Oral History Interviewee: Dr. Joe Warren

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How did you get into forensics?

Oh well, that's an interesting question because that's not a truly… it's not a straight path. I think I probably started my interest in it probably when I was in junior high school, maybe a bit younger. And a lot of it had to do with my background. My father was a physician and my, his brother, my uncle became a chemist. My mom was a nurse, so I had kind of like the science background from that part. But most of the other relatives, especially my dad's side of the family, were all cops in the New York City Police Department. And so I kind of grew up listening to their stories, meeting their friends and stuff, and I developed an interest in law enforcement too. And again, back in junior high school 'n stuff—we're talking now the late '60's—there wasn't the interest in forensic science. And in fact a lot of people didn't even know it was. They kind of equated to being a coroner or something. But I managed to find a few books about it. And I said "That's really what I want to do." So I went to college. I majored in biology. I got my Bachelors and Masters, but still didn't know how to get into this field. So I went into a biomedical research down at the Tulane Medical School down in the New Orleans area, and was there for two years or so—a little over two years. Grants ran out. And I was lookin' for a job. And really just through serendipity or pure luck, I managed to literally run into a friend of mine who was a captain of the Jefferson Parish Sheriff's Office. And he told me that they were looking for someone to work in their crime lab who was a biologist. So I applied and got the job. And that's how I got my start. That was back in July of 1984

You kind of bounced between New Orleans and Fort Worth a couple of times.

Yes, I did. I was with the Jefferson Parish Sheriff's office for about six years. And also during that time, I'm going to say, when I first got in this field, we didn't have DNA testing. The testing that was being done back then was looking for protein-based genetic markers such as blood typing, and various enzymes—polymorphic enzymes that we're examining. But around 86-87, I was reading about this DNA testing and I said to myself, "I need to learn this. This is a coming thing." So I went and started training on my own time basically with a molecular biologist that I knew at Louisiana State University Medical School. I would go during lunch times and after work, on weekends occasionally. And over a period of six months or so I learned to do basic DNA testing. And then we opened up a part-time business doing paternity testing using DNA. So that's how I got my experience. In 1990, I left the Jefferson Parish Sheriff's Office. I was offered a job here in Fort Worth with the Tarrant County Medical Examiner's Office. They were just opening up their brand-new crime lab that was to service Tarrant County area, and they wanted a DNA biology section. And the person who was their lab director was my former boss at the Jefferson Parish Sheriff's Office, Mr. Ron Singer. So I kind of followed him over here. And I was there for about nine years from 1990 to 1999. During that time I also decided that I wanted to get a doctorate. And I got accepted at our campus in Denton, the University North Texas, Denton, in the biological sciences program. I obtained my doctorate degree. I had two **co-main** professors: Dr. Robert Benjamin, up at the Denton campus; and Dr. Arthur Eisenberg, who is currently the Chairman of our Department for Forensic Investigative Genetics. I obtained my doctorate in molecular biology in 19… 2000. And around that point I was also offered an opportunity to go back to New Orleans to work for a private DNA testing company called **Religing Technologies(?).** That was pretty interesting for me because they're one of the few laboratories that was doing the two types of DNA testing that are still offered today. Autosomal DNA testing, which is what we commonly think of as DNA, that's the DNA from our nuclear DNA—the DNA that we inherit from our mother and father. They were also looking at a specialized type of DNA testing called mitochondrial DNA—that DNA we inherit only from along our

mother's side of the family. And my doctorate happened to be in studying the mutations rates of mitochondrial DNA and how these rates affect interpretation of forensic testing. So it's kind of cool from my aspect to use my dissertation directly to apply it into my work. Not many people have got a second chance to do that. So I stayed there for about two years, a little over two years. And then Dr. Eisenberg called me up and said, 'We're starting this graduate program in forensic genetics here at the UNTHSC, and we'd like you to come aboard and be one of the instructors." So that's when I started here in 2002.

Are there any memorable cases that you worked on?

Oh yeah. There's several. I think one case that will always stick out in my mind for a variety of reasons, and that I think you'll understand it, is that it was the kidnapping and murder of a —I think—11-year-old girl named Nichole Lopatta. She was reported missing. This was I believe in 1985. June of 1985. I had been working just about a year. So I was just getting my feet wet, so to speak, in the field. And I was assigned this case. And this is back again in '85 and back then these cases of missing—missing children were still pretty—pretty rare. And so the press kind of jumped on this case. And about a week, if I remember correctly, about a week or so after she was reported missing and kidnapped, the FBI got involved. Her body was found about 10-15 miles, in a swamp, about 10-15 miles west of New Orleans—right off Interstate 10. And it was a pretty gruesome crime scene especially for me. It was the first child murder I had to work, and you know you examine the body, and help collect evidence, and just deal with it. And so that will always stick in my mind. And it was interesting for a lot of different perspectives. I got to work with the FBI because they got involved in it. So I got to know a lot of the FBI forensic people and investigators who later played a role in my career later on down the line. I got used to working with the press. This was again a big case in the press. I got used to—I don't want to say used to, but I got my first exposure to really a high-pressure situation. They called it a really hot case. That's the terminology that they used. The sheriff was very… He wanted this thing worked right away. He wanted it

solved right away. We had a lot of false leads. The mother of the child was divorced and she had a lot of boyfriends, about six different boyfriends. Four of them were suspects because they all had backgrounds in sexual abuse. One was a Satanist. He had just committed suicide after her body was found so. And I had the only physical evidence. I found some hairs on the girl's body. At the time, part of my job description was not just in conventional body fluid biology, but also in hair and fiber analysis. Microscopic hair and fiber analysis. I was cross trained in that. And so I was in the hot seat because I was the one who would either match hairs up from suspects to evidence or say, "No, it's not it." And every time I said, "No, It's not," it was more and more pressure to make a match. They've actually made an arrest because the fella who eventually was convicted of it was arrested for murder and attempted murder in Pensacola, Florida. And his girlfriend managed to… She was arrested too, and then she basically opened her mouth to her cellmate about what had happened down in New Orleans. And again it was considered one of the crimes of the decade in the New Orleans area. They wrote a book about it. I had my name written up in that book. So that was one of the more memorable cases. Otherwise, I would say around here, again a very similar one was the—I worked—one of the people in Tarrant County Medical Examiner's office who worked evidence, and actually helped examine the body on the Amber Hagerman case—who the Amber alerts are named after. That case, as far as I know, is still unsolved today. They never actually caught the murderer on that, of Amber Hagerman. But that's another case that sticks in my mind. There are several, several others obviously, but just to give you an example of two of them.

Going back to your first case- Was the person who was eventually arrested connected to her or any of her boyfriends?

No. That was just he basically--he's psycho--he was a psycho--it's a psychopath. He is still alive today, even though he is on death row. He has not been executed. He was dating a woman in the general New Orleans area, Jefferson Parish, New Orleans Parish area. Didn't quite remember her address. She had an 11-year-old daughter he was attracted to. He wanted to find that daughter and do what he did. He never did find that person but Amber Hag-not Amber, Nichole Lopatta just happened to be close enough and be available. So he actually had his girlfriend's 14-year-old daughter kind of make friends with this little girl in the playground, and then bring her to the car, and then so on and so forth.

How did you identify him?

With his hair. That is the only physical evidence that they really had against him was the hair. The hairs found on her body matched his head hairs. Microscopically

How has the field changed since you started? *No DNA analysis and now…*

Yeah, yeah, tremendously. Back before DNA analysis we were very limited, both in the types of evidence we could examine—therefore the scope of the crimes that we could examine, and just how certain we can be that this evidence did or did not originate from a particular source. Blood typing for instance. We could say if I had type A blood at the crime scene, and let's say the victim or the defendant or the suspect at this point, if it was type A blood. They match. It's the same type, but so does 40% of the population. Now if we found type B blood on the crime scene and the suspect was type A, then we could exclude someone. But again that was… So we were very limited in what we could tell an investigator that we could eventually tell a jury. With DNA that's not the case. With DNA we had much more conclusive results. We could definitely exclude someone 100%, which in my opinion is really the strength of DNA testing. Not many people realize but nationwide, probably about 30% of our cases nationwide are exclusions. So that's 30% of people who may have been arrested falsely and a percentage of those may have been convicted falsely. We can just forget about it right off the bat. As far

as the inclusions go, if we have enough DNA and the results are strong enough, we can almost individualize them. So we can give people much stronger results. Sexual assault analysis, in my opinion, is one of the really areas that has been really tremendously assisted. The investigation of it has been tremendously assisted through DNA testing. Back again with the older technologies, blood typing enzyme analysis, if we had a mixed sample—which you always do—you're always going to have mixed body fluids in a sexual assault case from the victim and from the perpetrator, we couldn't separate those components out. So sometimes, quite often, would lead to confusing results or results that could be valid for any one of three or four different explanations. And we have to explain that to an investigator, and we have to explain that to attorneys and juries. With DNA testing, we have methods now where we can definitely separate out DNA that originates from sperm cells to DNA that originates from other body cells like mucosal epithelial cells. So now again we get much more stronger results. Even DNA testing has changed much over the years. When DNA testing first started out, we were mainly restricted to working with blood and semen stains. The stains had to be approximately, at least from my experience anyway in order to get a really good complete result, about the size of half a dime. Now we can get DNA test results on item—you don't even have to see the stain. We get it off perspiration stains, smudged fingerprints. The test is so sensitive now. Because of that, that also has now opened up the scope of crimes that can be investigated. Earlier testing, we were mainly homicide and sexual assaults. We still do a lot of homicide and sexual assaults. In fact, I believe over half the cases worked by the many crimes labs in the biology section still deal with sexual assault cases. However we can also get evidence off things like computer keyboards, cell phones, plastic wrapping. So now we can examine cases such as drug trafficking, extortion, and national security issues. Who used that laptop? Who used that cell phone?

Who licked an envelope?

Who licked an envelope. Exactly. Saliva stains. Who wore that hat that was found a half block away from the crime scene? Or that ski mask?

Has the testing advanced? Can you start going backwards from the DNA sample to determine if an individual is male or female?

Yes. That is not… that is just now starting to be in use. It is still a lot of work to do that. Currently we can definitely tell… In fact, part of our, one of the conventional procedures now is to determine a sex—male-female. That's a test that's always done. That's been around for a while. We can get some idea of ancestry now. There's specialized DNA markers that will point to certain ancestry. Probably the most famous case that's pointed to that was the—there was a series of rapes that occurred in mid-2000s in South Louisiana. Rapes and murders. A serial killer. And the witnesses described a white male. So the police officers were investigating it. Any leads they got involving a nonwhite male they would just not even pay attention to it. When they isolated DNA from two of the victims, and the DNA profiles matched cause they knew it was the same person, they decided to do some of these ancestry, ethnic-based markers. And they found out that the, statistically speaking, this person had an 80%, I think it was an 80% greater chance of being an African American male than being any other race. So that opened up more leads that finally lead to an arrest of somebody. Some of the research that we're doing here at the Health Science Center under Dr. Bruce Budowle, and one of his graduate students, David Warshauer—I believe, involves getting… trying to develop… finding DNA markers that will actually give a physical description of someone. Similar to how anthropologists do it when they look at a skull and they can kind of flesh out a skull. We're trying to do the same thing now, but with DNA. Cause each of those markers... each of those facial features might have one or more specific DNA markers attributed to them. That's down the line.

No more sketch artists? A computer will just pop up an image of a person?

I don't want to go that far, but I'll say it could be another… Again, it's just another good bit of investigative information. You're gonna, you still have to pound the pavement unfortunately. To all those police officers and detectives out there, you still gotta be the old gumshoe, y'know. Sam Spade and stuff. But it's definitely going to help. Definitely going to help.

Where do you see the field headed?

Yeah. Again, I see it expanding to other areas. I see, for instance, helping to identify the geographic origin of somebody. And this particularly could be interesting in certain national security issues. We're not only looking at human DNA, we're looking at the bacterial DNA that is found within a person. They believe now that each of us can be individualized just through the bacterial populations we have. And we can also show a bit of our histories as a people--where we've been, what foods we eat, things like that. Again we've talked about getting, using of DNA to obtain a physical description and an ancestry description of somebody. Even some of the conventional markers now could be supplanted with other DNA markers. Using different technologies that will make DNA testing much more faster and more efficient. There are now rapid DNA--is the field that people are looking at right now. In fact, it's being used by the military to analyze DNA samples at crime scenes, overseas, or on the battlefields.

Was that used to identify bin Laden?

I'm not sure. I'm not sure if that was the one or not. And right now, the FBI wants to use it here, in more conventional stateside crimes--where you can get at least a reference sample off a suspect. Have it worked right there. You know where they take fingerprints from someone? The police officer will take fingerprints. They'll take a DNA swab of someone's cheek. Put it in an instrument. You get a DNA result back in a very short period of time that goes into a database to see if you have a hit or not. So that,

that's another area. And improvements in current DNA technology--pushing the envelope, so to speak, to work with samples that are too badly degraded, that have a lot of PCR inhibition**.** That have a lot of…, I don't want to get too technical here--samples that might cause problems for downstream testing. How to better work with those compromised samples. So that's some of the research that we're looking at now too. And also to get a better understanding of how to better interpret very small amounts of DNA, and DNA mixtures of two or more people.

If someone wanted to get into the forensics field, what would you suggest that they do?

I think if someone was--depending upon the age group of the person--if someone was just in grade school, I would say, "Pay attention in your science courses, and your math courses, and English too. Your language courses, because communication is extremely important part of our field. Someone in high school, I would suggest, again, doing well in your science courses. Look at advanced placement courses, particularly advanced placement biology, chemistry. If your core… if your school offers a statistics course or intro to statistics, take that. College-level: major in a science, and take coursework in genetics, and molecular biology, and biochemistry, and again coursework in statistics. Then apply to our graduate program. [laughter]

Do you want to tell us about your current research?

I'm working on that with my doctoral student--doctoral candidate now, excuse me, Laura Gaydosh. And there's a project that we came up with about three years ago. I've always been interested in again, in working with compromised DNA samples. And part of my interest was looking at... one of the testing procedures that's used in DNA, in fact the major testing procedure using DNA after extracting it is to amplify up DNA. Cause typically samples found in crime scenes are fairly small, and there may not be enough there that we initially extract that we can get results from. So we need to amplify that DNA, copy it multiple times over, to where we have enough of a type of DNA we're looking for and that we

can actually work with. That technique is called PCR or Polymerase Chain Reaction. There are certain chemicals that might inhibit PCR from happening--hematin for instance, from bloodstains, can inhibit PCR. Humic acid, from soil samples taken from outdoor crime scenes or from buried remains, could inhibit PCR. So Laura and myself, just as a small project with our class of 2009, looking at commercially available reagents that are supposed to overcome inhibition, and seeing how well they work when compared to one another on different inhibitors. During the background research we found out several things. We found that some of these re-agents that were tested, they were tested for not using real relevant levels of these inhibitors--biologically irrelevant levels of the inhibitors cause we went back to the original literature. And so we decided to do our experiment using more relevant levels of inhibitors. And we also looked at chemically what was going on there and we realized that one of the things that these inhibitors have in common is that they all contain metallic ions. Metal in various electrical states transitioning: calcium, lead, aluminum, and copper. And a lot of these are found in soil and burial sites. And our laboratory, our forensic laboratory, we have here specializes in analysis and DNA from skeletal remains. So our hypothesis is… one of our hypothesis is that, or I guess our ultimate hypothesis… our alternate hypothesis is that these metallic ions have something to do with the PCR inhibition. And that, we want to see is that true or not. So we've done several experiments so far, where I think we've demonstrated proof of concept--that indeed they are inhibited. That's what we got the grant for. We showed them this result and they gave us the grant to go further. Now we need to definitely prove that to also demonstrate that these metallic ions are co-purified with the DNA. We're in the process of doing that right now. And then to again look at different methods of extracting DNA or different ways to treat extracted DNA to remove these metallic ions. And were doing this in conjunction with Dr. Theresa Golden, she's at the Department of Chemistry at UNT Denton. So we have a nice, nice partnership going there.

What are some of the biggest misconceptions that you see in the public about forensic investigation or DNA testing?

Yeah, sure. I think in forensic investigation in general. I'm not as negative as some of my colleagues are. Y'know the CSI type programs, some of them just don't like them at all because they think it gives a too unrealistic expectation. You know it's a trade-off. Life's pay as you go. So yeah, you have now a public that first didn't know anything about forensics, and now they might know too much. And what they know might not be totally correct. So it's up to us to educate them. And while that doesn't seem like a serious problem, it could be when you testify in front of a jury. Cause that they might expect to hear something that you just can't give them or they might misunderstand something you tell them based on what they've seen on the TV show. On the other hand, it has increased the public's interest. I don't think that programs like ourselves would be very successful unless people watch these shows and say, "Hey, that'd be a cool way to make a living." So it's helped us out. It's helped us out with grant funding. Now there's a lot more money available to do research on. So that's been the plus. Again the minus has been in the fact that it does give unrealistic expectations for the timeframes involved. The fact that there are times where you just get evidence that you just can't do anything at all with it--no matter how sophisticated testing, no matter how good the analyst is. Evidence sometimes just, there's nothing there to work with. Or whatever's there to work with is just so badly damaged we can't help you out. And I think that these shows give the impression that they can work with almost anything in a very short period of time and come up with the definitive answer. Sometimes it might come up to an inconclusive result or just a partial answer. Other than that, you know, the usual Hollywood stuff. We don't carry guns. We don't interrogate people. We don't… we might go to crime scenes. But we don't we don't

typically go and arrest people, go on investigations. We definitely don't interrogate anybody. I've never interrogated anyone in my life.

And then in testifying you have to explain the statistics to a jury?

Yeah, yeah. So you're giving people, even if you get a partial profile, you still have these very small frequency estimates--1 and a billion, 1 and 500 million. Most of ours are in the quintillions, quadrillions, 10 to the 18^{th}, 10 to the 15^{th}, 18^{th}, 21^{st}, $1n^{th}$.

Do the jurors eyes glaze over?

Yeah. Their eyes glaze over. I think most jurors probably will not once they hear greater than one in a 1,000. That's about it. So that's another skill set to that I think separates out people, scientists, who do forensic analysis from those who don't in that we really have to learn to communicate to a lay jury in a very short period of time. I tell my students, "You probably have a good 20 minutes where their attention is really riveted on you. And then they're going to start drifting away." And in those 20 minutes you have to accomplish a lot. You have to get them to trust you. Get them to trust that you're reliable. Get them to trust your laboratory, the techniques you use, understand your results, and how best they're going to use those to make a very, very difficult decision. And communication skills are important. Demeanor, appearance. You assume with most juries you're going to have somewhere between the sixth and ninth grade level of education. So you have to explain again these numbers, how you got to them, what they actually mean, why you're doing this test, what is DNA, where is it found. Okay, it's found in blood cells--there was blood at the crime scene. Okay, or it's found in your blood—there's blood at the crime scene. That's why we're doing it. DNA is basically, parts of it are very, the parts that we look at are very, very different between individuals--like fingerprints are different. That

sort of communications. So communication skills and the jury. But you have to do it without it being condescending to them. The worst thing that adults hate to hear is another adult talking to them like they're kid. And it's so easy to do, to talk down. Even if you don't mean to talk down to someone and you're trying to educate someone. And it's also, you have to realize too that we are so used to talking to scientists and one another--that we can use technical jargon all the time. We know what we're talking about. You do that to a jury, they're not going to even listen to what you have to say. You use a term like alleles: What's an allele? Capillary Electric Phrases--god forbid you use that term. They are not going to… not even going to pay attention to what you're gonna have to say. Their mind is going to be stuck on what the heck is this person talking about. They're not even going to hear the fact that the DNA matches or the DNA is different, it does not match. So it's a skill set you have to develop.

And talking to the defense attorneys?

Yes. During the cross-examination, answering them y'know. Attorneys, that's what they do. This is their milieu, is the court room. They work in words. We don't. So you have to at least understand something about different strategies, general strategies that defense attorneys use to cross examine individuals. Not that any of its bad, they're doing their job. That's the first thing you have to realize. They're doing their job. They're not out to get you personally. They might like you personally, or at least feel ambivalent about you. They're doing their jobs. And part of their jobs might be to make you look as bad as they can. So don't let them get to you. Stay calm, stay collected, stay professional. Maintain eye contact with the jury. One of the tricks that defense attorneys like is: I'm supposed to be looking at jury members. You're asking the questions. It's only natural to answer the person who's asking questions. You don't want to do that 'cause you're actually addressing the jury and not the attorney. And that takes a while to learn, believe it or not, 'cause you're going against your natural instincts. I think I mentioned this previously that I had a little head start on that. Of course while I majored as an

undergraduate in biology, I actually had a minor or what was considered a minor in the theatrical arts. So I wanted to be an actor at one point, and I kind of had that background in talking to the public--not being afraid of public speaking and then developing a persona to communicate with someone.

So if one of the CSI shows calls, you're ready to do it?

I'm ready to do it. Yes I am. I think I'll retire and work for CSI later on in my career. [laughter]

Can you talk about Blood Spatter Analysis?

Oh sure. That's another specialty that I developed over the years. Like I, when I was with the Jefferson Parish Sheriff's Office especially and some aspects too with the Tarrant County Medical Examiner's Office, we would go out to crime scenes. It was expected of us actually to help. And most of the crime scenes that we were called to do being a biologist was, for want of a better term, pretty gruesome. They usually were multiple murders involving stabbings, beatings, and in some cases shootings. The bodies are still there. And I got trained in this field of forensic science called bloodstain pattern analysis where you will look at the size, location, shape of bloodstains. And try to reconstruct a crime scene from those-- determine things such as 3-dimensional reconstruction. Where was an individual standing or located when they were attacked? If I see a stained pattern on the wall, how far away was that person when they were first attacked? Did that person move? Was there more than one person there? What was the mechanism? Could it have been beating as opposed to a shooting? Could there've been more than one assailant involved? Could the assailant have been injured? And can we locate the assailant's blood at the crime scene? That is one area that I actually specialize in is trying to find assailants' blood at

crime scenes. And yes a lot of it involves physics, fluid dynamics, and trigonometry. And now we either, there's a lot of, the back then, and its still done mainly… You do this at the scene itself. You can do it by hand. There is also now a lot of software that will assist you in this as well, but I teach a course in that here to our students. I don't do as much of it in case work anymore as I used to. I still occasionally do some private case work, or I can look at photographs of crime scenes and try to help attorneys or investigators out just by looking at photographs. But that's been a different area. It's a fun area that I enjoy. If fun is the right word.

Do you enjoy what you do? Is it rewarding?

Yes it is. Yeah it is. I don't like to… sometimes it comes out wrong when I, you know. Because I may not have done other jobs, and I can see they could all be… I even worked as a salesperson once for about nine months. I didn't personally like that, but I could see how people really enjoy it. Okay, but I can say one thing about my career that I could really say positively is that I can leave this career when my time is finished with and say, "Y'know, I don't know if I made a difference or not. But I know that I tried to make a difference." I like to think there's some people out there who would have been in prison innocently except for the work I did. I like to think that there's some people out there who would have been victims of crimes who are… who were not victims because we managed to help catch someone before they were able to hurt another person and put that person away for a while. And so, yeah. Yeah, I think it's very rewarding as far as, and again you'll never quite know what the full aspects of all those are. You never know, at least not here. Maybe somewhere else you might find out about it. But I do like to think the fact that I really think I tried to make a difference. You don't, for most of my career no one knew what I did. It's only recently that people knew what I did for a living and really understood it. And you don't… you know, you make a comfortable living but you're not going to get wealthy doing this. But I

think there is a feeling of satisfaction that I try to tell that to our students. That's one thing I try to communicate with them is that you're entering a field, it's going to have its ups and downs. It's like anything else. But in general most people, even though they might have problems with individual jobs, everybody loves their career. And I think that speaks something for our career.