destroy it. But basically, mostly, it's heat. So, you know, there's a fire or, you know, high temperatures, like if it's out in the sun, like in Texas, you know, something left out in the sun for days, and days on end might destroy it. So, sunlight heats water, not really so much water, but mostly moisture. So, you know, like I said, the bacteria or mold growing tends to be the typical reason why it's destroyed.



Jose Sanchez 41:39

Can you kind of talk to us a little bit about some of the work that's being done. But it's not quite ready to be used in court yet. But have there been any new developments over the last few years that are t up and running and full, and for use?



Kathy Corrado 41:56

So there's a couple different things that we're looking at, you know, one is just new technology in terms of instead of this current technology, where I said, we're using, you know, PCR to look at small regions of DNA, there are newer technology where we're sequencing DNA. And so we're able to get more information in a shorter amount of time for samples. So, that's one thing. But the other thing I think that's pretty amazing is, you know, as I said before, the current state of the art is that you have a sample from the crime scene, and the police either bring you a suspect that you can compare their DNA, or we compare it in the database. And if you're lucky, you get a match. If you're not, if there is no match, then what do you do? You really just waiting until the police can bring you someone else or more samples are added to the database. But there's new tests coming out there are able to predict externally visible characteristics. So, now, we're at the point where we might be able to provide police with, you know, information to help them proactively narrow down their suspects, or actually look for particular people. And so basically, a lot of these new markers that we're looking at involve different pigmentation characteristics. So skin color, hair color, eye color, and some of them depending on the particular pigment, if it's more rare or not, you know, they can say with 70 to

90% accuracy or so, you know, we believe the person that donated this has blue eyes, or you know, we'll have this type of skin color. So, combining that with, you know, ancestry data and things like that they are sort of generating ideas of what the perpetrator might look like. So that's certainly something that's really starting to be used a lot more frequently.

J Jose Sanchez 43:34

And we mentioned again, from your introduction, that you oversaw an accredited lab, you talk to us more about our DNA apps regulated or monitored by a larger body, like, is there like a DNA lab association?

K Kathy Corrado 43:51

Yeah, so one of the things that happened when they started the CODIS database to DNA database, because the federal government kind of oversees that, they were able to set some rules and regulations to say, if you want to participate in this database, you have to follow certain rules. So, that was a really good thing. So, there are so all the DNA labs that participate in CODIS, which is pretty much all of them, have to follow what's called the FBI quality assurance standards. So, this is a set of standards that are very strict, and they cover everything they cover, you know, the training that analysts have to have, they cover their competency testing, the procedures that you have to use the validation of the procedures to make sure they're scientifically sound, all the quality control measures you would have. And also there's the continued monitoring of analysts. So, it's called proficiency testing. So, basically, analysts, labs actually purchase tests from companies that are like mock cases, mock scenes, and they come into the lab and analysts have to analyze them and submit them and see if they're getting the right result to make sure that they're still you know, competent in doing their work. So, in that particular accredited, or that particular certification accreditation should say accreditation is you're audited every other year by an external agency. So, an external group comes out to the lab looks over everything that you're doing, look at your casework, look at your training, talk to your staff, make sure that everything's okay. And on the off years that they don't come out, there's also an internal, you know, you're required to do an internal assessment. And we also have a lot of quality assurance things in place that we monitor, you know, we have controls that we make sure are working correctly. And if things aren't working correctly, we have to figure out why not and stop testing and figure out what's going on. So yes, so the DNA labs have that in regards to forensics in general, there's also for DNA as well as all the other disciplines, there's a national accreditation agency. And that's where we talked about earlier, we talked about the ISO 17025, five. So ISO 17025 is an internationally recognized standard for testing labs. So, labs have to meet those standards, as well as supplemental standards for forensics. So, while it's not required, except for there's about 10, or 12, states that now require labs have that accreditation and New York is one of them, as large percentage of labs about 350-400 labs are accredited by that as well. And again, they go through the same thing where they specific training of their analysts, they have procedures that they have to have written procedures, they have to be accepted in the community. And they also come out and do on-site audits every couple of years as well. So, that is a big oversight. So, both of those are oversight agencies. But in general, there's not like a regulatory body, like you know, the FDA, or there's not a regulatory body that oversees all of the labs, these are independent agencies that accredit the laboratories.



Jenn Tostlebe 46:43

And you did mention the like, I don't know if I would call them test cases, but during the auditing process, and then you've mentioned training a few times, but do analysts have to do like yearly or bi-yearly additional trainings to keep up with new advancements? Or is that more of a it's on you? We want you to stay up to date, but you figure it out?



Kathy Corrado 47:08

That's a good question. So, they do have to, in part of the accreditation standards require that they're getting a certain number of hours of continual education, but it is difficult, you know, prior to COVID, it was hard, because the laboratories would often pay, you know, if you're lucky, and you work in a lab that has the funding will often pay for you to go attend a conference or attend a training session, or you could bring a training session into your lab, all the laboratories do that. I mean, it's, you know, continuing education in this field is so important, because things change so rapidly. But honestly, that's maybe one of the good things that came out of COVID was, you know, all of a sudden, there's, you know, online training and zoom meetings. And so it's been a lot easier for people to actually get that training than it was before. And even conferences, like some of the conferences that we would have to go to in person. Now they offer a hybrid where you can go in person, or if you don't really have the funding, you can at least watch some of you know, the sessions online and things like that. So there is that. And, you know, also, I think it would be remiss if I didn't point out the initial training that forensic scientists go through is really pretty robust. So, it's not just like, you walk in the door, and here you go, go do some DNA tests, go do some fingerprint analysis, you know, every lab is going to have so people usually come in with a science degree to begin with, they get hired in a lab, and there's a training program where they're going to go from start to finish, they're going to do readings, they're going to have lectures, they're going to do hands on work, they're going to do tasks, they're going to do mock samples, in a lot of things can take, you know, it can be some disciplines, like a drug chemist, it might be about, you know, nine months or so of training, whereas other disciplines, like fingerprints, or firearms analysis, it can take, you know, sometimes two to three years for someone to be it's kind of like an apprenticeship, right? So you have to do a lot of comparisons before we deem you competent to be able to be making your own decisions on this. So, the training can last a really quite a long time. And it involves a lot of hands on work, and then tests, you have to take competency tests, and also training in testifying so that, you know, we want to make sure that when you're explaining things, the jury can understand it. And we want to make sure that you're testifying within your limits, you know, your scope of what you know. So, all that comes into play.



Jenn Tostlebe 49:19

Do most people have doctoral degrees? Or do they come in with all different levels of education?



Kathy Corrado 49:27

Right, so typically, it's really all levels. I mean, there are some disciplines that maybe have some more doctoral like toxicology, for instance, or, you know, some DNA analysts have PhDs. But you know, a large numbers are Bachelor's of Science in a science discipline, or there are

but you know, a large numbers are Bachelor's of Science in a science discipline, or there are also a lot of master's programs. And you know, it's not required to have the master's degree. But there are so many people now that are getting a master's in forensic science, kind of like we offer here at the university, Syracuse, that it's becoming more than norm because because so many people are getting it that if you're, you know, if you're hiring somebody and one person has that extra two years of training specifically in forensic science, you know, all things being equal, you might go ahead and order the person with a master's degree or hire the person with a master's degree.



Jenn Tostlebe 50:12

And then the additional training on top of that, that you mentioned, so yeah, absolutely. Yeah.



Jose Sanchez 50:19

Well, those are all like the main questions that we had for you. Is there anything else that you would like to add to our discussion on forensic science and DNA analysis? Maybe something that you wish we had asked that we maybe didn't?



Kathy Corrado 50:31

I don't know, I think you did a pretty good job covering everything.



Jose Sanchez 50:35

And it just maybe hit me right now probably should have included it. But you wouldn't happen to have any quick party stories about your days of like, Crime Scene investigator, would you like maybe an interesting case that sticks with you?




Kathy Corrado 50:49

Probably not any that I should share. You know, I would say one thing, you know, that we always take into account is, you know, there's always, you know, silly things that a person may have gone, you know, committing a crime, you always hear about those stories, you know, but also, we always like to take in mind that, you know, a lot of the cases that we look at are really serious cases. And so, you know, every case is important, every person's important. And that's really how we look at things, you know, so I don't have any for that, I will say that, you know, being involved in this field is discipline, it's just, it's really rewarding work. I mean, that's one thing is, you know, you go to work, and it can be a long day, and you're tired at the end of the day. But when there's times when you know, you help shed some light on this crime, you might help solve it. Or you might help exonerate someone that was under suspicion, it really does make you feel good. And especially when you're a lot of the cold cases that we work that I said, were 20 or 30 years old. And we had one case where there was a woman was killed. And the last person that had been with her was her husband, they had been in a bar fighting, that kind of thing. And so everyone thought he had killed her, he threatened to kill her when she left the

bar. And she was raped and killed, but there was no evidence. At first, they didn't have any evidence that they could use, and to the point where their children always assumed he killed her mother. So, fast forward about 30 years and we go back and look at the evidence and there was actually a towel that had some semen on it, that we were able to generate a DNA profile from, put it in a database, and it hits to a serial killer that had been on death row in Georgia for raping and killing other women. And so I know that the prosecutor, in that case, went to tell the man, you know, we found your wife's killer. And it was really bittersweet, because, you know, it was so nice that this man who had been under suspicion for so long, was now exonerated. But, you know, he was estranged from his kids estranged from his grandkids all that time, you know, because they always thought he had been the killer. So it's cases like that, that make you realize the work is really worth it, you know?

 **Jose Sanchez** 52:53

Yeah, I don't know what to say. Like, it's, it's unfortunate that things like that happen. But it's also very fortunate that we do have people that are doing the work that you do, and that you've done, that can help really bring closure to these cases.

 **Jenn Tostlebe** 53:09

And that science is improving to where these, you know, exonerations are possible. So.

 **Kathy Corrado** 53:16

Yeah, you know, we're definitely making strides and, and not just in DNA, and all the disciplines, you know, there's always making progress, making things better. So, that's really important too. And again, that's, you know, why kind of, like, when I left the crime lab, and I came here to the university, I mean, it's kind of nice now to be on this side of things, where we have a lot of research going on here to help improve the technology and, you know, training students, I mean, we, in our program here, you know, we trained forensic scientist in DNA concentration, and also firearms, latent prints digital evidence, we have a medical legal death program. And also, you know, we don't just focus on the science, which is critical. So we do focus on the science, but we also cover, you know, quality assurance and ethics and, you know, understanding your role in the criminal justice system, and why it's so important to be transparent in when you give results and things like that. So we hope that we're helping these students become well rounded, have a strong science background, and also has a strong sense of ethics. So that, you know, they can go out into the field and do good.

 **Jenn Tostlebe** 54:18

You miss your crime scene analyst days?

 **Kathy Corrado** 54:22

I don't I don't I mean, I do, because it's always interesting, honestly, you know, it's hard work. It's, you know, it's and, you know, there's a lot of sadness at crime scenes and the types of

It's, you know, it's sad, you know, there's a lot of sadness at crime scenes and the types of situations you're in. And also just, it's nerve racking. You know, like I said, you're always hoping you didn't miss something. You're spending a lot of time very detailed. So I do miss it, though. And I missed, you know, I missed the co-workers, you know, it was, you're in situations where, you know, probably you could think of other fields that are similar where, you know, you're under such stressful situations that you really bond pretty closely with your co workers because you've kind of experienced the same horrible things. And so I do miss the people certainly in working with side by side with people that care so much about what they do.

J Jose Sanchez 55:04

Yeah, back in my undergrad days at Cal State LA, one of my professors, he was retired crimps investigator for the LA sheriff's. And his whole deal was crime scene reconstruction. Like that was his expertise. Yeah, he'd say, he found it super interesting. But it was also disheartening because he'd have to basically reconstruct and even try to recreate what had happened. And, you know, use like, blood spatter, like broken furniture to kind of paint the picture, like what exactly happened here? How did this end up the way that it did? So it was very interesting, but I could tell that it was it could also be emotionally taxing.

K Kathy Corrado 55:44

Yeah, I think that's exactly right. You know, just seeing that day in and day, I think the crime scene people is the hardest, honestly, and also the crime lab in some ways, because, you know, you get a lot of crimes that involve children or things like that. It's just hard. It's just hard to know that that evil exists in the world, you know, and you're seeing it, you know, right there in front of you. So, I think crime scene though, I know people, I have a lot of colleagues and friends at a lifelong career crime scene investigators and, you know, I do think, you know, at some point, some of them just say, you know, what, I can't absorb any more of this, I think I need to find a different line of work. And a lot of times they teach, like, for instance, yeah, our the person that teaches our crime scene classes here, he's a retired New York State Police forensic investigator that did crime scene, and, you know, he loves He loves teaching. And I think it's a nice thing to do after a lifelong career of doing crime scene work. So.

J Jose Sanchez 56:34

Yeah, it gets a pass on the tips and tricks. Yeah, you pick up along the way.

K Kathy Corrado 56:39

Yeah. And they certainly they have great stories for sure. The crime scene people that do that all day long. Definitely have great start. Yeah, you need to do another podcast with those people. Yeah.

J Jose Sanchez 56:49

We will try. Well, anyways, thank you so much for joining us today. You know, we were really

interested in doing this episode, Jenn and I are both in the sociology department. We're criminologist. So this is really out of our realm. But we thought it'd be really interesting to come bringing in this other side of crime, law, and justice that we're not very well versed in. And so thank you so much for taking the time to talk to us. We really appreciate it. And you know, you mentioned the program, can you tell us maybe a little bit more about the program, and then anything else that you might want to plug?

K

Kathy Corrado 57:23

Sure, I mean, and I would first say thank you for having this has been really fun and I appreciate you taking the time to bring this in. Yes. So our program here at the Syracuse University, or the Forensic and National Security Sciences Institute, we have undergraduate and graduate programs. So, our undergraduate program is what we call an integrated learning major, it's basically a dual major, so you can't just major in forensic science, you have to pair it with something else like chemistry or biology or other disciplines. So, we have that as an undergraduate program, which is real popular, a lot of students in it. And then we have a master's program, which is obviously smaller, smaller group of people. And as I said, we have different tracks, we have a forensic science track, we have a biomedical sciences track, we have a digital evidence track, a medical legal death investigation, and then we also have something that's a little bit unique is that we have a combined degree that we are with the law school, so you can get a JD, as well as your MS in forensic science. And so that's kind of useful for people that maybe want to go into be defense attorneys, or prosecutors or things like that. So we have all of those here, our master's programs take typically, it's 36 credits. So, it typically takes about two years. What's really convenient for me and really nice is that we're located, you know, half a mile away from the crime lab here in Syracuse, which is where I used to work. So it's really great, because we have a lot of interactions with them. And a lot of the people that work at the crime lab by day, you know, their forensic scientist, buddy, they teach for us at night, they're adjunct professors for us. So, it's great for our students, because they get firsthand, you know, interactions with these practitioners. And it's also great for me, because I get to still interact with my old colleagues. So, I left but I didn't, you know, I still have some interaction. So, it's been really nice, just in general. And it was great to me, I could move to this new job, and I didn't have to move locations or change houses or anything. So.

J

Jose Sanchez 59:13

That's great. And where can people find you like, social media, Twitter, ResearchGate, Google Scholar, things like that.

K

Kathy Corrado 59:22

I would say our program, you can find us at forensics.syr.edu, you can email us there. We have a website just search Syracuse, forensics website, social media, Twitter, that's pretty much you know, those are mostly our social media outlets that we use.

J

Jose Sanchez 59:38

Well, thank you again. And we really appreciate it. But this was very interesting.

well, thank you again. Again really appreciate it. But this was very interesting.



Jenn Tostlebe 59:43

Thanks for educating us. I'm sure we'll have 1,000 word questions.



Kathy Corrado 59:48

Anytime. Call or email anytime. It's really nice talking with you both. I really appreciate you inviting me today.



Jenn Tostlebe 59:54

Yeah, thank you.



Kathy Corrado 59:55

Thank you.



Jenn Tostlebe 59:56

Hey, thanks for listening.



Jose Sanchez 59:58

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Jenn Tostlebe 1:00:07

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Jose Sanchez 1:00:19

or email us at thecrimacademy@gmail.com



Jenn Tostlebe 1:00:24

See you next time!

