(Open court, defendant present.)

THE COURT: We're on the record in Cause No. 1275151 and 1275152, State of Texas versus Dean Jerome Wood. Is the State ready to proceed?

MS. FULLER: Yes, your Honor.

THE COURT: Is the Defense ready to proceed?

MR. HOCHGLAUBE: Yes, your Honor.

THE COURT: You may proceed.

MS. FULLER: Thank you, Judge.

CLAY DAVIS,

having been duly sworn, testified as follows:

DIRECT EXAMINATION

BY MS. FULLER:

Q. Would you please state your name for the record.

A. My name is Clay Davis.

Q. And Mr. Davis, how are you employed?

A. I'm a criminalist with the Houston Police Department crime lab.

Q. How long have you been employed there?

A. Since 2005.

Q. Prior to 2005 what did you do?

A. I was a research assistant at Baylor College of Medicine on the Human Genome Project.

Q. And how long were you a research assistant there?

A. Five years.

Q. Okay. So as a research assistant what did you do in that position?

A. We were sequencing the DNA of a human along with other animals, including see urchins, monkeys, rats and mice, and several bacteria.

Q. Okay. And how long did you say you were in that position?

A. Five years.

Q. Five years.

While you were in that position, did you have any -- did you publish anything?

A. Yes. My name was on around four papers, I believe.

Q. Okay. What were the papers regarding?

A. One was the sequence of the rhesus monkey and the other two were certain chromosomes of the human that was also sequenced by Baylor, so my name was on part of those.

Q. Okay. And did those experiences, did that position there aid you in your current position?

A. Yes, it did.

Q. And how so?

A. Just getting the experience of a lab, and in DNA, using small volumes, and just how to quality control everything, just keeping everything on track.

Q. And so when were you the research assistant from?

A. 1999 to 2005.

Q. All right. So previous to that what did you do?
A. College.
Q. All right. Where did you go to college?
A. I was a biology major at Louisiana Tech University, and I also have a master's from the University of Florida in forensic serology and DNA.
Q. Do you belong to any professional organizations?
A. I do. AFDAA, which is the Association of Forensic DNA Analysts and Administrators, and SWAFS, which is the Southwestern Association of Forensic Science.
Q. And are you active in those organizations?
A. I am.
Q. Have you testified as an expert witness before?
A. Yes, I have.
Q. On few or many occasions?
A. Many.
Q. And does this include expert testimony in Harris County, Texas?
A. Yes, it does.
Q. Can you tell the Court what exactly DNA and a DNA analyst is?
A. DNA is the genetic material contained in all nucleated cells. We get half from our mother and half from our father, and what a DNA analyst does is take evidence samples that contain either DNA from an individual, it can be blood,

semen, saliva, skin cells, and we take unknown profiles, DNA profiles, and compare those to known profiles, which is usually a blood sample or saliva sample from a known person and we do a comparison between those two.

Q. Okay. So how long has DNA been -- how long has DNA been an established science?

A. For forensics it was -- some of the earlier testing was in the late 80s, and the current method that we are using, one of the first kits was probably in the late 90s, and then this kit was later on that we're using now.

Q. All right. So you talk about kits, can you tell us what a DNA analyst, what the process is, what is the process?

A. So for DNA the process starts with extraction, so that is removing the DNA from the cells, so whether that's sperm cells, blood cells, or skin cells, we're trying to get the DNA out of the cells, so that's the first step, and that's done by adding a series of reagents to the tube with the evidence sample inside, and, you know, letting that incubate, and it breaks up into cells.

The next step is quantification, which is trying to find out how much DNA is actually in that that we broke open and released, because the next step requires a specific amount so I want to know what I started with.

The next step is amplification, which is copying the DNA, and we're copying just the 16 regions that I'm looking at,

not the entire DNA. So those areas are copied.

The next step is detection, so that copied DNA is injected onto a machine that would develop a DNA profile, and it will do this based on -- the DNA is separated, so those 16 regions are separated based on size and charge, and then we will develop a DNA profile from that.

The last step is interpretation, so I will start looking at the evidence sample and seeing what kind of a sample is this, what kind of a DNA profile is this, is it a single source? Is it a mixture of two people? Do I need to do more work on the sample? And I base the more work on whether -- what the serology results were, the original screening of the case. I also base it on what my quantification value was, and just if I need to do more work on the sample. And then of course there's interpretation at the end, which is interpreting the DNA, which is doing the comparison between the known samples and the evidence samples, and writing a report and stating those results.

Q. Okay. So backing up to the beginning of the process, you said that extraction occurs when you take a reagent and you put it into the tube with the material that you're trying to extract the DNA from; is that correct?

A. Yes, there are several reagents, yes, but yes, reagents into the tube with the evidence sample, and also the known, but obviously two different tubes.

Q. Okay. Then when you go into the quantitation, is that -- am I saying that right?

A. Quantification.

Q. When you go into that step, do you use a machine, or how is that done?

A. Yes. The quantification, the amplification, and the detection all use machines, and they will display a result at the end. So those are loaded onto a machine, yes.

Q. Okay. And when you talk about kits, are you talking about those machines that you're using in this process?

A. Yes. The quantification has a kit that is specific for DNA and so does the amplification, also has a kit, specific for human DNA -- sorry -- that, you know, if there's cat DNA it's not going to amplify cat DNA, but it will amplify only human DNA.

Q. Okay. So I want to talk about machines that are used in these processes. Let's talk about first quantification. What -- what are -- what, hmm -- what's in place to make sure that whatever reading you get from that machine is valid and you can continue on with the next step in the process?

A. There are a set of standard s that are processed with the machine, and so those standards have to be within a certain range in order for the data to be used. If they're not, then the data is -- I'm sorry -- the sample is requantified, and so that data is scratched and then it's started over just because

of a pipetting.

Q. Okay. So you would go back and get another piece of that same evidence and start the process over again?

A. Well, no, you actually just step back one step. So you could go back to the original extract, to the original -- the extract tube of DNA and then just requantify and see how much you're going to get from those.

Q. Okay. So assuming that the quantification, that the results come within that standard curve range, you would then next go into amplification?

A. Correct.

Q. And are there any standards that are set up in amplification to ensure that you're getting a valid reading?

A. Yes. There is a positive and negative that is processed with -- within the amplification process, and this is just to make sure that the kit is performing what it's supposed to do, it is amplifying correctly, and that the negative is clean. There's also reagent blanks involved within the extraction process that are processed with the evidence and with the knowns separately, and they are processed throughout the entire all the way to detection to make sure that the original chemicals involved in the extraction process were also free of DNA and there was no carryover from another sample.

Q. Okay. So you would check to make sure that you get the right results in the amplification process before you would

then move into detection; is that correct?

A. Correct.

Q. Okay. So within detection is there any -- any checks within detection to make sure that that phase is also getting proper results?

A. So the detection phase is using the positive and negative from amplification, and so within the detection I can tell whether the positive amplified correctly within the kit was working and that the negative was clean.

Q. Okay. And let's say that you get, throughout any one of these three steps where you're using these machines and the kits, let's say that you get something that's outside the standard, what does the protocol tell you to do if that should occur?

A. Is to back up one step. So if the process with, let's say, detection, if the negative control was not clean, then we would step back one step and reset up that original plate, because it's two different plates, so we have an amplified product plate, and we would reset up the amplified product onto the machine and see if it was clean then. So maybe it was just a, you know, a contaminated well within the second plate that was the problem.

If it shows up clean then then we are good. If it doesn't, then we will set up and completely reamplify the sample, which means going back to the original DNA extact,

pulling from that and reamplifying the sample.

If that is still the problem, then we will actually go back to the original evidence sample and take other cutting or swabbing and completely re-extract the sample.

Q. Okay. And the kits that are used, where do those kits come from?

A. They are companies that actually manufacture the kits, and so there's one called Applied Biosystems.

Q. Okay. And are they accepted within the scientific community?

A. They are. And they also do their own quality assurance within the company to make sure that the kits are valid. And then once we get the kits we do a QC check on the kits to make sure that a positive turns out to be a true positive and there's nothing within the reagents that would cause a negative to be unclean.

Q. Okay. Let's talk about -- when was HPD crime lab accredited by the Texas Department of Safety?

A. Well, the Texas Department of Safety does not accredit us. They have to approve your accrediting body that we get. So they did approve the accrediting body, which was the American Society of Crime Laboratory Directors Laboratory Accreditation Board, they approved that, and we got that accreditation for serology in May of '05 and for DNA was June of '06.

Q. Okay. And since that time how often does the crime lab have to go through the accreditation process?

A. The accreditation process, or the accreditation certificate lasts for five years, but we were just new, of course, getting it, so we actually did it in '05, '06, '07, 2011 and 2010.

Q. Okay. So in each of those years, was it a voluntary audit that HPD crime lab did?

A. Yes, because we were only supposed to do it every five but we did it every year.

Q. Okay. So you were most recently accredited in 2011, which will last now for five years?

A. Correct.

Q. Taking us to 2016?

A. Correct.

Q. Okay. Let's say that while you're going through the process from extraction all the way to your detection, if you had any problems with any steps along the way, would you document that and leave that documentation within your case file?

A. Yes, all of that paperwork remains in the case file.

Q. Okay. And why do you hang onto -- to that documentation?

A. It's a record of what happened to the sample. If it was, you know, amplified once and then reamplified I know that,

you know, the original volume that I started with with the sample is now down by two amplifications, not just one. And so it's just a record of everything that has happened to that sample.

Q. Okay. Now, I think we kind of left off with your -- your last process being your interpretations. Can you explain how the process of the comparisons with the interpretations works?

A. So you take the unknown sample, which is usually the evidence sample, and then you evaluate that sample based on, you know, again, is it single source? Is it a mixture? Do I need to do more work on it? And then you compare that sample to any known samples that you have and do a comparison of is this person's DNA consistent within the evidence sample or is it not, is he included, is he not, is anyone else included, and you just do a comparison based on that.

Q. Okay. And then after that do you write a report that documents your findings?

A. Correct.

Q. Now, the procedures that you just outlined for us, are those standard procedures in scientific labs that are accredited.

A. Yes, they are.

Q. Now, back in 2010, were you asked to do some DNA analysis on the case that we're here on today?

A. Yes, I was.
Q. Now, back in 2010 when you received this case, can you tell us what you did in terms of the standard procedures that you just outlined?
A. I did the extraction, quantification, amplification, and looked at the results and the interpretation for all of the samples except for one set where another analyst did four extraction samples for me and then passed them to me for me to carry on through the rest of the process.
Q. Okay. But with the exception of that first round of testing, you handled everything from extraction to the interpretations?
A. Correct.
Q. Okay. Is there a particular scientific method used to extract DNA from a biological material?
A. There are several within the community, and just depending on which lab you're in, they have to validate that extraction method before they can use it, so it will differ within labs, but there are a certain set within a community, yes.
Q. Okay. Can you tell us which particular method was used in this case?
A. For -- I used two different methods in this case. One is called a differential extraction, which is if semen is suspected of being present, then we will try to separate semen

cells from non-semen cells, and that's called a differential extraction. For other samples, like known references, contact samples, blood samples, saliva samples, we will use what's called a straight extraction.

THE COURT: A what?

A. Straight, and this is through a company called Qiagen, they have a kit for those, and it's just a nondifferential basically extraction, it's just a straightforward extraction.

Q. (By Ms. Fuller) Okay. And so for each of those two tests you use two different kits?

A. Correct.

Q. Okay. And even though it's two different kits, do you still follow the same procedures that you outlined in terms of the protocols at each step?

A. Yes. The same protocols are outlined, and also the kits have to be validated before they're used, and they were.

Q. Okay. And they were in this case?

A. Yes, they were.

Q. Okay. In this case in particular, I want to talk about a couple of pieces of evidence. First of all, the -- first of all, there was quite a bit of evidence collected and tested in this case. Would you agree?

A. Yes, there was.

Q. Okay. And from any of these pieces of items, did --

did you-all receive any -- any sperm fractions or sperm? Semen, sperm or semen?

A. Kind of two different questions there. Sperm fraction is part of the differential extraction, so that's what I will generate. Now, the serologist or screener will actually, if they will indicate sperm is a different question, so if they suspect that semen or sperm are present, then I will do a differential extraction. So I did a differential extraction on penile swabs, and so there would be a sperm fraction there.

Q. Okay. So on the penile swabs you do the differential?

A. Yes, I did.

Q. And were you able to get any conclusions from the penile swab?

A. No. There was no DNA profile obtained from that item.

Q. Okay. Now, after you did not receive any DNA profile, what did you decide to do with those penile swabs?

A. We requested that an outside lab actually take the penile swab, remaining swab that we have, plus the extract that we have, extract the final swab, and combine those two to see if a DNA profile could be generated using another, a different kit called a MiniFiler that HPD did not have on-line at the time.

Q. Okay. So at the point that you don't receive a DNA profile, you then ship it off to an outside independent lab to get them to do a test that the HPD lab was not doing at the time?

A. Correct.

Q. Okay. Now, did -- did you do any differential testing on any of the other items?

A. No, I did not.

Q. Okay. And so does that mean that there were no sperm fractions found on any other pieces of the evidence?

A. That means that no other sperm fractions were generated by me during other pieces of evidence.

Q. Okay. Now, you corrected me when I said then about when I started talking about semen, you said semen is a different -- a different test; is that correct?

A. Yes. So semen can be detected in the original screening of the case, and that's doing a certain test, which is an acid phosphatase test or an alternate light source test, and both of these are presumptive, which means they are sensitive but not specific. So both of those will react to other things besides semen.

And then there's a confirmatory test, which is the microscopic exam for sperm cells, sperm heads, which is a confirmation for semen. And then there's also a PSA, which is a prostate specific antigen test, which is also a confirmatory

for semen.

Q. Okay. So somebody before you, the serologist, would have detected what they thought could possibly be semen; is that right?

A. Yes. They would have tested certain items for the presence of semen.

Q. They would have done a presumptive test, and if that presumptive test came back positive, it would then get sent to you to do more testing?

A. Correct.

Q. Okay. Now, on any of the pieces of evidence in this case, were you given any other pieces of items, pieces of evidence to do any confirmatory testing for semen?

Q. So again, they would have done the confirmatory test for semen if there was adequate sample for to do that test, but she did do presumptive semen testing, and by she, the first analyst that did this was Kristina Skalski. She did not indicate semen on vaginal swabs of Flora Ryan, and no semen was detected on the oral swabs of the same individual, on rectal swabs, and also another set of vaginal swabs. All of these produced no semen was detected on these items.

Q. Okay. Were there any other items that were tested for semen?

A. Yes. An additional report, Kristina Skalski reported that no semen detected on capri pants, shorts, a shirt,

pillowcase, a maroon towel, white hand towel, a white bath towel, a floral hand towel, a plaid hand towel, a potholder, a multicolor blanket, a red multicolored blanket, and a brown blanket.

Q. Okay.

A. All of those were negative.

Q. Okay. Were there any other testing that were done for the presence of semen?

A. There was also Juli Rehfuss recorded in a last report semen was negative for an item that was a diaper and another item that was a diaper.

Q. Okay. So at that point nothing further comes to you because since nothing's detected there's nothing for you to further test?

A. Correct.

Q. Okay. Turning your attention to a few other pieces of evidence. You received some swabs from a pair of shorts and some beer bottles; is that correct?

A. Yes, I did.

Q. Okay. Who did you receive those swabs from?

A. Normally I will receive those from a locked walk-in freezer, but in this case I actually took those directly from the serologist at the time, which was Juli Rehfuss.

Q. Okay. And after she's swabbed those pieces of evidence and she handed the swabs to you, what did you do with

those swabs next?

A. Then I will start portioning those samples, which is taking a half of swab or one swab, depending on how much or how much she started with -- if she took two swabs then I'll usually take one. And so I'll take one of those swabs and place it in a tube and start the extraction process.

Q. Okay. And did you do that with the swab taken from the pair of shorts and from the swab taken on a beer bottle?

A. Yes, I did.

Q. Two beer bottles; is that correct?

A. Four beer bottles.

Q. Okay. Let's talk about the shorts first. Did you follow all the standard protocols from portions all the way through interpretation with that swab?

A. Yes, I did.

Q. Okay. And was anybody else involved in the process?

A. No. I was the only one that handled these samples during the process.

Q. Okay. And you've already outlined to us all of the standards at each step of the way. Were all those standards met as you were doing this testing?

A. The standards were within range, and the negative control was clean and the reagent blanks were clean, yes.

Q. Okay. And have you had a chance to review your case file?

A. I have.
Q. Do you have any documentation in there regarding the swabbings to the shorts that would indicate that there were any problems throughout the steps that would have been documented?
A. I have reviewed and I didn't see any issues with that.
Q. Okay. So when you were able to go through the process, what were your -- first of all, were you able to get a -- a DNA profile from the shorts?
A. Yes, I was.
Q. Okay. And was it a full or partial profile?
A. This was actually a mixture of DNA from at least two people.
Q. Okay. And once you get the mixture of the DNA from two people, what will you then do?
A. I will take the known samples that I have and see if their DNA is consistent within that mixture and then do an inclusion or exclusion of that individual.
Q. Okay. Now, let's talk specifically about the shorts. Were you able to identify two people -- who the mixture belonged to in this case?
A. Yes, I was.
Q. And who was that?
A. The major component, which is an individual that contributed more DNA, was Flora Ryan. She could not be

excluded from this mixture. And then Dean Wood could also not be excluded from the mixture of the shorts.

Q. Okay. And then once you are able to say whether somebody is included or excluded, major contributor or not, do you then assign a probability to each individual?

A. Yes, we did.

Q. Okay. And what were those probabilities?

A. For Flora Ryan the probability that an unrelated individual would be included as a major contributor is 1 in 7.8 trillion for Caucasian, 1 in 2.1 quadrillion for African-Americans, 1 in 7.6 billion for Southeast Hispanics, and 1 in 19 trillion for Southwest Hispanics.

Q. So based on those probabilities, can you say with scientific certainty that the unknown sample came from that complainant, Flora Ryan?

A. Not for the shorts, no.

Q. And what do you mean by that?

A. It means the number has to be above a certain threshold before we will say it with scientific certainty this person, you know, other than an identical twin could be on those shorts.

Q. Okay. So the probability goes to -- let me back up. So you're saying that there could be an identical twin out there that could also have that same DNA?

A. Correct.

Q. Okay. Let's move on to the beer bottles. The swabs were taken. You got them directly from Juli. Was anybody involved in the process from extraction through your interpretation?

A. No, just myself.

Q. Okay. And can you tell me, here we might need to go by -- tell me the results from the bottles.

A. The first bottle is item 8.2.1.1, and this was a partial female DNA profile, and Flora Ryan could not be excluded, and Dean Wood, Julie Ostlund and Mary Ostlund are excluded as contributors.

Q. Okay. So on that first one, 8.1.1 -- is that right?

A. 8.2.1.1.

Q. 8.2.1.1, you've got a partial profile and Flora Ryan cannot be excluded?

A. Correct.

Q. What was the probability that was attached to 8.2.1.1?

A. Approximately 1 in 110 billion for Caucasians, 1 in 34 trillion for African-Americans, 1 in 75 million for Southeast Hispanics, and 1 in 270 billion for Southwest Hispanics.

Q. Okay. Let's move on to the next bottle.

A. So item 8.3.1.1 there was no DNA profile obtained from this item.

Q. All right. And the next one?

A. Item 8.4.1.1, this also was a partial DNA mixture of two individuals. Flora Ryan cannot be excluded, and the probability for her is 1 in 890 for Caucasians, 1 in 4100 for African-Americans, 1 in 280 for Southeast Hispanics, and 1 in 8200 for Southwest Hispanics. Dean Wood could also not be excluded from this mixture on this beer bottle.

Q. And was a probability assigned to him?

A. Yes, there was. His was 1 in 100,000 -- sorry -- 1 in 11 million for Caucasians, 1 in 160 million for African-Americans, 1 in 100,000 for Southeast Hispanics, and 1 in 160 million for -- sorry -- 1 in 93 million for Southwest.

Q. And was there one more beer bottle, or was that all of them?

A. There was one more. Item 8.5.1.1, and there was no interpretable DNA profile obtained from this item.

Q. Now, again, I asked you specifically to the shorts, but also with the beer bottles, does your file indicate that there were any problems throughout the process with the standard protocols at each phase?

A. No, there was no problems indicated for the beer bottles extraction or all the way through, no.

Q. Okay. So is it safe to say that all the protocols were followed in this case leading up to all of your conclusions about the DNA?

A. Yes, they were.

Q. Now, after you do your interpretations and you've reached a result, what happens with your results?

A. So my report is then reviewed by another qualified analyst, and that individual has to agree to all of my findings and all of my interpretation, and actually has to sign off a checklist on that. And then it also goes for another review. So there's a double review of all interpretations and all reports before they are finalized. So two other people also have to agree with the conclusions, the inclusion or exclusion and the stats involved.

Q. Okay. And in order for them to do that, do they just review the data that you've interpreted or do they go back and do all the steps?

A. They review all the data that was generated.

Q. Are DNA analysts under a code of ethics or moral obligations?

A. Yes, we are. We have to follow a code of ethics through the accrediting body and also within the lab.

Q. Okay. And what basically does that code of ethics prescribe you to do or not to?

A. To have a moral compass, and not convict the wrong individual.

Q. Can we go back to the -- your results for the shorts, and could you give us -- you said that that was also a mixture.

You gave us Flora Ryan's probability, but can you tell us who the other individual was on the shorts?

A. So Flora Ryan was -- could not be excluded and Dean Wood could also not be excluded as a possible contributor to this DNA mixture. And his stats are approximately 1 in 8100 for Caucasians, 1 in 51,000 for African-Americans, 1 in 9700 for Southeast Hispanics, and 1 in 74,000 for Southwest.

MS. FULLER: Pass the witness, your Honor.

THE COURT: Cross-examination.

MR. HOCHGLAUBE: Judge, may I use the television system just so the Court can see the --

THE COURT: Sure.

CROSS-EXAMINATION

BY MR. HOCHGLAUBE:

Q. Okay. Basically, I tried to make a list here of the items that you did DNA testing on, all right. And so you can see on the left side it talks about the defendant's penile swab.

A. Correct.

Q. The complainant's shirt stain, the complainant's blanket stain, fingernail, two fingernail swabs. The defendant's shorts, which was a swab, and then there was a bloodstain from the shorts, and then two beer bottles, malt liquor bottle and one more beer bottle, and then the last I said I just have a thing -- before I forget, item 1.1 that you

analyzed was the defendant's shorts, right?

A. Yes, 1.1 was the shorts.

Q. And that's the item that Juli Rehfuss did of basically initial testing to see whether there might be any bodily fluids on it, right?

A. Correct.

Q. And it came back as a presumptive positive for semen, correct?

A. Correct.

Q. And you and I and Ms. Fuller were meeting outside just before your testimony here today, right?

A. Yes.

Q. And just so everybody's clear, you ultimately take the swab from those -- well, no, you take -- ultimately you take the shorts and you never detect any semen on them; is that correct?

A. It was presumptive for semen, but actual semen, no.

Q. All right. So there's no actual conclusive evidence that there was any semen found on -- on item 1.1, which are the defendant's shorts, right?

A. Correct.

MR. HOCHGLAUBE: And I guess I just ask, Judge, the prosecutor and I, I think have a gentleman's agreement on this, but just to memorialize it, that the prosecutor's not going to refer to any presumptive positive test because there was no

conclusive test subsequent to that.

MS. FULLER: That's true, your Honor.

THE COURT: All right.

MR. HOCHGLAUBE: Thank you, Judge.

Q. (By Mr. Hochglaube) Now, the items that -- let's start with the defendant's penile swab. The -- would you say that you performed a test on epithelial cells; is that right?

A. Not a test. There's a differential extraction will reveal a sperm fraction and an epithelial fraction, and these are from the same swab, originally from the same swab, just separated.

Q. Okay. And ultimately you found no evidence of there being sperm, right?

A. For the epithelial there was no interpretable DNA profile, and so the original test would indicate --

Q. Let me -- you have two different results because you're testing for two different things, right?

A. Correct.

Q. You're testing for epithelial, which basically means skin, right?

A. Correct.

Q. And for sperm, right?

A. But you're not testing for epithelial, you -- the fraction is called an epithelial fraction. It's just a word that we use. But it's an epithelial fraction, which is like a

non-sperm fraction. It's not testing for epithelial cells. I mean, it could be spit cells, it could be any other cells, it's just a -- some other cells besides sperm cells.

Q. Okay. So some sort of bodily fluid that is not sperm, right?

A. Correct.

Q. You tested for the presence of that?

A. It's not testing for the presence, it's just trying to get a DNA profile from that fraction and from the sperm fraction.

Q. All right. And the sperm fraction, there was no sperm that was located, right?

A. Correct.

Q. So basically when -- from this swab, the only thing you get are skin cells, right, or some sort of not sperm cells?

A. Correct, I did not get a DNA profile from sperm cells.

Q. All right. Can you tell me what kind of cells you did?

A. No.

Q. So you don't know whether they're blood or whether they're epithelial or whether they're some other kind of fluid?

A. No, because we don't do tests for what kind of cells are present. So what I'm trying to develop is a DNA profile from that sample. Now, whether that sample contains blood

cells, skin cells, or saliva cells, I don't know, because there's not a test for that we perform.

Q. So there is no way to tell whether this is a skin cell or a blood cell?

A. You can look where the item is collected from. In this case it was penile swabs. So if a DNA profile was generated from an epithelial fraction, you could assume that the DNA from that was from skin cells of the penis, but if there's nothing, then I'm not getting cells at all.

Q. But in this case you're also trying to locate not just cells of the person's penis, but you're trying to locate another person's cells on that penis?

A. Correct.

Q. All right. And you can't make any assumptions about what type of cell that is, right?

A. No, I cannot.

Q. And is there a way to determine whether or not that cell is a blood cell or some other kind of cell?

A. Doctors, pathologists can determine what the individual cells are, but I cannot.

Q. Do you know whether any type of testing was done to determine whether this was a skin cell or a blood cell or some other type of cell?

A. No, I do not, not that I'm aware of, no testing was done to determine what cell that was.

Q. Okay. Do you know whether -- because some of the evidence that went -- that I saw was -- went through serology, right?

A. Correct.

Q. In fact, probably all of it went through serology, right?

A. Yes.

Q. And at serology they're presumptive blood tests, are they not?

A. Yes, they are.

Q. This swab ever made for a presumptive blood test?

A. (Looking in report.)

Q. It's 3.1.1.

A. So no testings for blood were performed on the penile swabs, no.

Q. Okay. Now, I don't want to quarrel with you, but you refer to this -- this type of cell in your report as being an epithelial cell, correct?

A. Correct.

Q. And an epithelial cell is not the same thing as a blood cell, correct?

A. Correct.

Q. Okay. But your testimony here today is that it could have been a blood cell or an epithelial cell, you don't know?

A. If a DNA profile was developed, I would not be able

to specifically tell you that the DNA profile is from an epithelial cell or a blood cell, because I do not do a test to determine what the cell is before the DNA profile is developed.

So an epithelial fraction can contain blood cells, skin cells, or other type of cells, like saliva cells, but again, the test is not there to determine what the cell is before the profile is developed.

Q. Okay. Now, I just want to cover the piece of evidence the prosecutor went through with you, so I'm not going to cover the complainant's shirt stain, which is item no. 4.3.2.1, or the blank, which is 7.1.3.1, or either of the complainant's fingernail scrapings, which is 10.3.1.1 or 10.4.1.1. And I want to skip down to what are marked as the defendant's shorts, and a swab from those shorts, which is 1.1.1.1, and in that sample, you ultimately conclude that the complainant's DNA matches the sample found on that swab with the likelihood of 7.8 trillion to 1 essentially, right?

A. It is consistent with Flora Ryan, yes.

Q. Okay. And but with the defendant -- and it's difficult to see my writing here -- the defendant it's only about 8100 to 1, right?

A. Correct.

Q. There's a big difference between those two, correct?

A. Yes.

Q. The -- now, I'm going to skip the defendant's shorts

and the bloodstain. This is what was sort of interesting, you have specific things that the lab tested that you guys identified as being blood, right?

A. Yes.

Q. Well, how do you identify it as being blood?

A. Because there are presumptive tests to indicate that human blood is present. But again, even if they say human blood is present and I develop a DNA profile, I can't say with certainty that the DNA profile that was developed is from blood or is there saliva stains under the blood that's developing the profile. And so -- but I can tell you, like, whose DNA that is consistent with, just not exactly the source of the cells that it came from.

Q. Okay. So the beer bottle, 8.2.1.1, the ratio you come up with, a hundred ten billion for Caucasians, that's a hundred ten billion to 1 that another person would have the same DNA like the complainant to match this -- the DNA found on this beer bottle?

A. Correct.

Q. But the defendant is excluded from that beer bottle, right?

A. Yes, he is.

Q. Okay. And again, you don't know, I guess, whether or not the bodily fluid found on that beer bottle is -- whether it's saliva or whether it's blood or whether it's something

else?

A. No, I do not.

Q. And you're saying you're not aware of any testing that was done to determine whether it was blood or saliva or anything else?

A. For the cells, no. There was no other testing to determine which cell it came from, no.

Q. Okay. The next beer bottle, 8.3.1.1, there's no DNA, but the malt liquor bottle, 8.4.1.1, this again shows a fairly small ratio in comparison to some of the other numbers we see on some of the evidence, right?

A. Yes.

Q. It shows a ratio of 890 to 1 match against the complainant's, right?

A. Correct.

Q. And if she was a Southeast Hispanic the number could be as low as 280, correct?

A. Correct.

Q. Whereas for the defendant you show it as being 11 million to 1, right?

A. Correct.

Q. But again, with the malt liquor bottle, you're not saying that it's blood or saliva or any kind of bodily fluid in particular?

A. No, I'm not.

Q. And you're not aware of any kind of testing that's done, that your lab did to determine what kind of fluid it was?

A. No, no testing was done.

Q. When your lab gets items that have -- what obviously appear to be bloodstains on them, does your lab take steps to try to identify the substance that you're seeing is blood?

A. Yes, there are tests to determine whether it is human blood, but if an item is suspected of being just touched, we will not perform those tests of whether it's blood because that will remove DNA from that item, and so then I'm losing DNA to a test when reddish brown stains were not visualized, so we do not do it in the event of removing possible DNA from that item.

Q. Sure. But you agree with me that in substance it is indicative of the fact that nobody saw any obvious signs of blood on these items?

A. Correct.

Q. By the fact that they didn't do any tests to see that it was blood?

A. Right. The report will state that no red brown stains were indicated or no indication of blood was there, so they would not do those.

Q. Okay. Now, you talked about the machines that you use, and the extraction process, which I guess is the first part of this process that you go through; is that right?

A. Yes.

Q. What's the name of the machine you use?
A. There is not a machine for the extraction process. The extraction process is done manually within the tube itself, and so reagents are added, they will break open the cells, and then the swab is removed and there's a set -- there's a kit which is from a company called Qiagen, and the DNA will pass through a filter and all of the proteins and sugars and all the debris will be filtered out and then you will have purified DNA. So there --
Q. Is there -- because you did one test, the differential test, right?
A. Correct.
Q. And that's where you're trying to basically spend some time trying to separate out sperm from other types of cells, right?
A. Correct.
Q. And doesn't that require a machine to spin?
A. Well, there is a centrifuge involved, which is just spinning the tubes fast, and so there is a machine there, but that is just the separation part.
Q. Okay. So and what's that machine called?
A. A centrifuge.
Q. Is there, like, a producer or manufacturer?
A. There's different ones. There's -- I think Applied Biosystems has one.

Q. Let me focus on this, do you know which one -- who made the one in this case?
A. No, but I would have to go back to the lab and look, which actual machine was used.
Q. Okay. So you didn't know which machine it was?
A. Not at this time right now, but I can find that out.
Q. And then is there any other kind of machine that's used during the extraction process?
A. There are pipettes, which are items that will take out the fluid, and all of those are -- there's a couple different vendors for those, and I can get those names too.
Q. Okay. Do you know what the sort of scientific theory is behind the pipettes?
A. It's kind of like a syringe. It brings liquid up and expels liquid out.
Q. So it's just like a vacuum that sucks?
A. Right.
Q. Okay. And then it sucks it into -- we're talking about quantitation; is that right?
A. We're still on extraction.
Q. Okay. Are there other machines in extraction besides these two, that -- the --
A. There's probably a heat lock, which is once the reagents are added it stays at a constant temperature during the evening, or overnight, so there's a heat lock associated

with that.

Q. Okay. And what else, any other machines?

A. Not that I can think of.

Q. All right. What is a TKN 150?

A. A TKN 150 is a machine that will do the quantitation set-up or the amplification set-up.

Q. Okay. Is that -- was that machine used in this process?

A. No. I did all of this manually with a pipette.

Q. I see. Okay. So you didn't use the TKN 150 or the TKN 7500?

A. No, sir, I did not.

Q. What about the 9700 Thermocycler?

A. Yes, those were used.

Q. Those were used. But that gets to the amplification; is that correct?

A. Correct.

Q. So your testimony to the Court is that you manually took -- did the job of what sometimes machines are used for in the extraction and quantitation process?

A. Quantitation, there are a couple of machines that can be used for extraction, but those were not being used at the time of this analysis.

Q. Right. And you did it manually?

A. I did those, yes.

Q. Okay. And this is -- I asked you this as a grammatic question. Why do sometimes they call it quantitation and sometimes quantification?

A. It's just interchangeable. It's determining how much DNA is present.

Q. Now, you get to the -- so I guess the next machine that comes into play is the amplification machine; is that right?

A. After extraction, there's quantification, there's a machine there, and then the next machine is amplification, which is the 9700.

Q. All right. And what does that do?

A. The 9700?

Q. Yes, sir.

A. It amplifies DNA, the 16 regions that I will look at. And so it's just copying the DNA that I'm looking at.

Q. And do you understand the scientific principle behind how it does that?

A. I do.

Q. Can you explain to the Court?

A. I can. So when DNA is extracted, you have full DNA within the tube. That DNA is added, along with another kit, and another asset of reagents into the amplification process, and then primers, which are short sequences of DNA, will come in and sit down on an area before the 16 region -- 1 of the 16

regions that I'm going to look at, and we'll start copying that region. And so through a series of heating and cooling, that area will be copied millions of times on that area, and since this is a multiplex system, all 16 regions are being copied at the same time, and that's how you get DNA copying.

Q. Okay. Now, is there a computer that's involved in the 9700 Thermocycler?

A. Yes.

Q. And explain to the Court what that does.

A. Well, the computer is within the system itself, so the computer is basically telling the system to raise the temperature and lower the temperature. So as you raise or lower the temperature, these primers will bind, and as you lower it they will copy, and then it raises it again so more primers will bind, and then more copying, and that's how you get the exponential copying of it. And so the computer is actually within the machine.

Q. All right. And is there not some sort of computer program that you would be sort of overseeing in the amplification process?

A. I mean, it's an internal computer program within the machine, yes.

Q. But my understanding is that you will sometimes type in information into a sort of -- I'm forgetting the right word for it -- but basically a form that -- a form that sits on a --

on a computer; is that right?

A. All of the heating and cooling cycles and programs that are used are preprogrammed or programmed by us and then are validated by us before the kit goes on-line or before the machine goes on-line using for evidence samples.

Q. So do you do that validation every single time you do a test with it?

A. No. The validation is done originally when the instrument comes in.

Q. Okay. And when was that in this case, how much earlier to your testing was that validation done?

A. These machines were there before I started in 2005, but they are checked every year, twice a year, a series of preventative maintenance, to make sure that they are working correctly.

Q. And those checks are in October; is that right?

A. They are -- I know one's in September and I think one's in March, so they're about six months apart.

Q. And so how much time had gone by when you did this test on -- when you did these tests from when the last validation check had been done?

A. These samples were processed in May of 2011, and so March would have been when they were tested and preventative maintenance were done on them to make sure that they were working correctly.

Q. So two months, approximately?
A. Correct.
Q. But my understanding, I thought some of this stuff was not done in 2011. I thought some of it was done earlier than that. Is that not true?
A. Yes. Some of the original DNA extractions were done in 2010, but the shorts and the beer bottle were done on this set, which was 2011.
Q. So basically for 1.1.1.1 and 8.2.1.1 and 8.4.1.1, which is a swab of the defendant's shorts, a beer bottle and a malt liquor bottle, your testimony is that your testing was completed in May of 2011, and that the last validation check on the 9700 Thermocycler had been in March of 2011; is that right?
A. Sorry, not May, it was April 2011.
Q. Okay. And March of 2011 is when you believe the -- this 9700 Thermocycler was last maintained?
A. Correct.
Q. And when they do the maintenance on it, they run a known sample through it and check to make sure that it's coming back with the information you expect it to come back, right?
A. We do a series of tests to see if the machine is heating and cooling correctly, and then a known sample is processed to see if the expected results are there.
Q. All right. But there's no telling how many different samples had gone through the 9700 Thermocycler since its

last -- since its last validation check and when you did this testing on the evidence here; is that right?

A. Correct.

Q. And the next time that the -- that machine is checked you would say would be September of 2011?

A. Yes.

Q. And my understanding is that when you do the check, you basically -- like you say, you go through the process of seeing whether -- seeing whether everything appears to be working correctly at that time, right?

A. Correct.

Q. And then you put a known sample through and see whether it comes out with the known sample's information accurately?

A. Correct.

Q. Were you a part of either of these validation checks in September of 2011 or March of 2011?

A. Yes. During the time I was part of the team that was doing the checks on these machines.

Q. Okay. Was there any type of maintenance issues with the 9700 Thermocycler?

A. Not that I have indicated in this report, but I would actually have to go back to the logbook of these machines to see if there was an issue.

Q. Okay. So you can't say with certainty that there was

or there was not?
A. No.
Q. And for the defendant's penile swab, you do your testing in 2010, correct?
A. Yes, it was done in December of 2010.
Q. So by that reckoning, the last -- the last validation check would have been in September of 2010, correct?
A. Yes, the last preventative maintenance would have been in September, yes.
Q. So that's three or four months?
A. Three months, yes.
Q. And then it would have been another three months until March of 2011 before you had got the next check; is that correct?
A. Correct.
Q. Okay. The -- the -- after the amplification, is there another machine that's used in the amplification process besides the 9700 Thermocycler?
A. No, sir.
Q. Is there another machine that's used in the -- I guess the genetic analyzer, what is the actual name of that machine?
A. That is the name. It's a 3100 Genetic Analyzer.
Q. Thank you. 3100. And who is the producer of that?
A. Applied Biosystems.

Q. Is it the same information in terms of when that machine is maintained as the 9700 Thermocycler?

A. No. That was actually -- I'm sorry, what was the question?

Q. Do you maintain the Genetic Analyzer in the same sort of cycle that you maintain the 9700 Thermocycler?

A. Basically that one is checked every time you process a sample because you have a known positive that is processed with all the samples, and so the Genetic Analyzer is basically checked every time a set of samples are processed, because the positive has to come out with expected results and the negative has to come out clean. Now, there is a preventative maintenance on the 3100 that is done every year in November.

Q. All right. And so in November of 2010 is when -- is the last check of the Genetic Analyzer before the penile swab which gets tested in December of 2010, right?

A. Correct.

Q. And it would also be the last check before the other three pieces of evidence, the defendant's shorts, the beer bottle -- and the beer bottle and the malt liquor bottle, which you say were tested in April of 2011; is that right?

A. Correct.

Q. And why do you do this annual check?

A. This is a technician coming from the actual company that will make sure all the components are working correctly.

Again, we will do individual checks of the machine with running the positive and negative. If we indicate that there's a problem, then we will do certain steps. There's daily maintenance, there's changing the water, changing the buffer, but a technician preventative maintenance is done once a year.

Q. Okay. What is -- what is the difference between DNA material that's degraded versus inhibited?

A. Inhibited is like a component coming in and inhibiting the copying process, and that can be anything from, dirt is an inhibiter and the dyes from jeans can be an inhibitor. Degraded is the sample, the DNA is broken down, either exposed to sunlight or mold or heat. In either case you can get a -- not a DNA profile or a partial DNA profile.

Q. And the MiniFiler, is that made by Applied Biosystems also?

A. Yes, it is.

Q. And your lab has an RFU standard; is that right?

A. Correct.

Q. Tell the judge what that is.

A. The RFU is the relative fluorescence unit, and that is the DNA profile when it's produced on the graph has to be above a certain RFU value before an allele call is made, which means like a 12 or an 11, whatever you would see on a DNA results chart. If it does not meet that threshold, then at this time we were indicating that with an asterisk, which means

it was below that RFU volume, which means it could be inhibited, it could be degraded, or it could just be less DNA is there.

Q. Okay. And so basically, as I'm understanding it, sort of like when you listen to a -- for a sound, right, you might see a wave that jumps super high up because it's a really loud volume, right?

A. Okay.

Q. All right. But when the volume goes down, underneath a certain level, you guys decide we're not going to make a call as to what that DNA -- what that DNA chemical is?

A. What that DNA call is, yes.

Q. So -- okay. And so basically if the volume goes down low enough, at some point you guys say we don't trust it to make a call definitively?

A. Correct.

Q. And you guys use RFU, the number 150, right?

A. At this set, I believe it was done at 100.

Q. 100. You're aware that Applied Biosystems recommends use of 150 as a bottom RFU unit?

A. No, I'm not. But we do validation studies to determine what level of sensitivity our machines have. And so 100, which was three times a baseline noise, was our cut-off value based on our validation studies for those machines.

Q. Do you know what NFSTC stands for?

A. Yes.
Q. What's that?
A. National Forensic -- National Forensic Science Technology Center.
MR. HOCHGLAUBE: Can I approach the witness?
THE COURT: You may.
Q. (By Mr. Hochglaube) They're basically an established body, they're recommended, they're a respected body within the scientific community; is that right?
A. Correct.
Q. Okay. And you'll see this printout right here, www dot --
A. NFSTC.
Q. -- dot org, right?
A. Correct.
Q. And I just want you to take a look at this paragraph right here.
A. (Complies.) Okay.
Q. Do you accept that the Applied Biosystems recommends at least a 150 RFU threshold?
A. Yes, but they also say that each lab should determine what their threshold should be based on validation studies, and you can go anywhere from 50 RFUs to a hundred, to 150. So based on the validation studies, you can determine your own threshold.

Q. How many of the tests that you performed on -- how many of the tests that you did DNA analysis on had RFUs below 150?

A. How many samples?

Q. Correct.

A. Or how many -- so for Item 58, Item 1.1.1 -- sorry, 58 is my number. These are portion of swabs from shorts. Approximately 6 locations out of the 16 have RFU values below 150.

Q. How would that, if we eliminated those 6 that were under 150, how would that change your ultimate conclusion?

A. I mean, I don't know. I would have to eliminate those and then go back and write a different report and have it reviewed.

Q. So suffice to say, though, it would make it so that the number -- the numbers came down, correct?

A. As far as the probability numbers?

Q. Correct.

A. Potentially, yes.

Q. The -- how about on the beer bottles, 8.2.1.1?

A. Also approximately 6.

Q. And we don't know what the final conclusion would be in terms of what -- it says 110 billion to 1 chance basically that this is somebody besides the complainant right there, right? We're talking about 8.2.1.1?

A. Correct, a hundred ten billion.
Q. All right. So is potentially that number would be different if we threw out the numbers that were below the RFU threshold recommended by the manufacturer of the machine, Applied Biosystems?
A. Correct.
Q. And the malt liquor bottle, 8.4.1.1?
A. Approximately 4.
Q. 4 out of 16?
A. Correct.
Q. Were any of those four applicable to the complainant's number, to the complainant's likely DNA?
A. (Looking at report.) Two of those were used in the stats.
Q. So potentially this 890 to 1 number for the complainant, that could potentially be lower as well, a lower number, correct?
A. Yes, if I deleted the two, yes, it would be lower.
Q. If you deleted the two, two alleles that came back beneath the recommended 150 RFU that's recommended by Applied Biosystems, right?
A. Correct.
Q. And for the defendant's penile swab?
A. His penile swabs?
Q. Right, 3.1.1.

A. There was no DNA profile obtained and there was no interpretable obtained on both of those.

Q. But you tried to interpret it, right?

A. Yes. There wasn't enough information to interpret.

Q. Okay. I get that. What I'm trying to get at, you ultimately were able to come up with some alleles but all the alleles that came back were beneath the 150, right?

A. No. Some of the alleles were above 150, but there just wasn't enough information to make a conclusion on those results, whether they were above 150 or not, it was just too little DNA.

Q. Okay. And basically part of the reason why is because you guys decided it was not interpretable is because you were getting some results that were below the threshold that your lab finds acceptable, right?

A. Some were above. There was also other indications of -- just not enough information. So some of the alleles were above the 150 and above a hundred. Some were in the 300s. It's just it wasn't enough information for me to make a conclusion on who that was.

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

THE COURT: Redirect?

MS. FULLER: Nothing further, your Honor.

THE COURT: Thank you very much for coming in.

THE WITNESS: Thank you.