Oral History Interviewee: Dr. John Planz

Oral History Interviewer: Mike Pullin

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00:02 How did you get into forensics?

0:04 Totally by accident. It wasn't even on my radar originally. I was in the process of doing my post-doc with the Carnegie Museum and we were working on setting up a molecular systematics type operation at the museum in Pittsburgh. And I came into my old lab where I did my Ph.D up in Denton. Was working on some preliminary data—and the museum changed its focus and scope and basically did away with a lot of its research programs and postdocs. So my post doc was coming to an end. And I was applying for university positions and things like that—looking to go into academia. And there was a position opening at the Southwestern Institute of Forensic Sciences over in Dallas, where they needed somebody to come in and set up their laboratory operations using this brand new technology—PCR. Well I had been playing with PCR ever since Kary Mullis published on it back in 1988. And that was 1992 at the time, so I had figured, "Well I'll do this. Y'know I'll go in."

It was a soft money grant position that they had open from the Department of Justice and I figured I'd go in and set up their lab. It was a year and a half position. I had their lab operational in six months. And they figured, well let's see if I wanted to stay in this field. So they asked me, and I was still figuring, "Well I'm gonna still saturate the market looking for a good university position and I'll do this for the time being." They haven't let me out since. That was, I was at SWIFS for about, oh almost four years and then I went for a director's position at a private company then called Gene Screen. It's been bought up multiple times over the years and known as Orchid Cellmark now. It's one of the bigger DNA testing labs. I was their director for identity testing primarily overseeing many things: their paternity operations, their forensic operations. They did a lot of private forensic casework there at the lab. And we started doing some mitochondrial DNA which was my specialty. And from there, I was there for about two years or so before I went to another biotech firm over in Lewisville—set up a human identity testing lab there focusing primarily on mitochondrial DNA sequencing. And we were actually doing all of the

mitochondrial DNA testing for Texas and Oklahoma and Arkansas out of that laboratory. There were no crime labs other than the FBI's laboratory doing mitochondrial DNA at that time. I got involved, you know with a lot of the law enforcement community at that point and was talking to Art Eisenberg one day, and he had position open here for an associate director primarily overseeing the paternity operations—that's what he had established here. Started that up, around 1989 or so. And I had known Art at that point because I was still a graduate student in Denton when he started the operation here in paternity testing for the Attorney General's Office. And I figured I can come over here, you know, puts me in an academic position. My goal was still to get into an academic institution and not into corporate or governmental crime lab setting cause my background is really in population genetics and molecular evolutionary genetics. That's what I like doing I'd been sidetracked for about 20 years, you know in getting to that point. And came over here at that point and we basically worked in the paternity testing venue. We did… At that point we were doing a small amount of forensic work here in the lab, primarily forensic paternity cases: when you have a sexual assault case and there's the product of conception linking that child to the assailant. Basically is that kind of how that works. It's a standard paternity test, really. And I've been here now since—2000 is when I started here. They have gotten rid of me yet. You know…

04:42 Well, that's good.

04:44 And from that…

04:46 Well I was going to say, we'll come back to what you're doing here in just a minute. But more back to your background. You mentioned, like you said it's not exactly in this area. So you want to talk some about your lower degrees?

04:58 Well, when I first went to college my interests were primarily in behavioral ecology. And I went to SUNY Oswego which was up on Lake Ontario in New York, and I was a biology major at first. And when you do behavioral ecology you need to know all of the ecology and behavior theory, but you also have to know the organisms you work with. So I ended up taking a lot of zoology courses as well. And those were two separate departments at the time. And I ended up basically completing the requirements for both departmental degrees by the time I got done with it. So I actually double majored in biology—which had all of the ecology, behavior, physiology, all that fun stuff, as well as all of the organismal biology and zoology. Primarily to go into the area of behavioral ecology and that kind of work. I was a field person. I spent a lot of time out in the woods, out in the deserts, and things like that. That's where I preferred to be most of the time. It's kind of funny that I was the first and only person to ever double major in that because they merged the departments right after I graduated; Because they figured, "I guess this is a little silly." So, I cause trouble no matter where I go.

06:28 **(inaudible)**

06:30 And after that I went for my master's degree at Shippensburg University, primarily following that same track. I was looking at habitat utilization by mammals in the Allegheny Mountains, primarily in Pennsylvania. And at that same time I had hooked up with Carnegie Museum, they were in need of field people and they hired me as a field biologist to go out and primarily do survey work—capture, trap, mammals, bats and things like that in various places. Worked heavily with them on a project in West Virginia where we were doing a mammals survey for the state of West Virginia. In the course of doing fieldwork I had one of their postdocs with me, Karen McBee, who is a professor up in Oklahoma now. I haven't talked to Karen in a long time, but it's her fault that I switched over to genetics. She was out doing fieldwork—karyotypins shrews and things like that that we were catching. I was wondering, "Well, hmm. How does this fit into the whole mix of things?" Started looking into that and basically took

the quantum leap shift into genetics, and then into molecular genetics, populations genetics, and came down here to Denton to UNT to work with Earl Zimmerman. He's retired now, but primarily in the area population genetics. And he was interested in starting to do some molecular evolution work.

There was some new work being done with mitochondrial DNA for identifying species, then looking at bio-geographical patterns. And that's what I was interested in. I ended up kind of switching from a lot of the field to a lot of the lab, but my actual dissertation work involved both. I basically characterized an entire genus of mammals: of wood rats, of pack rats—not the nasty ones you find in the dump. They were the native species to North America. They stem from Nicaragua up to the Yukon and coast-to-coast. And basically that was my study area and I covered a lot of that territory in the course of doing my PhD work. And then, using the samples that I collected did the genetics work in the lab. And that's primarily how I got to the point of working with PCR and doing a lot of the statistics behind population genetics analysis. That's primarily what I do right now in the forensic field. I do a lot of training in forensic statistics for laboratories and then our own graduate programs.

09:25 What types of statistics were they?

09:27 Oh it's pretty much simple, in my opinion, simple population genetics. Some of these people really y'know get worried about it. But understanding how population substructure works and how that would affect an estimate of finding a particular profile in an individual. And looking at those kinds of things. Looking at haplotype markers like mitochondrial DNA or Y-chromosome markers, how those databases are handled, how those frequencies of their haplotypes are actually calculated and applied, to coming up with an estimate of the statistical weight of when you match an evidentiary items DNA profile with that of a perpetrator of a missing person or any of those kinds of… some kind of a known individual.

10:18 So, does the statistics we hear about when they say?

10:21 Mhhm.

10:22 This sample has a one in 1 billion chance of?

10:25 Right.

10:26 Okay . Very good. And then you had already talked about how you go here, so tell us about what you do here in the Health Science Center

10:34 Well when Art first brought me on it was to be the Associate Director over the DNA Identity Lab which is what the paternity lab was called. And that we still do a fair amount of paternity testing work, but that whole laboratory operation really evolved after about 2001. There was a real strong interest within the state for doing missing persons work. We have, every state has, a missing persons clearinghouse within the law enforcement community that basically captures a lot of the data, what we call now metadata, the non-genetic information relevant to cases—who relatives are. There a lot of non-governmental organizations like the Doe Network and so on that work closely with the community, public community, individuals missing loved ones, and things like that. So there was a growing interest in that here in the state. And one of the things that I brought with me when I came here to UNT … not things, but one of the people that I brought with me was one of my senior analyst at the company that I was at. And she's still here with us as a forensic analyst. But she and I got us started doing mitochondrial DNA sequence analysis here in the lab. We, Tom Yorio often jokes that I was a probably a very cheap acquisition for the University. My whole startup package was one DNA sequencer to the tune of about $60,000 and from that all things sprung actually. We started setting up to do mitochondrial DNA work. A lot of the contracts that we had with Oklahoma and such transferred with me when I came here. So we gradually began to be known as the place to go in Texas at least for mitochondrial DNA--which largely is done on hair samples in criminal case work. When you have shed hairs that don't have a root very often

the only DNA you can get is mitochondrial DNA. But it also is very effective on unidentified remains, skeletal remains and such.

So around 2000, the end of 2000, 2001, an initiative went through the state legislature to set up a Texas missing persons database. You can't do missing persons without mitochondrial DNA. And between the paternity testing operations that does familial relationships, which is what missing persons require, and having the capability to do mitochondrial DNA, we were really the only game in town who could do that. So at that point things expanded greatly. Senator Cornyn, well he's now senator--he was attorney general at the time of this development--actually provided a seed of $1 million to set up the missing person's program for Texas out of the victim compensation funds that the Attorney General's Office collects. And we were able to then expand our operations from our one single capillary sequencer. I think we have about 4 or 5 of them in the operational lab now that each have 16 capillaries or through-putters. Pretty large. We're basically the size of the small genome center with all the equipment and the robotics and everything that went on. We have, I think, about 18 or 19 actual DNA analysts working both on case work and in the missing persons unit. And shortly after we actually went online with missing persons, there was an initiative out of the Department of Justice to fund missing persons. So we started getting federal funding to expand the scope of our missing persons operation.

We, there were very few labs in the country doing this. The obvious one is the Armed Forces Institute of Pathology Lab, AFDIL laboratory. At that point, they were focused primarily on military personnel. They had the capabilities to do this. The FBI had the capability to do this, but their focus still was primarily aiding other law enforcement with casework--doing the hairs and things like that. That was their strong point and focus of the Medical Examiner's Office in New York City. The Office of the Medical Examiner there unfortunately got a lot of experience really quickly working with that after 9/11, because all this

was happening at that same time so. But there were really very few labs capable of doing that kind of work.

So, when we started our outreach program to state and local law enforcement agencies throughout Texas and throughout the country, we basically weren't inundated with casework, but it steadily grew. As the word got out, more and more agencies actually started submitting material to us. The advantage to them was that it didn't cost them a penny because it was all funded from the federal government, and all of the work done in Texas is still funded through Texas. All of this goes into the database system called CODIS that the FBI monitors. And over this period of time, we've been involved with changing the scope and format of CODIS really to be able to handle relationship type testing, pedigree-based searching instead of the one-to-one searching that's commonly used in case work—where you have a perpetrator you're looking for and you have an evidentiary profile at a scene. It's different when you have a set of unidentified remains and you have group family members who are missing a particular person in their family tree, and you look at that whole set of information from the knowns of family references as a package—as a pedigree. And that requires totally different types of searching algorithms and statistics involved in that. So the CODIS system this year rolled out their latest version that has the full capabilities of doing that to all of the law enforcement agencies. So we're actually getting a lot more interaction with local and state laboratories who might do some of the family reference samples, but we're still the major place doing the bones.

17:50 Can you go backwards from that? Can you take the bones and take the DNA and say this person appears to be of this type of race or this type of?

18:02 There are ancestry informative markers within the genome that could be tapped that can give you some indication about it, but it's a trickier thing. All of the markers that we use in criminal case work are not designed to give us information about how somebody looks, what population they belong to, what

diseases they have. They're basically markers that have a lot of variability among people. And by having a lot of variability means there's a lot of different types. So each individual type is a rare event when we get it. So that makes the genetic markers extremely strong for individualizing a sample, being able to say this sample came from this person. We can do that very well with the markers we have. Not many of them give us very much information on what population somebody might be from. Mitochondrial DNA does to some degree because it's more structured in populations, but even that's not a sure thing because, especially here in the US, we have a lot of what's called admixture in the population. We have a lot of blending. The US is the big melting pot and while that's a great thing for society, it's a horrible thing for population geneticists because we have such a combination of markers coming from all different parts of the world that when they mix and then they remix generation after generation a lot of those trails are lost. You know, so, you can kind of triangulate some of these ancestry informative markers that are in the genome if you're testing for them. We don't. But it's still more of a guess. It's not a surefire thing. Y'know we can't tell you that this individual is of this particular population and they came from this particular country in Africa or the Middle East or things like that—you know in this particular village. Now when you're doing wildlife forensics very often that's exactly what they want to develop is that level of resolution, but they don't have the problem that we have with people being highly admixed. So there's some interesting things that still could be looked at. That's definitely not a surefire thing that we'd ever have a system that would give us that level of resolution.

20:40 How has the field of forensics changed since you started in it?

20:43 It's changed actually fairly rapidly at first and then it's kind of in a plateau steady state now. Right when I got into forensics, you know like I said earlier, I was hired primarily to set up a new technology that was originally thought to be something to augment the existing technology--which is what Art used

here for all the paternity testing--the RFLP approach. Using radioactive or chemi-luminescent probes, you look at variable markers in the genome. Very powerful tools but very, very labor-intensive, and also required a fair amount of bloodstains or a biological sample to work on. The PCR approach offered an alternative where you could actually work on very minimal amounts of DNA and it wasn't as labor-intensive. The first systems basically looked at SNP markers, single nucleotide polymorphisms. And only the first, the first kit only looked at one genetic marker. So that by itself isn't strong enough to really individualize the sample, although additional assistance came out that did that but all over a very short period of time these developed.

And the real quantum leap occurred when the switch went from using short tandem repeat markers which are amplified using PCR. They're small pieces of DNA. And they were analogous to RFLP approach where you have a lot of what we call polymorphism, or variability, at every genetic marker. And the original systems only had three or four of these genetic markers to be tested, and the standard now is 15 or 16 of these markers all done in one reaction at one time. It can be automated. It works on very little DNA, so it was definitely a major improvement in the shift from the traditional DNA based testing to the STR approach. Occurred fairly rapidly in the last 10 years, y'know. Recently there are kits available that have an expanded set of markers that do 22, 24 different markers all simultaneously. An enormous amount of genetic information for individualizing, but really that's all it tells us is individuals—not anything about the individuals. So that's kind of the plateau we've reached. We've pretty much set on a single type of technology using capillary electro-fluoresces and fluorescent detection on amplified fragments, or amplicons, of these various genetic markers. It's not a perfect system. A lot of information is still hidden in the actual DNA sequence. We're looking at fragment lengths of a piece of DNA that we've amplified up. It doesn't tell us anything about the actual sequence underlying that fragment. We just know it's a X number based pair size, and that fragment is the same length as this fragment in the sample—so they're the same allele type that we use. The underlying variation, and I actually had a

paper… two papers come out in the last year, looked at the underlying variation in these markers using mass spectrometry. And there's a lot of variation underlying that. Many times the things that we're calling the same type aren't genetically the same DNA sequence. And it basically triples the number of types available at any genetic marker that we've tested that has the capability for underlying the polymorphism, the changes.

So the next real change that were going to see, it isn't going to be the adoption of the mass spectrometry approach because it's not as broadly adaptable to crime laboratories, but the next big check—change is going to be next-generation sequencing. The same kind of stuff that they're doing for whole human genomes and things like that. Most of the platforms available have gradually gotten smaller and smaller and smaller and can be used for targeted approaches where we can still look at these same set of genetic markers that we've databased for all of these years, but getting more information out of them. And some of these instruments, y'know kind of the size of a water cooler, not the size of a refrigerator anymore. And some new technology that should be released here in this next year out of Nanapore, Oxford, Nanapore in England, the entire DNA sequencer is the size of a thumb drive. And you can actually put a blood sample in it without any precursor kinds of treatment. Y'know at least that's what they say it has the capability of. And it can go through and read the DNA sequences for you. That's not the approach we necessarily use in forensics because we are limited due to legal and ethical issues as to what markers that we look at. So we have to develop our assays to be very specific to the set that is allowable within the CODIS system, and also that we don't necessarily target markers that give us information about the genetic diseases and things like that.

But an area that we're very interested in, and missing persons especially, is markers that tell us something about phenotype or physical appearance. With all of the genome projects and the encode project that came out this year, we're learning a lot about what causes the variation that we see in

physical appearance. And we've often worked on cases very closely with forensic artists who can take a skull and make a rendition of what this individual looked like. They're working in the dark however as to what skin color, eye color, complexion, muscle development, ear shape, things like that, They're really taking guesses at that. And we've seen… For instance one case we did… We did a pretty big case down in Florida where we had several sets of unidentified remains that were collected and the forensic artist made renditions of those and had them posted on the Internet in various places. And we started actually making some of the identifications, associating those remains with various families. When we actually got that done and saw pictures of what these people actually looked like they were pretty way off to what the forensic artists' renditions were. So there's definitely a very good reason to go that approach. Whether there is going to be a lot of push back from the ethics community with regard to the use of markers that are actually something that code for physical appearance has yet to be seen. But it would definitely aid in the identification of a lot these sets of remains if we could actually have artists' rendition fed with genetic information on what certain characteristics are. We'd get a much closer picture, and maybe we don't have to worry too much about DNA; Maybe it will be more chance for an ID and all we have to do is a confirmatory test. Y'know so we could definitely aid the process. I see us going to those kinds of things more than investigating markers.

29:34 Is testing getting cheaper and faster like everything else?

29:36 Everything is getting a lot more cost-efficient. I mean it took $13 billion or something like that to do the human genome originally over almost 13 years. You can do a human genome these days in a week for a 1000, 2000 dollars so the technology is definitely capable. The implementation of the technology takes a little bit more time, especially in the forensic field. We go through extensive validation processes, and those tend to be expensive because you're doing a lot of redundant sampling, really proofing out the system--which you want to do. If you're going to say that this piece of DNA from

a crime scene matches this particular defendant, you want to make sure that there is no chances to have a mis-association. So there's a lot of precursor work to be done before new technologies could be adopted. But the sheer nature of how virtually all genetic testing is done these days is much more streamlined than it used to be. Where in the past a lot of people had to do cloning and things like that to get a particular piece of DNA that they could sequence or whatever, these days you can basically amplify that thing up in two hours and have it there to work with in another two to three hours—have a full DNA sequence of. Even the instrumentation that we have here today, which is the first generation of sequencers, where technologies already in the third or fourth generation of DNA sequencers. And the newer systems also give you a large measure of the statistical redundancy on how they're done. So you actually come up with some quantitative measures, which might be very, very helpful in forensics.

We work a lot with mixed samples. If those mixed samples can be tested in a manner genetically in which the proportion of the different DNA types is maintained, we can actually break those samples apart. Kind of like you see on sci-fi shows where you can say, “Okay this piece of DNA came from this individual. This piece of DNA came from the other individual.” Y’know, and have a little bit more level of certainty on what the contributors are. Narrow the scope. Narrow the field and make a stronger association that way. So there's a lot of potential yet to be developed. I would estimate, within the next five years we’re going to see a major shift in how DNA testing for forensics is done. It's going to occur quickly in the near future, primarily because we have to keep up with the state of the science. You know one of the underlying questions you often are asked when you testify in a DNA case is, “Y’know these science, technology methods that you're using commonly accepted in the scientific community?” You know the scientific methods we’re using is used in a lot of the scientific community. It has been for the last 15 years. So it’s very out of date on the spectrum of scientific development, and eventually that is going to push things in the direction of switching to new systems. Which system? I don't know. There’s several players. Like I said earlier, we’re narrowed down to basically one technology, one platform that

is used almost everywhere. If that one company disappeared, forensics would be in pretty big trouble. And the new technologies have a lot of variability. The end result, however, is still the same. It's still DNA sequence. So the unifying, the endpoint, the gold standard would be actually testing at that level instead of making some kind of associations to what might be in that DNA sequence, in that gold standard. We would actually be looking at the endpoint. With any of the new technologies we'll do that. So I think there'll be a big advantage of that in the future.

34:31 Very good. If somebody were interested in getting into this field--other than coming here eventually--but before that what type of preparation should they…?

34:30 Well, in any of the forensic scientists, sciences, they're really looking for people trained in hard-core basic sciences. You have to have a good background in math, more so statistics, than in calculus and things like that but it depends on the field of forensics you go into. But in the biological end of things, you're really looking for your physics, math, biology, biochemistry, organic chemistry, analytical chemistry, those kinds of backgrounds, and any of the crime lab sciences. Many of the disciplines within the crime labs--DNA testing and biology is only one portion of a typical crime lab's operation. They also do a lot of trace evidence work where there's analytical chemistry, instrumentation analysis-- that kind of work, chemistry, hard-core chemistry, identification kind of work. They have a pretty good program for that up in Denton actually. But those are the kinds of degrees that you need to have as a foundation courses to get into virtually any of them. A bachelor's degree is definitely preferred over a BA degree, so BS instead of a BA. A criminal justice degree doesn't help in getting into a crime lab. It might help with getting into the law enforcement, but not necessarily, if you want to be an active analyst in a crime laboratory you're not going to get the background that you need. You need the hard-core science. You could minor in something like criminal justice and that might help you a little. But it's the hard-core sciences that they're going to be looking for. And the field has specialized.

All of the disciplines are developing standards for education, and training, and methods. The DNA community was well ahead of the curve in that area. Since the late 1990s already, we had guidelines that the community adopted, that basically were reshaping to now what are national standards. And those are constantly being reviewed and updated and things like that. The criteria for the various job positions, if you will, in the forensic DNA lab are very clearly spelled out. Many of the other disciplines are now following that path as well--developing standards for their particular disciplines.

So the first thing to do is decide what area you might be interested in, and then do your homework. In most cases there are many forensic science programs at universities throughout the country. Many of them aren't very useful because they only give you a smattering of a couple of forensic courses here and there, but nothing solid and consolidated. You don't get that hard-core science background. You get introduced to a lot of interesting things but I've talked to, over the years, many students in these programs who wonder y'know--they have a forensic science degree, but they can't even get an interview at crime laboratory. It's because they don't have the base education that the science disciplines require. So those are issues that have been going on for at least the last 10 years now with people trying to get into the field. And there are jobs in the field in all of the disciplines, all over the country, and there is a dearth of qualified individuals to fill those jobs. So you know the best thing to do is do your homework. See what's required. But, look at me, I never even thought… I knew a forensic anthropologist when I was in my doctoral program, Dr. Gill-King up in Denton, a good friend of mine. He always said I should go into forensics and I said, "I'm not interested in that stuff." That wasn't my thing at all, but I got sucked into it and basically here I am 20 years later still doing it.

39:38 inaudible

39:39 It's a very interesting field. It's… it has its challenges and things like that. I've been able to switch my focus out of the lab, operations lab, and more into the education area. So, it's achieving that goal

that I had for myself so, and also getting back into some more regular types of research, instead of the applied research that we do in a forensic lab.

40:12 Speaking of that, what is your current area of research?

40:14 Primarily, going back into molecular evolutionary genetics in population genetics. We're looking, currently have one PhD student, actually two, that are interested in looking at the energy production system--oxidative phosphorylation--it's a, really a relationship between the mitochondrial genome and the nuclear genome proteins that cause ATP energy for the body to be produced - are generated by a combination of proteins sub-units**,** some coded in the mitochondria, some coded in the nuclear genome. And both those genomes are basically disjointed from one another; they have different evolutionary paths. Mitochondrial DNA is inherited along maternal lineages and is more structured. While the nuclear genome goes through all that admixture and mixing and recombination and the fun stuff normal eukaryotic cells go through that scramble up the genome considerably. So if originally these systems had coevolved to work efficiently in particular populations in particular environments, how does that effect US populations that are admixed and highly mixed? Y'know mitochondrial genomes that might have come out of Central Asia mixed with African origin genomes and some Caucasian thrown in from the nuclear genome. So that level of admixture may have some effect on ATP production capabilities and that has been linked to... I think, virtually every disease known to man these days has pointed the finger at mitochondria or mitochondrial DNA. But, all of them have really missed the point that the mitochondrial genome only codes for 13 genes that are involved in that. There are another thousand or more involved in the nuclear genome that have to work together with those mitochondrial genes. We're looking at starting a project up that combines the genetics with actually looking at energy production itself--measuring oxygen consumption in crossed lines. We're probably going to start with a mouse model. There have been implications that that there is a strong effect of hybridizing these

mitochondrial types, nuclear types in house mice and natural populations contact zones that run through central Europe. But again, nobody's looked at the actual combined genetics with the actual oxygen consumption rates. So we're looking at that approach and it has a much broader implication you know. We have some interest in the biomedical aspects of it, but also the natural science aspects. Going back to my roots really. One of the things I was looking at in my doctoral work were contact zones--where closely related species, sub-species, population, whatever level of nomenclature you want to use for these things--where they come together. What actually forms boundaries between species that are very closely related and stem from common ancestry? Why can't they just remerge when coming into contact? So it could have some effect on the rate of evolution that goes on. Mitochondrial DNA is very fast evolving compared to the nuclear genome, and the nuclear genome has recombination and admixture going on in it. So coupled that could form very effective barriers between species. So that's ultimately one direction. You could take it from the spectrum from overall species evolution to biomedical applications that are in the line of health disparities really. One of the issues that we have when we look at populations here is they're all hybrid populations--Caucasian populations, Hispanic populations, African American populations. They're all admixed to various levels. Some more than others y'know. So, that could play a role.

44:59 Sounds very interesting. And then my final question has to do with what you do this summer with the online course you worked with the Department of Justice.

45:08 This was a Department of Justice/NIJ training program. I put in a grant proposal back in, I think it was 2010—yeah, 2010, to the Department of Justice. They had a solicitation for, basically, training grants. They fund training programs in a broad spectrum of forensic disciplines. And one of the areas that they're always interested in is the forensic area, forensic DNA area, because especially since so much advanced training is required for forensic analysts. They not only have to be good people at the

bench who can follow the protocol to do a particular process, but they have to be able to interpret the results--which can be tricky. And they have to give statistical weight for those results, which is a part usually most of them hate. That's the part they don't like for some reason. I don't know. But one of the things that we had come up with is why not develop or test out how effective really. It was really more of a research project is the way NIJ looked at it. How effective is online-based training? How would that work in the area of forensic DNA interpretation, and the statistics? The area that we really excel at here … we're probably the most known group nationwide for training in forensic statistics and DNA interpretation. So what we developed was a way to test the model. We sent out a survey to all of the analysts, technical leaders of crime labs, lab directors. Getting some baseline information of exactly what people were doing out there, and to see if they were interested and getting additional training in the areas of forensics statistics, and data interpretation and, software utilization, things like that. And we got very good response needless to say because everybody is always needing continuing education requirements. It's one of those things that's required in the national standards. The best thing was it wasn't going to cost them anything, because it's all funded by NIJ. So we developed an online course that was really designed and mimicked off of a course that I developed for a graduate program here back in 2001, actually when I first put the course together. It outlines all of the basic foundations; basic statistics, profile statistics, development of population databases, mixture statistics, kinship parentage, basically all of the things that a working forensic DNA analyst needs to have expertise in. But we did it all with, basically, narrated videos built into a deployment of an online course, fully with exercises, and discussions boards, and the whole 9 yards. It was a six week program. After they completed the six week program, our first pilot, we had about 19 people participate that we brought in for follow-up in a hands-on session where we actually did some computer training with them. Had them actually do groups like our TBL exercises we do--the team-based learning approaches that we use in our graduate courses, for instance. They seem to really enjoy that. These are folks who knew each other, but never

actually got to mingle with each other and discuss things that they're all working on. And everybody does things a little bit differently. So they actually got a good chance to interact, which they normally don't. Normally training has been in this field has been--you go to a workshop, you have a speaker come out, and it's a one day, two day marathon lecture, talking head in front of the room, very little interaction. The idea with this is making it massively interactive, both online and for the on-site. That worked out very well. And from our first pilot group the responses were very positive. They gave us some very good ideas of things to tweak, which we did. And then we deployed the program again last summer. And this time we did it a little differently. We had a much bigger pool. We had about still about 18-19 participants participating in it who would come on-site. And they came on-site in October, but we also had another 90 participants who participated in an online program. Then, while the on-site folks were here in October, we did a web simulcast of all of the activities. And they actually were able to participate. We had an audience response system type set up over the web where they could text in questions. They could do it on twitter. They could do a whole variety of different ways, and it would show up on our monitors here. It worked out extremely well. There's some aspects of the on-site program that aren't really useful to the online only people, or the people working in the groups that are actually doing computations at the computers and all of that. They couldn't participate in it. We didn't have… if we had a huge network, like Web CT network, where everybody could be working off the software in groups. Maybe. But they definitely, the online only folks, definitely got a lot out of the group discussions and the trainings, parts of the on-site. The overwhelming response was--the online plus the on-site was the best way to do it. And really the comment I got back most from participants was this is clearly the best training that they had ever had. So it worked. It really came full circle this fall. I just finished up teaching that course that I developed in 2001 that this online program was based on. I rolled all of that or the majority of the material from the NIJ program back into this course where I never gave a single lecture to the students face-to-face. All of those lectures came out of the online training

program material because it was the same subject matter. And then all of our online meetings were all group discussions, group exercises and things like that. And the students responded to that amazingly well. They definitely liked having the online lectures because they could put you on rewind whenever they want and hear it again. And some of the material gets to be pretty complex, if you're hearing it only once. And a lot a lot of the lectures and some of the med school courses and core courses, they try to record it--you know on a recorder. It's not the same as an actually interactive video where they can actually turn it back, go forward, and we had quizzing built into it to reinforce the material. And actual video training of how to use the software tools that we had them use. And they did extremely well. I think that that kind of a blended learning approach is very, very effective for getting this kind of material--which is fairly technical—across. And hope to expand that into some of our other materials. And right now I'm kind of tasked with the role of getting the graduate schools online offerings off the ground. So that's going to be my chore for the next several months to years, I don't know. We'll see if it actually can get the other faculty involved in starting developing some of these programs to have certificate programs that have actual degree programs online in the graduate school. Learned a lot from the NIJ project on how not to do things.

54:40 Inaudible

54:45 It worked out well.

54:48 What did you learn about the online program?

54:54 Some of the technical issues: made assumptions on what kind of computers and Internet access, things like that that the participants had. It was very interesting to find that some of our crime lab people were working on PCs with Windows 3.1, which doesn't support any of the software that we have them working with today. A lot of individuals didn't have home computers that had Internet access. I

found that very surprising considering these are folks who are working on DNA and stuff like that. How can they not have Internet access at home and work in a technical field? Some of the logistics for doing these kind of workshops. Originally, we ran through the Blackboard system and there was a mechanism to run it through the Blackboard system, giving them IDs, and things like that. It was much more effective once we switched to basically enrolling them like students. I think that will work extremely well for all of the online courses and things like that. Any kind of training session, I would do that way again. So it was a learning curve.

56:24 And you developed, I guess what you might call prerequisites for computing hardware?

56:28 We definitely. For the second deployment of our NIJ workshop, we sent that out with the invitation to participate. And we had little to no issue with any of the folks who were participating in the program. So not 90 some odd people. Because they knew what they needed, they weren't going to bother signing up for it if they didn't have the capability to. So everybody had a much smoother transition. And you know learned a couple of tricks on how to actually be able to use source materials in an online manner that I've implemented now in my courses as well.

57:20 Any questions, Danelle?

57:29 Inaudible. I was just wondering why there are still those labs running Windows 3.1?

57:39 I am wondering as well. That one… what my instructional designer and I, when we got that e-mail back… when we asked them--the person was having all kinds of problems even looking at the video presentations. We were like, "It's got to be something." So we finally had him give us the information on what they're actually trying to do this on. Because we developed these systems to be able to work on the nook, work on the iPad, you could use your iPhone, any computer system, Mac, Windows. it didn't matter. But they were just working on an antique system in that lab. That surprised me. You know the

other thing that we ran into with this particular community of individuals--we were working with people in crime laboratories that have fairly stringent firewall restrictions. And in some cases they were able to work with their IT people and get end rounds, because a lot of crime laboratories won't let you download an Excel file, or even a PDF file or things like that. So that was an issue we had to work around. That one we kind of expected to run into. Most of the labs were very accommodating to their staff in getting them the clearance to access materials from the web when needed. Others just had to do their work at home, and that's when we ran into people, "I can't do the program because I don't have home internet." And that one shocked me. Y'know every high school kid these days… they're required in grade school. Y'know so how can it be that people working in a technical field don't have access to something like that? That was a shocker.

59:41 Inaudible

59:47 Oh yeah. Well if you're in a closed zero access network, it might work. Most of them in crime laboratories that work off a lab information system, it's a closed system with nothing coming from the outside. In some cases they're all run off a server and you don't even have a PC type computer, you just have a terminal. But I thought a lot of that went away a long time ago already. I was surprised at that. Y'know that was enlightening. I'm curious to see what NIJ's thoughts on that will be when I give them my progress reports in the near future.

1:00:33 Any more questions? - Was your work ever emotional for you?

1:00:37 It can be. I'm fairly removed these days from any of the actual casework. We now have two technical leaders in the lab and a whole slew of analysts, and they're really the ones that interact with the law enforcement. We don't interact very much with the public. The actual contributors, all of the family reference samples, have to be submitted through a law enforcement agency. No, it's really hard

sometimes when I've gone and testified in trials and you know the family members are there. And when the trials over, you know, they do come up and talk to you. And they are very, very grateful of what we do. And some of them have some pretty interesting stories. That's for sure. It's a good thing we're doing. I think that's probably why… what's kept me in here. It is worthwhile. Y'know we do serve a major function for not only here in Texas, but nationwide. We are the largest lab doing this work in the country. Over 70% of what's in the CODIS databases for missing persons came from here. We do have a lot of exposure. Art is usually our face person for all of that. I tend to stay in the background; you don't see me on the news or in the congressional hearings and things like that. I tend not to want to be there, but we did a lot over the years, when we first started this stuff off, to take it from one sequencer to what it is now. It's a good accomplishment. Not what I had in mind when I was in grad school. And the same thing happened with our graduate program really. It came in passing. That was another thing that happened by accident. Because like I told you, I was looking at university positions and I was actually teaching over at UT Dallas for several years before I came here. They were very interested in putting in a program in forensic DNA, because that's right when all of the various TV shows were just getting popular. So there was a lot of interest in it. And I actually taught a course in an introduction to forensic biology, and things like that over there. And I had actually put together an entire degree program centered around forensic genetics. It was with the biology department where I was teaching. Kinda had that in my back pocket on a computer disk, you know. When I came over here and just in a passing conversation one day, when Art and I were talking to Tom Yorio, who is the Dean of the Graduate School, that topic came up. And a week later I found myself sitting in the Graduate Council outlining how we could do this kind of program, and they said, "Well go ahead and do it." And that was like okay. Well again, you know that's where Tom would joke that my startup funds were about one sequencer. So not only did the lab come out of that but the entire graduate program came out of that. And relationships with all of the various manufacturers in the field definitely didn't hurt. We have very good relationships

with all of the major producers of forensic products for DNA work--Applied Biosystems, Life Technologies, Promega Corporation, Invitrogen. They were all separate at one time; Lifetech, Invitrogen, Applied Bio are all one company now. They were all separate entities once upon a time when we first started all this. So they helped very greatly in getting our laboratories systems up to speed rapidly. The waiting list weren't as long for getting things going. And they were very, they still continue to be very helpful in our graduate program. It's extremely expensive to do forensic DNA testing. The kits themselves are really expensive. And that's what really give us our edge here is that we train the people on the actual systems they would work in a crime lab on. We went from our first class of about 4 students. Our class sizes average between 12 and 14 students coming in as a cohort every two years. Say a cohort goes through the graduate program, and over 90% of them are working forensic scientists out all over the country. And I get calls all the time now from people who graduated in the early 2000 period who are now laboratory supervisors wanting to hire new graduates coming out of the program. So it's worked very well. And those who didn't go into the field went into law, medicine, some went on for PhD programs. So they've all been very, very successful. And our program really was targeted to training a specific discipline and provided all of what was needed, not only the bench training--which is extensive - right now they go through 2 years of labs. Everything from the basics all the way up to DNA sequencing and things like that. They get all of the bioinformatics and statistics. So when they show up at a crime lab, they can out compete anybody who is applying as well. So it's worked out fairly well in that regard and the program is very popular.