(Open court, defendant present, no jury)

THE COURT: Are we ready?

MS. COLLINS: Ready, Your Honor.

MR. OLIVER: Defense is ready, Your Honor.

(Open Court, jury and defendant present)

THE COURT: Call your next witness.

MS. COLLINS: Your Honor, at this time the State would rest.

THE COURT: State's rested.

What says the defense?

MR. OLIVER: Your Honor, defense calls Dr. Vincent Miller.

(Witness sworn)

THE COURT: You may proceed.

MR. OLIVER: May it please the Court?

DR. ROGER VINCENT MILLER,

having been first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. OLIVER:

Q. Could you state your name for the record?

A. Yes. Dr. Roger Vincent Miller.

Q. And could you spell your first and last name for the court reporter?

A. R-o-g-e-r. M-i-l-l-e-r.

Q. Good morning, Dr. Miller.

A. Good morning.

Q. Could you tell the jury what your occupation or profession is?

A. Yes. I'm the DNA technical leader and chief technical officer for a laboratory that does DNA testing, both relationship and forensic testing, located in Phoenix, Arizona.

Q. And what is the name of the company you work for?

A. It's Chromosomal Labs Bode Technology.

Q. How long have you been working for them?

A. I've been working there since 2004.

Q. Can you just describe briefly for the jury your responsibilities and duties?

A. Yes. As a DNA technical leader, as defined by the FBI quality assurance standards, basically, you have to have a minimum of three years of experience, along with education, including molecular biology, genetics, and human population statistics.

Q. Could you describe your educational background to get to that point?

A. I have a Ph.D. in plant pathology with expertise in molecular biology earned from Montana State University in 1983, and then several years working in microbial genetics, and then culminating in the

establishment of Chromosomal Labs. I was one of the founders in 2004. I became a DNA analyst in 2005 as per the FBI standards. And then once I did my three years of experience in 2008, I became the DNA technical leader, which I still retain.

Q. And as part of your work responsibilities, do you have any continuing education responsibilities in the area of DNA testing?

A. Yes. As dictated, again, by the quality assurance standards, we have to have a minimum of eight hours. I usually have 12 to 15 hours of continuing education every year.

Q. Have you ever testified before as a DNA expert?

A. I have testified 45 times as a DNA expert. And of those, 40 of those were for the defense, one was for relationship testing, and four were for the prosecution.

Q. And just to be fair, you get paid to be here, right?

A. That's correct.

Q. And what professional societies or organizations do you belong to?

A. I'm a full member of the American Academy for Forensic Science.

Q. Dr. Miller, did you prepare a report in this case based on your testing observations?

A. We didn't do any testing; but, yes, I did prepare a report.

Q. But you did review some materials in order to prepare that report, correct?

A. That's correct.

Q. Could you tell us what materials you did review?

A. We obtained documentation for three reports, one on screening and two on DNA, for this particular case, along with laboratory bench notes, worksheets, and what we call electropherograms, which are the ones that actually showed the peaks that they were looking at to do their analysis.

MR. OLIVER: May I approach the witness, Your Honor?

THE COURT: You may.

Q. (By Mr. Oliver) Dr. Miller, do you see what I'm looking at here (indicating)?

A. Yes, sir.

Q. Can you tell us what that is?

A. This is -- this is the report that I prepared for you.

Q. Has that been changed or altered in any way since you sent it to me?

A. No.

Q. Does it fairly and accurately reflect the report that you prepared?

A. Yes.

MR. OLIVER: Your Honor, at this time, the defense would offer Defense Exhibit 1, tendering to opposing counsel.

(Defense Exhibit No. 1 Offered)

MS. COLLINS: Your Honor, as you're aware, all of the contents of said report would be hearsay. And that would be my objection.

THE COURT: That's sustained.

Q. (By Mr. Oliver) Dr. Miller, let's talk about DNA.

A. Okay.

Q. We covered some of this ground, but I just want you to briefly refresh the jury's mind. What is DNA? What are we talking about?

A. Okay. DNA is the -- I like to equate it to like having a hard drive in each one of your cells. Every one of your cells have a full complement of all of your DNA, with the exception of red blood cells, which don't have a nucleus. And egg and sperm, which is half of the complement. But, basically, all of your cells have all of the information to make every cell type in your body. And it turns on and off different types of

genes depending on where it's found within the body itself. So, an eye cell will become eye cell, and so forth. It's a compound that was first described or first analyzed and the structure identified in 1953. And since then, we've obviously made tremendous advances with it.

Q. Can you describe for the jury how DNA is transferred from individual to individual or individual to surfaces or objects?

A. Sure. Any part of the body that has any kind of cells, which would be any type of excretion that the body will make, as well as skin cells, will actually contain DNA. Now, the skin cells themselves that we usually shed don't have nuclei in it and the chromosomes have changed their shape, but there's still sufficient DNA to be able to analyze for it being deposited on various surfaces. So, I equate us to being something like Pig Pen, for those of you that remember Peanuts. We're all kind of just little shedders of DNA. We leave our DNA fingerprint every place that we go. And if you've touched a surface in here, such as the chair, your DNA has been deposited to that surface.

Q. And what are the methods used to distinguish DNA from different individuals?

A. Okay. What we do, basically, is we make copies

of DNA. And we have -- right now it's usually -- 13 is what is mandated by the FBI. We usually do 15. Most laboratories will do 15 total, plus one that will tell if it's a boy or girl. And the way you look at that is that we make this very specific area where people vary. And by that I mean, at a given place you and I might have the same signature, but at a different place we'll differ. So, again, it's like a fingerprint. We may have the same whirl in one spot, but in a different spot you're going to differ from me. And it's the same idea here, is that of the 16 different places, you may vary from me 16 or you may vary from me one or two; but, nevertheless, we can still distinguish you from me.

Q. Have you personally employed these methods to distinguish these things yourself?

A. Yes. As I indicated, for the first three years of the existence of the company that I work for we had to -- I did all the analysis in the beginning and all the validations of the instrumentation. So, I did literally thousands of samples at that time during that timeframe. I still do interpretations, which is actually to me the most important part, which is to look at the lines that come off. So, we have analysts now that do the chemistry part of it and they will give their interpretation and I will look over their

interpretation and say: Well, you have a problem here because this is a spike, or something else that is going on, it's not a real peak.

Q. And is there more than one type of DNA that is looked at from a forensic standpoint?

A. Yes. We have three basic kinds. We have one that's called the autosomal. And that's most of the DNA that we're going to be talking about most of the time when we talk about forensic DNA. And that's the one that distinguishes individuals, you and me, from each other. And those are not the ones from the X or the Y, which are the sex ones. Most laboratories are not utilizing the ones for X here in the United States. That will be coming forth, but we are doing ones for the Y. The Y chromosome is specific to males. So, we use that in situations where we want to eliminate a female profile, because, obviously, the female won't have one; but the limitation of that is it doesn't distinguish the individual. And that's important. It only says that it goes down to the paternal line of that individual. So, I can say: Well, my father, my brother, my sons, two sons, all of those individuals have the same Y chromosome profile as I do.

And then we have a third one, which is called the mitochondrial, which is transferred from the

female. So, I have the same mitochondrial as my mother and the same mitochondrial profile as my brother and all of my maternal line, my grandmother and so forth from my mother's side, but I don't pass it on. My wife passes hers on to my sons and my daughters.

Q. Now, of those three things you just talked about, which of them is most forensically and statistically specific?

A. Okay. The one that only tells the specific individual is the autosomal.

Q. Now, I think we've covered a little bit of it, but just tell us why the autosomal DNA is the most forensically and statically specific?

A. Because, again, we look at areas where we vary or individuals vary and you can take it down to the individual. And so, you are going to be specifically indicating what the individual's profile is as opposed to one that's not limited to the individual, such as what we see in the mitochondrial or Y chromosomal testing.

Q. From a forensic standpoint when you're talking about individuality and identifying people, what are some of the others ways that Y-STR DNA is different from autosomal DNA?

A. Well, we only have -- we only have -- it's

linked, for one thing. So, it's only one chromosome. And so, the numbers may be quite a bit smaller because when it's linked like that, you only look at -- you can't multiply things together because they are not independent. So, statistically, you'll have much smaller numbers to begin with. You won't see things like in the billions, trillions, and larger numbers such as that. You will see things in the thousands, typically, for the numbers they will have in like chromosomal testing. And, again, as indicated, you will also have any relationship type as to the paternal line.

Q. What are a few different reasons that analysts would test for Y-STR?

A. The most common reason that they utilize it is if there is an overwhelming amount of female DNA and they want to eliminate that as a component because they aren't either able to resolve a male DNA. What happens when we have DNA on surfaces, we have two individuals that have touched an item or the DNA has been deposited on an item, it's a competition. And all of these different reactions we have going on, which is 16 for one individual, actually 32 because you have two copies, we have 32 from the other individual as well, it's going to be competing with each other. And so, if there's a lot of one person's DNA and a little bit of another

person's DNA, you may not be able to resolve anything with the second person because all you're going to see is peaks from the other one, it just overshadows everything. It's like looking at mountains and not seeing the tiny hills below it. Okay? And so, that's the best analogy I can show to you, is that if you're looking at the mountains you may very well not see the tiny hills below. And that's one reason. And so, if we have a male-female, then we can eliminate the female part of it and look at only a male-derived DNA.

Q. And when you say sometimes a female DNA overwhelms the DNA, are we saying that what we're looking at from the male in some of these instances is just a very infinitesimal amount of male DNA?

A. That's correct.

Q. And how do you turn these tiny samples into something that can be utilized?

A. Well, what we do is we utilize a method called PCR, which is polymerase chain reaction. Big fancy word, but you can think of it as the molecular xerox machine of the molecular world; but rather than making one copy into two copies into three copies, we make one copy into two copies into four copies into eight copies. And so, when you do that about -- you do it about 25 to 30 times, you're literally making billions of copies.

So, by doing that, we can pull out DNA that's specific; but, again, we still have this competition going on. So, it's dependent upon how much DNA is there from each individual.

Q. Okay. So, just generally -- all of these ideas and principals we're talking about, are all of these generally accepted in the scientific community?

A. Yes.

Q. I want to talk little about statistics. Okay?

A. Okay.

Q. What are population frequencies generally?

A. Okay. So, what we basically have done is -- our scientists have done is they've taken subsamples of populations that are self-proclaimed based upon race/ethnicity. And usually there are 2 to 400 individuals that they utilize, but they've done this many times and they've shown that even though there is slight differences that it will have an idea of how often a specific -- you can think of it as a gene will occur within a population. So, let's say blue eyes, which by the way, just so you know, is limited to the Caucasian population, which most people don't realize. So, therefore, we've eliminated right there about 80 percent of the world, 90 percent of the world. And so, immediately you're down to 10 percent. So, if somebody

has blue eyes and you say: Okay. That's an idea -- that gives you the idea of the population statistics right there. We'll say the population statistic for that is 10 percent of the population would be expected to have this. And so, they do that in all of these different places we're looking at where people vary and those are where the numbers are actually generated. They say: Okay. This will happen in 10 percent, this will happen -- if it's around 50 percent, that's like half the world or half the population. Then it's pretty much neutral. It's like every other person is going to have it. You can even go up higher than that where you can get close to one-to-one and virtually everybody has it one.

Q. So, it seems a little bit obvious, but tell us why these population frequencies are important in DNA typing and testing.

A. All right. Well, basically, what we're trying to do is give you an idea how often we would expect something to be seen if we were to test the random individual. So, let's say that I have 1 out of 1,000, you would expect -- which is a 99 -- 99.9 probability just so you know. I would even expect 1 person out of 1,000 to meet that criteria if you were to test 1,000 people.

What you have to understand is when we're talking about population statistics is the first person I test may have it and the next 999 might not. Or I might test 1,000 and none of them have it. Or I may test 1,000 of them and 999 might have it, but I might do millions of people. Then it will come out with an average of 1 out of 1,000. So, it gives you an idea how often you would expect that frequency, but it doesn't mean that the next person tested does not have it, even as improbable as that might be.

Q. Are you familiar with the population frequencies that were provided in this case?

A. Yes.

Q. And referring you -- referring you to the population frequencies that were included on the -- in the State's -- or the Harris County M.E.'s report from August 30th, 2012, tell the jury what those frequencies were.

A. Well, if I can recall -- and I can take a look at the actual numbers, but if I remember correctly they were around 1 to 80 to 1 to 150, depending upon the population.

MR. OLIVER: May I approach the witness, Your Honor?

THE COURT: You may.

Q. (By Mr. Oliver) If I were to show you the report, would that help to refresh your recollection?

A. Yes.

Q. Without saying anything out loud, just take a look at this part of the report (indicating)?

A. All right.

Q. Does that refresh your recollection?

A. Yes.

Q. Okay. So, can you tell us what the population frequencies were that the State relied upon?

A. Yes. And, again, it was dependent upon the race ethnicity, is what they always base it upon. The lowest number is 1 out of 79. Basically, about 1 out of 80. And the highest was 1 out of 150. And Caucasian was the 1 out of 80.

Q. So, applying the example you just gave the jury -- or the discussion you just gave the jury about population frequencies, we're not saying that -- well, just apply that same analogy to this statistic.

A. Sure. Basically, if we were to line up -- and this is the Y-STR. If we were to line up 80 male individuals of Caucasian descent, we would expect approximately 1 of those to have a profile which would correspond to the profile that they had, which was within their statistics, which is not all because it was

a partial profile. It wasn't a full profile. But, again, understand that of those 80 that I line up, maybe none of them have it, but there might be 79 that have it as well because it's a random chance -- it's like tossing a coin -- as to if they might have it or not have it. So, we would expect it to happen 1 out of 80 times, but it doesn't mean it won't happen. The test to the first person might be -- match that criteria.

Q. Now, these population frequencies statistics, do you always have to conduct a statistical analysis in these type of cases?

A. The standard for the industry is -- with a few exceptions and I'll say what those are -- is that if you are going to say that there's a possible inclusion of that individual -- and so, we can't say it's that individual because that's not what DNA tells you. It's never zero or a hundred for statistics. It may be improbable it may be somebody else, but it's not zero or a hundred. And so, we're supposed to give a weight as to how prominent that is.

And so, the exception would be in a few states if you have a match and it's on the autosomal, they don't want to hear 1 in 17 quintillion. So, they say: Well, it's a match and it's all of them, then they'll accept that, but that would be the exception.

Q. Are the databases that you guys use to get these statistics for autosomal DNA and Y-STR DNA the same or different?

A. They're usually the same because most people rely on the autosomal ones. Most people are utilizing the FBI ones, which were derived from three major populations. Two of them in the Washington D.C. area for Caucasian and African-American and one in the Los Angeles area.

For the Y-STRs, that's been kind of an evolving sort of thing and it kind of depends on when the actual testing was done. And so, if you look back five years ago, we're going to be down somewhere around 1 out of 1200 to 1800 is the highest number you would see because they only had 1800 people in the database and that's the maximum number it could be, is whatever is in the database for the Y. We're now up to about 13,000 for most people. And it depends on which database you utilize.

Q. So, basically, what you're saying, which of these two databases, the autosomal or Y-STR, have been in use longer?

A. The autosomal.

Q. And so, would you agree that the statistics that we're looking at is only as good as the database?

A. Yes.

Q. Referring you to the DNA -- the concept of DNA transfer, what does the presence of DNA on an article of clothing or surface tell you about how it got there?

A. It doesn't tell you anything. Any source of cells in any way -- there's various ways it could be there. It could be if you touch it, if -- it can be by secondary transfer. It can be -- so, all it tells you is there is DNA there.

Q. So, is it difficult or not difficult to transfer DNA onto people or things?

A. No. We -- as I said, we're like little Pig Pens. We shed all of our DNA. And there's been studies that have shown that where individuals have DNA, they've actually swabbed their neck and looked at that and found that, you know, some -- you know, there's almost always foreign DNA there. A lot of times it's people they know, but sometimes it's even people they don't know at all.

THE COURT: Sir, would you slow down just a wee bit again?

THE WITNESS: Okay.

Q. (By Mr. Oliver) Dr. Miller, can you describe what primary transfer is?

A. Primary transfer is where we have a direct

source from the individual. And that's the case if I touch your shoulder and we test that area, that would be primary transfer. That can be from blood, sweat, tears, saliva, and skin cells, are the primary ones we would see that from.

Q. What about the concept of secondary transfer, can you describe that?

A. Secondary transfer is where an item comes into contact with another item that has DNA on it. One of the most common ones is two pieces of clothing that got commingled. So, you throw all your laundry into -- you know, into one heap and your significant other's clothing is there as well, there can be transfer from that clothing to the other piece of clothing. Or there may -- you know, it depends. There may be any type of secondary type of transfers like that. And they have actually even shown where if you use the towel, you can get DNA off the towel onto your skin and be able to have it recovered.

Q. So, this secondary transfer, is it common or not common?

A. It's not real common, but certainly there are situations where it's more common than others. As I said, the commingling is one of the more common ones. And then, certainly, it also is dependent upon the

individual. Some people are bigger Pig Pens. We may have dry skin, we may have personal habits such as touching our mouths, rubbing our hands through our hair, and, therefore, we have more DNA to be deposited, basically. So, we call those good shedders versus poor shedders.

Q. Does the amount of DNA found in a particular sample tell you whether or not the DNA occurred as a result of primary or secondary transfer?

A. Well, no, not directly. What would happen would be is if it's secondary transfer, you would expect it to be at low concentrations, but you can have that with primary as well.

Q. Now, changing gears a little bit. Can you tell the jury what generally is serology?

A. Serology is a -- it actually means it comes from the testing of blood originally, is the original derivation from it, but we now utilize it for testing of things such as amylase for saliva, for components of blood, and for components of semen, for sperm cells themselves. And so, a lot of times we'll actually put microscopy in there, which is technically is not true serology, but we kind of bulk it together.

Q. Okay. So, basically, the reason you study serology is because DNA can be found in all of these

fluids, right?

A. Correct.

Q. Now, if you find DNA and it's in one of those things, does the DNA itself, anything about the DNA tell you where it came from?

A. No.

Q. So, DNA is DNA is DNA?

A. Correct.

Q. And so, analyzing DNA might help us -- it might help us identify the person it came from, right?

A. Correct.

Q. But not what the person did to get it there?

A. Correct.

Q. Is there anything a lab can do to address that problem with certainty?

A. There are some research techniques right now that are being developed, but they're not fully available to law enforcement or to private labs either.

Q. Now, there are presumptive tests for blood, semen, and saliva in use?

A. Yes, there are.

Q. I want to talk about saliva specifically. Okay?

A. Okay.

Q. Is there a presumptive test for identifying

human saliva?

A. Yes. There's a test, which is called amylase, which is the enzyme that breaks down starch. And so, you have it in your saliva and you also have it in your pancreas. Two major sources of it.

Q. Now, are there any, you know, negatives using amylase?

A. Well, some of the old techniques that they utilized were not specific for amylase. And so, they basically took a starch plate, put the sample on there, and then let it work for a little bit and then they flooded it with iodine. And when the starch is broken down by the enzyme, it has a clear zone. That's not a specific, but there are some new methods out there that have been around now for, gosh, at least ten years, if not longer than that, which use antibodies that are made against that specific protein. And it's kind of like a pregnancy test. And so, you basically put your sample on and if a line develops, then there's amylase. And that is specific for salivary amylase.

Q. So, there are currently techniques available and widely used to identify human saliva without all the problems that the old iodine testing had?

A. Correct.

Q. Now, where there was an allegation -- a test

that a person was licked, would you expect to see an amylase test done?

A. Definitely.

Q. Can you account for the lack of an amylase test in such a situation?

A. There may not have been a communication as to the alleged incident. That would be one. The analyst may not know. And they may have had some standard procedures that they follow that they -- you know, this was, quote, a sexual assault, they may be just looking for semen and sperm. That would be one possibility. One would be that they may not be utilizing the test within their laboratory.

Q. Okay. Now, looking at this case specifically, you've reviewed all the lab records, right?

A. Correct.

Q. How many lab reports were generated in this case?

A. There were actually three. There was one for serology. And then there two that were done on the DNA. And in actuality, only one of those had analytical work on it. The other one was a reinterpretation.

Q. And you followed your lab's SOP for -- standard operating procedure, I guess, for the analysis and interpretation of the report for this case, right?

A. Correct.
Q. What, if anything, was included in the file that you received regarding the nature of the accusations?
A. I'm not quite sure what your question is.
Q. Was a copy of the SANE evaluation that was done in this case included?
A. Yes, there was.
Q. Did that describe generally the accusations that were made?
A. Yes, it did.
Q. What were those accusations?
A. The accusation was that the defendant licked the girl in her private areas.
Q. All right. Basically, the front and back, right?
A. Correct.
Q. Do you know about how many sperm cells are present in the average ejaculation?
A. Every ejaculation is well over a hundred million.
Q. So, obviously, there's no evidence to support, based on the documents you reviewed, the presence of any sperm, right?
A. That's correct.

Q. Did the Harris County lab find presence of any human saliva?

A. They didn't test for it.

Q. Why not?

A. I can't answer that.

MS. COLLINS: Objection to speculation.

THE COURT: Sustained.

Q. (By Mr. Oliver) You performed testing similar to this in the past, right?

A. The amylase test?

Q. The DNA testing.

A. We've done all of it, yes.

Q. When you receive that evidence, those items, what do you typically get?

A. Well, we would have someone describing as to what may have either -- what was transpired or there would be communication that would say: Okay. This is what we need to look for. If we think it's a sexual assault --

Q. Let me interrupt you. I'll ask it a better way, a better question.

Do you know what the Harris County lab received in terms of evidence for testing in this case?

A. They received underwear, among other things. Yes.

Q. Swabs and clothes, right?
A. Correct.
Q. So, if the allegation was that my client licked the child's vagina and licked her behind, where all might you expect to find the presence of human saliva?
A. You would find it on her body, which would be the primary place. And then there would be some that possibly could be on the underwear in the front or the back.
Q. Okay. And revisiting what we talked about earlier when you were talking about primary transfer and secondary transfer, in this context of this allegation where would the primary -- where would the larger amount of DNA be deposited?
A. It would be on her body, even if it's a secondary transfer from her body onto the underwear.
Q. So, would it be a smaller -- if there was DNA that transferred from the primary location to the secondary, would it be a smaller amount transferred onto the underwear?
A. Usually, yes.
Q. Now, you referenced the underwear as part of the evidence that was tested. What area of the underwear was this DNA extracted from?
A. It was taken from the crotch area, but

specifically right along the edge where the leg hole is.

Q. Was it on the inside or outside?

A. Well, they put it as the inside, but you really don't know because you're basing that on an assumption if you look at the tags, and saying: Well, yeah, this is the inside, this is the outside. That makes the assumption that the person doesn't turn it inside-out when they're wearing it, but that would be the question.

Q. And it's -- would you be surprised to find that a 3-year-old that dressed his or herself that put their clothes -- their undergarments on inside-out?

A. I think that's fairly common.

Q. So, really, based on what you looked at, you couldn't say for certain whether this DNA sample came from the inside or outside?

A. No.

Q. Now, there was other clothing, right, pants and a shirt?

A. Correct.

Q. And was any amylase or Y-STR testing done on those items?

A. No.

Q. So, would they be able to say -- what limitations does that place on their testing?

A. Well, certainly if the person had touched her

on the outside of the clothing, you would find his DNA there as well.

Q. And could that DNA then be transferred to the underwear?

A. If they were commingled, like when you take them off, yes, they could be.

Q. And -- well, strike that.

Now, what was the quantity of male DNA that was obtained from the underwear?

A. My -- based upon their quantitation, which is how they tell how much DNA is there, I calculated it to be about 115 cells in the total extraction, which is extremely small because you have about a trillion cells in your body.

Q. About how many cells could be transferred between two people during innocent and casual contact?

A. At least that many, if not more. Oftentimes you'll get a full profile of the autosomal and certainly a full profile of the Y chromosome just by casual touching.

Q. And so, just as an example, if I sat on your couch could that many cells transfer to my clothing?

A. It could.

Q. Could more than that transfer to my clothing?

A. It could. If you're a strong shredder, yes.

Q. Now, talking about -- strike that.

So, just to finish that discussion about the pants and the underwear, is there any way for us to know if the Y-STR DNA that was found on the panties was transferred from the shirt or pants?

A. No, there would be no way of knowing that.

Q. Why is that?

A. Well, because you have such a small quantity to give you primary or secondary transfer. All you know is there's DNA there that corresponds to any male.

Q. So, the Y chromosome, that profile, we know it's not limited to the defendant, right?

A. That's correct.

Q. And how is it related?

A. Anybody that's paternally related to him would have the same profiles that he has. Occasionally, there may be a mutation, but that's about 1 out of 1,000 people.

Q. So, if Mr. Peyronel has a teenage son, would you expect him to have the same Y-STR profile?

A. Yes.

Q. Could you talk to us about Y-STR mutations -- does that happen?

A. As I said, yes, it does occur. About 1 out of 1,000 individuals may have one mismatch. Right now when

we're doing relationship testing, we allow up to two, but the probabilities of that are very, very small.

Q. And so, the only way -- how would you know if there was a mutation from father to son?

A. You would test each of the individuals as an elimination sample.

Q. Now, when you talk about these different Y-STR profiles, when you're comparing one to the other, are we talking about like there's radical differences between the profiles or there could be, you know, one difference in one loci extracted?

A. You could have unrelated individuals that have one or two inconsistencies or mismatches within the profile. The Y chromosome, with the exception of one of the places, only has one number from your father. And so, I might have a 10 and my son might have an 11. That would be a mutation, but it could also be that he would not be my son. And so, each of those possibilities exists. It could be as little as one mismatch. And the way you do that is to test the individuals.

Q. So, you know, based on the documents you reviewed you know that the -- my client's Y-STR was typed, right?

A. Correct.

Q. And also the little child's father's Y-STR

profile was typed, right?

A. Correct.

Q. Was anybody else's?

A. No.

Q. So, as to a statistical certainty, can any other male be excluded?

A. Well, the -- any paternally-related male would not be excluded by definition.

Q. What if there was -- now I know it could be rare, but what if there is a Y-STR mutation?

A. Then you could -- you would have to test that. You would see what that would be. That would be empirically done.

Q. And so to be on the safe side and to be certain, would you test those individuals even if they're paternally related to exclude them?

A. Yes.

Q. What about anyone who lives, you know, next door?

A. Again, as I stated earlier, with the profiles that we're looking at, the partials, you should do all elimination samples. Even though it may be 1 out of 80, the first person you test may be that one out of 80 persons.

Q. Based on all the documentations you reviewed,

did you come to any conclusions about the evidence, you know, the things that you reviewed in this case?

A. I'm not quite sure what your question is. I drew conclusions that are outlined in my report.

Q. That's what I'm referring to.

A. Okay. Basically, the conclusions would be that we don't know the source of the Y chromosome. It could be from primary or secondary transfer. We don't know for sure the individual because it's not limited to only that individual. And it's a partial profile. And elimination samples should have been taken from other individuals.

Q. Now, the number of cells, the approximately 115 cells, could that number of cells found be attributed to caretaker activities or other just normal casual contact?

A. Yes, definitely. We certainly see those kind of numbers on casual contact and even on secondary transfer. And there's a report done in the American Academy for Forensic Science where it was a poster that they gave where they actually looked at a caretaker and male DNA was commonly found on females.

Q. Let me ask you this. If there was a common toilet in the house, could DNA mixing occur in a situation like that where a lot of individuals are

sitting on the same toilet?

A. Certainly there could be secondary transfer.

MR. OLIVER: I pass the witness, Your Honor.

CROSS-EXAMINATION

BY MS. COLLINS:

Q. Good morning, Doctor.

A. Good morning.

Q. Is it Doctor?

A. Yes.

Q. My name is Lisa Collins. We haven't met before, right?

A. That's correct.

Q. Okay. I have just a few questions for you.

A. Okay.

Q. Let me start with where you work. You work, as you said, for Chromosomal Labs, correct?

A. Chromosomal Labs Bode Technology.

Q. Okay. And that's because Bode Technology bought out Chromosomal Labs, right?

A. That's correct.

Q. Okay. Now, the place that you work, as you stated, does several different types of DNA testing?

A. Correct.

Q. Okay. You mentioned a few of those. I'll just

find the ones you mentioned. Paternity tests?
A. We do paternity testing.
Q. Okay. You do what you call infidelity testing?
A. Correct.
Q. You advertise: Catch-him-cheating or catch-her-cheating?
A. Correct.
Q. Okay. And for all of these different types of testing that your company does, you have a 1-800-number that people can call and receive your services?
MR. OLIVER: Your Honor, I object to relevance.
THE COURT: Overruled.
Q. (By Ms. Collins) And can receive your services?
A. Yes.
Q. Okay. Now, the lab, Chromosomal Labs Bode Technology, they're an accredited lab?
A. Correct.
Q. Okay. And who are they accredited by?
A. We're accredited by FQSI, which is Forensic Quality Services International, which is one of two that's accepted by the FBI Quality Assurance. The other one is the Crime Laboratory Directors.
Q. Okay. And you said you have been working with them for how long?

A. Since 2004.
Q. Okay. And that was kind of the startup of the company?
A. I was integral in the startup of the company.
Q. Wonderful.
Now, prior to working for Chromosomal Labs Bode Technology, your main focus had been working at different environmental type firms?
A. I've had -- I've had a very diversive background, but, yes, the previous one was Aero Tech and that was indoor air microbiology and we were doing molecular techniques.
Q. In fact, each of the companies that you worked for, Aero Tech Labs, Microgenesis, Eco Farm (phonetic), they all had focuses on, as you put it, microbiology?
A. Correct.
Q. When I was reviewing these companies, the words fungus, fungi, asbestos popped up a lot, right?
A. Right.
Q. That's the main focuses of those companies?
A. Correct.
Q. And none of those companies specialized in any kind of like genetic testing, DNA testing like we're talking about today?
A. No, that's not correct.

Q. Okay. Well, again, these were all environmental-focused companies, correct?
A. Correct.
Q. Okay. Now, prior to that, as you said, you worked as a scientist and a professor. Not at the same time, but at different times. Correct?
A. Correct.
Q. And, again, your focus as a scientist was on, simply for my terms, fungi?
A. Right.
Q. Okay. And as a professor, your focus was in plant pathology, correct?
A. Correct.
Q. Okay. Now, your job, as you said, now -- your current position is chief technical officer?
A. Yes. And I also serve as the DNA technical leader.
Q. Okay. Now, when we talk about professional organizations -- and I always mix up the terms accreditation and certification, so bear with me -- are you ABC-certified?
A. I don't know what ABC is.
Q. Okay. Let me rephrase. Are you certified with the American Board of Criminalists?
A. No, I'm not.

Q. And what is the American Board of Criminalists?
A. It's a professional society for criminology.
Q. Okay. It's the only, to my knowledge -- and you tell me if I'm wrong -- the only organization that provides certifications for forensic DNA type stuff?
A. Well, it's not just DNA. They do more criminology, which could be fingerprints and a number of other things.
Q. Okay. And there aren't any other organizations that certify in this particular field of forensic science?
A. There are some local ones. California has one and there's some other ones, but, yes, basically you're correct.
Q. And are you certified with any of those organizations?
A. No, I'm not.
Q. Okay. Now, you testify as an expert quite often?
A. Fairly common, yes.
Q. It certainly wouldn't surprise you to know when I researched your name, your name immediately pops up on quite a few different expert witness websites?
A. I haven't done that search, so I wouldn't know.
Q. That wouldn't surprise you, though, would it?

A. No.
Q. Okay. And, in fact, on Chromosomal Lab's website there's even a link for expert witnesses and you're one of those?
A. Correct.
Q. You do this a lot?
A. Yes.
Q. And as you've already stated, you're paid for your services?
A. Correct.
Q. An hourly rate, I'm sure?
A. Correct. I'm not paid. My company is. I don't derive any personal benefits.
Q. Fair enough.
The company you started?
A. Correct.
Q. Now, to this particular case, as you said, you didn't do any personal testing in this case?
A. Correct.
Q. So, your focus was on reviewing the documentation that was done by the Harris County -- what I call the Harris County Medical Examiner's Office?
A. Correct.
Q. In their lab?
A. Correct.

Q. You didn't actually like lay hands on any of the evidence, right?
A. Correct.
Q. Okay. So, it was strictly documentation?
A. That is correct.
Q. Okay. Now, you would agree with me that you, in your search of those documentations, didn't find any deviations, errors by the lab, anything like that?
A. That's correct.
Q. So, you're not certainly here saying that any of those numbers are wrong?
A. No.
Q. Wonderful.
Okay. Now, you mentioned first this idea of saliva testing, correct?
A. It was asked, yes.
Q. And when you talked about saliva testing -- well, let me kind of back up here.
As a researcher and expert witness, you, many times, rely on literature, right?
A. Correct.
Q. And by literature, I mean studies done by other people that you can base conclusions on?
A. Correct.
Q. Okay. And when you were testifying a moment

ago, one of the things you talked about was literature regarding saliva testing that's available?

A. Correct.

Q. Okay. And you mentioned -- what was the name of that test you mentioned as kind of the most common, best one?

A. Well, there's a serological one, which is an antibody-based one.

Q. Okay. Now, if I heard you right, that doesn't test for saliva specifically. It tests for like little things that make up saliva?

A. It's a protein within saliva, yes.

Q. Okay. Because of that, if you were to do that test, you couldn't look at those results and say: Ah-hah, that's saliva?

A. That's correct.

Q. You could say: Hey, I see something that is included in saliva?

A. That's correct.

Q. Okay. Now, because of that, that's not a protein that's only limited to saliva, right?

A. No. It's found in small amounts sometimes in urine, not in all urine cases, and sometimes in fecal material.

Q. Okay. And, in fact, the literature that you

were just kind of referring to a moment ago found in their own testing just those results, right?

A. That's correct.

Q. Now, because of that, when we deal with -- I mean, just commonsensically, when we're dealing with the panties, in this case of a 3-year-old child, it wouldn't be beyond imagination for those panties to possibly include bits of urine or fecal matter?

A. Correct.

Q. Okay. So, even if testing had been done like you suggested in this case of those panties, if that enzyme or protein had been found, there wouldn't be any way to say for sure it came from saliva?

A. I would agree with that.

Q. It could still have come from urine or fecal matter?

A. It could.

Q. And there's other things that could possibly pop up because of it?

A. I'm not sure I'm going to agree with that. You'd have to be specific on that.

Q. Fair enough.

Fecal matter and urine and saliva is not an exhaustive list of everything that particular protein is a part of?

A. It's amylase from saliva. So, it will have its initial origin from saliva.

Q. Okay. But for lack of a better term, it could end up in different things like urine and fecal matter?

A. At low concentrations, yes.

Q. Okay. Now, when we talk about doing these kinds of tests for semen, saliva, blood, you have to kind of use up a little bit of DNA to do those tests, right?

A. You have some destructive part of it, yes.

Q. Okay. And to be fair, when we're looking at something like panties, we can't, with a naked eye, see where DNA might be, right?

A. Well, sometimes we see stains and sometimes they'll actually do testing of the stain.

Q. Fair enough.

But DNA can't be seen with the naked eye?

A. No.

Q. And so, if we test a part of, say, panties, say, for saliva, we have no idea if what we're testing, that piece that we're using, is using up DNA that is needed, could be needed for DNA testing?

A. Only if it's in extremely low concentrations.

Q. Fair enough.

Okay. Now, when we talk about DNA, you

mentioned this idea that we've heard about before about statistics, right?

A. Correct.

Q. And this idea that when it comes to Y-STR testing, we're basically limiting the DNA to a group of people as opposed to one person?

A. Correct.

Q. Commonsensically, you would agree with me, Doctor, that because of that we would want to figure out a list of every single person who could have had contact with that object that has been tested and see who's ruled in, who's ruled out of that group?

A. Correct.

Q. That's the best way to know who that DNA belongs to?

A. Correct.

Q. Now, you mentioned this concept of transfer. I think specifically you mentioned the idea of clothing being washed together, things like that.

A. I didn't say washed. I said commingled.

Q. Commingled.

And when we're talking about commingled, that could be a number of things, right?

A. Well, no. Commingle means you mix it, literally. That's the Latin variation of it.

Q. Let me be clear. My apologies. When you say commingle, it could be commingled by being in a pile together?

A. Correct.

Q. By being washed together?

A. Could be, yes.

Q. Being in a drying machine together?

A. Could be.

Q. Things like that, right?

A. Correct.

Q. And, again, going back to the literature you referenced with regard to that, that study that you referred to with regard to commingling of clothing, and, therefore, the transfer of DNA dealt with people who cohabitated, correct?

A. Correct.

Q. Specifically, it was focusing on a father-daughter type of situation?

A. Correct.

Q. And even in that study, it stated that -- well, let me back up a little bit.

Again, the focus was people who would cohabitate together, live together?

A. Correct.

Q. Now, when we talk about transfer, DNA from one

person to another person, you mentioned this idea of -- again, going back to the literature -- strangulation studies, right?

A. That was the emphasis, yes.

Q. And in that study what they were talking about and what they were dealing with was exposed areas of the body, correct?

A. Correct.

Q. In that case, necks?

A. Correct.

Q. This may sound like a stupid question, but bear with me. It's fair to say when we're talking about transfer, this Pig Pen idea as you put it, that just like dirt or other substances, things that are exposed to the outside elements are more easily going to be transferred onto than things that are kind of covered up?

A. Correct.

Q. For instance, it would be transfer onto my neck than, say, my tummy that is covered up with clothes?

A. Correct.

Q. Okay. And even in that study it talked about, as I think you've mentioned, Doctor, this concept of different people shedding different amounts?

A. Yes.

Q. And, specifically, they actually reference a study of saliva in that literature, don't they?
A. They do.
Q. Specifically, they talk about in their studies where they knew that -- they actually mentioned licking cases, saliva, right?
A. Correct.
Q. That even in these licking cases, I believe it was only in two of the five of those licking cases were they able to find any DNA that was foreign to the person being licked?
A. Correct.
Q. And they knew that person had been licked, right?
A. Correct.
Q. I mean, when we talk about studies, these are normally controlled, right?
A. They are.
Q. We know that something has occurred and we're testing to see if, knowing what has occurred, we can determine that scientifically?
A. Correct.
Q. And even in that study of the people being licked, only two of the five people showed up that foreign person's -- the licker, if you will -- DNA

profile?

A. Correct.

Q. And that's because different people shed different amounts?

A. I agree.

Q. And even -- from what I read of the literature, even someone can shed different amounts at different times?

A. That's also correct.

Q. So, there's really no way to determine, unless you're standing there with them -- and I think there's a test for how much a person is shedding at a given time, right?

A. There is.

Q. But you actually have to like be in that moment with them testing for that to know how much they're leaving behind, right?

A. That's correct.

Q. Other than that, there's no way to know exactly how much DNA a person will leave behind?

A. That's correct.

Q. Now, as you stated, there's no way scientifically to determine exactly how DNA gets to the place that it's found?

A. That is -- with the public and private labs

we're utilizing now, yes, there's a research method, but that's not available.

Q. Not available to the outside world?

A. Correct.

Q. Okay. Kind of like special, and as you said being developed?

A. Correct.

Q. Okay. For everybody else, us little people, if you will, there's no way to make that determination?

A. I agree.

Q. And just to clarify. When we're talking about something being in development, that means it has not passed all those tests to make sure that it's kind of good to go, if you will, to be in use?

A. It's in research, as being presented at special meetings and papers and so forth.

Q. So, there's a lot of stuff it has to go through in order for it to get the go-ahead?

A. Well, it's actually more of a cost problem more than anything else right now, but, yes.

Q. Fair enough.

You would agree with me, Doctor, that per the literature, the conclusions, at least what I found from what you referenced in your report, are that profiles obtained from touch objects are more likely to

be a result from primary transfer than a secondary transfer; is that correct?

A. I would agree with that, yes.

MS. COLLINS: Pass the witness.

MR. OLIVER: Briefly, Judge.

REDIRECT EXAMINATION

BY MR. OLIVER:

Q. Dr. Miller, if you had done this testing or if you were reviewing this testing, would you expect to find my client's DNA in Ryleigh's fecal matter?

A. No.

Q. Would you expect to find my client's DNA in Ryleigh's room?

A. No.

Q. And so, if all these -- if you wouldn't expect to find my client's DNA in any of those things or fluids that caused these false-positives, could you then eliminate those if you did get a positive to the amylase test and find DNA in that location?

A. Well, you still would not know for sure that the saliva was the source. The point would be is if you don't do the amylase, you haven't shown that it might be saliva.

Q. And so, the amylase test can be a corroborating factor?

A. Correct.

Q. And does anything about -- when talking about this amylase testing and the reaction to the false-positives, do they all react to the amylase testing at the same time or does the time -- the reaction time for false-positives tell you anything about what you're seeing?

A. The false-positives are a very slow reaction. And so -- it's because there's less enzyme there. And so, when you look at that you would say: Okay. Well, it could be a false positive, but it also could be a very small amount of saliva.

Q. And so, an analyst that's doing a very careful examination of that evidence in light of such a significant charge could simply incorporate those findings into the report?

MS. COLLINS: Objection to leading.

THE COURT: Sustained.

Q. (By Mr. Oliver) I want to move to the prosecutor's questions about commingle. She referenced a study. Do you recall that? And in that particular study what they studied were people who lived together, right?

A. Correct.

Q. Does that line of questioning, does that

suggest that -- or does that mean that transfer, secondary transfer is limited only to situations where people live together?

A. Certainly not. It's just that there's more opportunity for them to have DNA being exposed.

Q. Okay. Now, the other study that she referenced about DNA transfer, do you recall her line of questioning about that literature only identified two out of five situations where DNA was transferred in a licking case?

A. Yes.

Q. What percentage is that?

A. Forty percent.

Q. Forty percent?

A. Correct.

MR. OLIVER: I'll pass the witness, Judge.

MS. COLLINS: Nothing further, Your Honor.

THE COURT: All right. You may step down.

THE WITNESS: May I be excused?

THE COURT: May this witness be excused?

MS. COLLINS: Yes, Your Honor.

THE COURT: Y'all are tired, aren't you? We're going to take a little break right now.

(Recess)

(Open court, defendant and jury present)