is missing? I think that is properly called a tumbler?

A Yes.

Q And was this the condition that the front door was in when you examined it?

A I believe so; yes, sir.

MR. MILLER: I have nothing further.

MS. SELBY: Nothing further. Thank you.

(WITNESS STANDS ASIDE)

THE COURT: Call your next witness.

MS. SELBY: I will call Fred Zain.

(Witness Sworn)

THEREUPON came

F R E D S A L E M Z A I N

called as a witness herein, who, having been first duly sworn according to law, testified as follows:

DIRECT EXAMINATION

BY MS. SELBY:

Q Will you state your full name, please?

A Fred Salem Zain.

Q And where are you employed?

A I'm presently employed with the Bexar County Medical Examiner's Office and Regional Crime Laboratory in San Antonio, Texas.

Q And what do you do there?

A My main job duties are to be the Chief Forensic Serologist and Trace Evidence Analyst, as well as assisting all

the areas of criminalistics in the regional crime lab. I'm also the supervisor in charge of DNA analysis with the crime laboratory.

Q Just for the jury, what is serology? When you use the term "serology", what are you talking about?

A Basically serology deals with the examination of blood from a clinical standpoint, and forensic serology deals with primarily blood staining in items that are submitted by police agencies, primarily dealing with blood staining, vaginal, seminal staining, saliva staining, things along this line that may be associated with certain types of crimes.

Q So you analyze blood and other bodily fluids that may be found as evidence in the hope of linking them up?

MR. MILLER: Your Honor, I'm going to object to the leading question.

MS. SELBY: I will strike that, then.

BY MS. SELBY:

Q When you refer to DNA analysis, what are you talking about?

A DNA analysis is simply the identification and testing of biological fluids and products which can give you a characteristic determination that may be linked to a particular individual.

Q What experience and training have you had in this field?

A My educational background is that I have a

bachelor's of science in biology, with a minor in chemistry. I got that from West Virginia State College. Got an associate degree in applied sciences from Marshall University, and also have a master's degree in biological sciences from Marshall University. The formal education, post graduate work, I've got classes in microscopy, which deals with the use and application of microscopes, as well as continuing education credits in the field of forensics.

The past working history, I was a chemist with the Department of Natural Resources here in West Virginia for three years, and a Lieutenant with the West Virginia State Police for twelve and a half years as a supervisor and director of forensic services, dealing with serological type work at the criminal identification bureau in South Charleston, West Virginia.

I am a member of the Southern Association of Forensic Scientists. I am a member of the Canadian Society of Forensic Scientists, a member of the American Academy of Forensic Scientists, as well as a working member of the American Association of Blood Banking, the International Society of Electroforesis, the International Society of Hemogenetics, and a member of the Criminal Justice Science Academy, which is an educational institution that deals in all aspects of police law enforcement.

I have given lectures and seminars throughout this state in the bar and medical arenas, as well as a continuing lecture

at WVU Medical College, West Liberty State College, West Virginia State College, Marshall University and a variety -- Fairmont State College, and a variety of other institutions in the state. I have several publications, one referring to genetic marker identification of blood characteristics of population in the State of West Virginia, which recently came out in publication, and secondly, another one pertaining to methodology of blood typing per se.

I also have a variety of continuing education lectures which were performed at the West Virginia State Police Academy, and am also doing and preparing sexual assault kit prototypes, which I did in this state, I am also doing that in the State of Texas, and that primarily is it.

Q Okay, these articles of yours that have been published, in what sort of publications have they been published?

A One was recently published in the Journal of Forensic Sciences, and it is an international journal that pertains to forensic and clinical applications.

Q Directing your attention specifically to this case, the Gilfilen arson/homicide which occurred on May the 18th, 1988, did you have occasion to examine certain evidence that was submitted to you in that case?

A Yes, I did. There was a variety of items submitted over a period of time, but I'm familiar with most of the items; yes.

Q If you could, and using your reports if you need them to refresh your memory, could you go through and describe for the jury the items you received, who you received them from, and the tests you performed and the conclusions you came to?

A Okay, first of all, relating to the original submission of evidence at the Bureau, I received from Detective Randy West, here at the sheriff's office of Kanawha County, on May 19th, 1988, a variety of items pertaining to the death of Kelly R. Gilfilen. The specimens submitted, or items submitted were a piece of carpet and padding, a quilt, a collar and rope, a portion of a door facing, a piece of front door, some debris, screen door samples, clothing remains, a bedspread, hair specimens of Ms. Gilfilen, a vaginal swab and smear slide; this was also submitted as having been taken from the body of Ms. Gilfilen by the medical examiner's office; a known blood specimen of Ms. Gilfilen, and a sock. All the items were checked for one, seminal fluid and blood staining.

The results of the examination were simply that seminal fluid and spermatozoa were identified on the vaginal swab and the smear slide. Stains of human blood were identified on the clothing remains, the carpet and pad, door facing, door frame, screen door and bedroom floor sample. No seminal fluid or blood was identified on the remaining items which I previously mentioned.

Continuing on with the results, microscopic

head hair which were removed from the rope were similar to the microscopic characteristics of the known hair specimen of Ms. Gilfilen and originated from her. I also requested that the known blood specimen be submitted for comparison purposes. This statement relates to any and all people that may be involved or associated in any way, shape or form with the particular incident that has occurred, should submit that as protocol set forth with the bureau to use as standards against possible unknown origin of certain staining. That is, the first submission of evidence right now.

Q Okay, I hand you what has been marked for identification purposes and has been admitted into evidence as State's Exhibit No. 4, and ask if this is the piece of the door and the blood sample that you examined?

A Yes, it is. To explain what we will be doing here is, the procedure at the bureau is when we log -- when items are submitted for examination or testing, then a particular number is placed and given to the type items that are submitted as well as whoever is doing the analysis will place his or her name or initials on a particular items. This not only pertains to serology, but pertains to the other identification units at the bureau. On this particular item, as I make reference to it, some of it may not be able to be visible is the number S88-271, and my initials, FSZ, that is in blue writing at the bottom part of the piece of paneling here. And it is my identification that I did receive this particular

item as one of the ones I previously got through mentioning.

Q So it was your opinion, then, that this blood on this door is the blood of Kelly Gilfilen; is that correct?

A Yes, that's correct.

Q I hand you what has been admitted into evidence and marked as State's Exhibit No. 2, which appears to be a rope and a collar. Is this the rope and the collar that you examined?

A Yes, it is. Like I say, some of the numbers would be hard for you to see, but it's marked for my identification from the laboratory. It is the rope which I removed some of the hair specimens which I spoke of, and did a comparison analysis with the known hair of Ms. Gilfilen. It is the same item which I received.

Q Okay. Continuing on with your analysis and investigation, did you have occasion to perform other scientific tests with respect to this case?

A Yes, I did. On -- I usually don't like referring to a lot of notes, but I think it is probably necessary in this particular incidence. I received from, again, Detective West on May 20th, 1988, a variety of items. They were referred to and I listed them as a pair of jeans, a pair of boots, T-shirt, sweatshirt, wash cloth, bandanna, hair sample from a bathtub, a paint chip and a hair sample from what is listed as the victim's vehicle. My results of the examination were that stains of human blood were identified on

the wash cloth, no blood or seminal fluid was identified on the remaining items, and there again, I requested known blood and hair specimens be submitted for comparison purposes. That was pretty much the summation at that time on these particular items. These were submitted, like I said, on May 20th, 1988.

The additional items were submitted on May 23rd, 1988, and May 24th, 1988, by Detective West. The first submission of additional items would consist of one, a ball bat, a dresser post, clothing remains, chair covering and belt. The submission on the 24th was a child's nightgown. The results of my examination on these items were simply that blood was identified on the chair covering, and this was from the trailer, I believe. No blood or seminal fluid was identified on any of the items, on the remaining items, except for the one described. Microscopic characteristics identified from the head hair which are removed from the ball bat, there again, were similar to the microscopic characteristics of the known head hair specimen of Ms. Gilfilen and could have originated from her.

Q When you talk about the trailer, are you talking about the Gilfilen house?

A Yes, that is correct.

Q I hand you what has been marked for identification and admitted into evidence as State's Exhibit No. 7, and ask if that is the ball bat that you examined in which you found the hair with similar characteristics of Kelly

Gilfilen?

A It appears to be. It was in a bag or a container at the time. But this appears to be the same ball bat which I examined at the time.

Q Did you perform any other scientific tests in your investigation, your participation in this investigation?

A Yes, at a later time in May, in particular May 25th, I received from Detective Johnson a known blood specimen of a Mr. William Karnes, and also a known blood specimen of John Paul Fisher. These known bloods were submitted for the purposes of obtaining the blood typings for comparison with blood staining that I had previously identified in this particular case. The results of the examination were, I reported the known blood specimen of Mr. Karnes contained a group of blood characteristics as well as I did the same thing for Mr. Fisher. These were simply reported and compared with the information I had upon the original submission of evidence, where I identified blood, and also identified semen; and these two individuals were excluded as having been either the depositor of the semen and the depositor of any of the blood samples which I previously identified.

Q What kind of testing do you do to determine whether or not a person of a given blood type, or given markers as you have called them, could be the depositor of semen?

A Okay, more particular is, when we refer to blood types, blood characteristic or genetic markers, they are all

one in the same things, so I will just refer to everything pretty much as blood types, or blood typings, from here on out.

Q Excuse me, Mr. Zain, I'm sorry to interrupt you. If you are going to sit back, move the mike a little closer to your mouth.

A Blood typings can be identified and pretty much all the body fluids, tissues, bone, teeth, pulp, whatever, depending on what particular blood characteristic we might be trying to identify. What most everyone is primarily familiar with is your AB or typing, because I believe in high school, at least I know I was and everybody I've talked to was at one time, typed their blood. We have the A, B, AB or O. A, B, O type bloods can be found in all your body fluids. The difference is that some people secrete their blood type, whether it's an AB or A, B or O in their body fluids at levels that can be detected, and some people secrete at levels that cannot be detected. We classify people that can be detected as secreter individuals; people we cannot identify their A, B, O blood type in their body fluid, such as saliva, semen, vaginal fluid, perspiration, whatever, are classified as non-secreters. The significance of this are that people that are classified as secreters range in around eighty percent of the general population. Twenty percent, on the other hand, are classified as non-secreters. So say out of ten people, normally an approximation would be that eight out of the ten would be secreter individuals and two would not.

The specific blood types which can be identified from all body fluids are in two classifications primarily. One of them is called red blood cell antigens, which are like your A, B, O, blood type, for example. The other classification are called protein enzymes. Protein enzymes are blood types that are separate, they are independent, you don't have one blood type that is dependent upon another blood type that is dependent on another. They are all separate and specific. It's just for forensic purposes and other types of scientific purposes other than clinical, you can identify blood characteristics just like you can from visually looking at someone, whether you have brown hair, blue eyes, long arms, short fingers, whatever, you can identify a variety of blood characteristics internally from each and every individual that would give or fall into a certain percentage based on the gene frequency that these blood types may occur. The bottom line is that you get a variety of blood characteristics that you can compare from an individual, and you can compare those to a blood stain or a body fluid stain where you may have identified a variety of blood characteristics also.

If they are the same blood characteristics you can say how much occurrence that this would fall into. If they are different, then you can one hundred percent exclude an individual from say, having deposited the semen, vaginal fluid or blood stain. Everybody knows that if you are blood type A and you have a blood stain that is a blood type B that there is

no way that the A individual could have left that blood stain there. And that is also true on any and all of the blood typings which I may refer to in these reports.

It's always a hundred percent exclusion, and it's always up to and including 99.9999 percent inclusionary. There are some other tests which are approaching one hundred percent identification and that is where we get into DNA analysis. But basically if you are an A, B, O type A, you could not leave B blood, you could not leave AB blood and you could not leave O blood. If you are an A secreter, you will secrete a blood type A in your body fluids. You will secrete it in your saliva, you will secrete it in your vaginal or seminal fluid, in your perspiration, whatever, and it can be identified.

If you are a non-secreter, then you cannot identify your A, B, O blood type from any of your body fluids other than your blood. That's really about the simplest we can go at it right now.

Q That was almost simple enough for me. Let's see if I understand this one part correctly. If a man is a non-secreter and he makes a sperm sample or leaves a sperm sample at a crime scene, would you or would you not be able to tell if he was type A, B or O?

A If the individual is a non-secreter, you wouldn't be able to identify his A, B, O blood type from the semen sample. If he is a secreter, more likely that you would, depending upon any possible factors. Say the sample was in

good enough shape you could identify the A, B, O blood typing of the depositor of the semen.

Q If he is a secreter?

A If he is a secreter. If he is a non-secreter, you would not.

Q Are there other indications that you can get from the semen sample of a non-secreter? Are there other indicators or identifying markers or whatever the scientific term is?

A Okay, from semen there are additional blood characteristics which can be identified that are not effected by whether a person is a secreter or not. The main point is, you do not -- the secreter status of an individual only relates to the A, B, O typing. If we talk about any other blood typings, they can still be identified from the semen. And that's the importance of it. If you weren't able to, and if a person was not able to identify blood typings from semen, they wouldn't be able to tell very much information pertaining to criminal type evidence.

Q Directing your attention to your report, with reference to William Karnes, a suspect with whom you say you eliminated, how is it that he is eliminated as a suspect?

A Okay, both the individuals which I just spoke of, Mr. Karnes and Mr. Fisher were classified as secreter individuals from the information I identified from the evidence previously mentioned, but not in detail, was that the semen

could not have originated from a secreter individual.

Q And why is that?

A Because no A, B, O typing was identified from the mixture of secretions which were identified from the vaginal swab, primarily.

Q In a little more detail, what information were you able to determine from the vaginal swab that you identified? What tests did you perform on it and how was that done?

A Okay, I think it would probably be easier if I would just go ahead -- when I received it, it was examined for one, the identification of semen. Semen is the transfer fluid and collectively a portion of an ejaculate that a male individual produces. Sperm cells, of course, are the reproductive cell of the male. Sperm cells are really not what we identify blood characteristics or blood types from. Not in this sense. Semen is the fluid, and that is what we identify the blood typings from. Identified that there were no A, B, O typings identified from the portion of the swab which was determined to have semen present. I did identify another protein enzyme which was by the long name was phosphoglucomutase, that's abbreviated PGM, and that's what I will refer to right here and in the future when I refer to this particular blood type. The PGM blood type was a 2+ - 1+, and by this, we're saying that the depositor of the semen, because the semen was identified, would either have to be a 2+ - 1+, a

2+ or a 1+; and I will explain that in a little bit, we're going to put it on the blackboard because I know it's hard to comprehend by me just saying a bunch of numbers up here. But those were the specific blood typings which were identified from the swab. Ms. Gilfilen was also a non-secreter individual. Her PGM blood type was also a 2+ - 1+, and -- but because of the results of the analysis from the swab, the two individuals, Mr. Fisher and Mr. Karnes were excluded as having been the depositors of the semen. Due one, because they were secreters and I would have been able to identify the A, B, O blood type.

Q Did you at a later date have the opportunity to make a comparison of the semen that was deposited and the known blood type of the defendant, Mr. Richardson?

A Yes, I did. On August the 2nd, 1988, Detective West and myself were down here at Saint Francis Hospital where a blood specimen was withdrawn from Mr. Richardson and turned over to me at that same time, and in my presence. At which time, I returned to the Criminal Identification Bureau and did the same type of blood test which I had done on the previous items that had been analyzed. The known blood specimen of Mr. Richardson contained a variety of genetic -- a variety of blood typings. The primary blood typing as far as comparison with any semen blood typings was that he was a non-secreter individual. In other words, he did not secrete his A, B, O blood type in his body fluids. His A, B, O type was type B,

which excluded him just from that one blood type of having been the depositor of any of the blood at the scene. His PGM blood type is a 1+, so therefore, I concluded that the blood typings were seminal fluid identified from the vaginal swab contained genetic markers which were consistent with the genetic markers of Mr. Richardson and could have originated from him. It was stated as such because there was no information available from the blooding typings which I identified from him to exclude his blood as blood typings as having been the depositor of the semen.

The secretions, as I stated earlier, from the swab were no A, B, O typing which fit to where the victim and Mr. Richardson were both non-secreters; secondly, he was an individual that could be classified or included in, being a 1+.

Q Okay, now, did we also ask you to test the blood type of a known blood sample of the husband, Tim Gilfilen?

A Yes, you did, and that was the last submission, which I received on June 2nd, 1989, from Johnny Johnson. I returned it back to John Johnson the same day. Corporal Johnson is with the sheriff's office here in Kanawha County. The results of the testing which were done on June 2nd '89 were that one, the A, B, O type of Mr. Gilfilen is a type A. He is also classified as a non-secreter, therefore, I wouldn't be able to identify his A. B, O blood type from his body fluid, and his PGM blood type is a 1+. Therefore, the blood typings from the same standpoint in which I previously stated could not

eliminate him as being the possible depositor of the semen that was identified from the swab.

Q Could you come down from the witness stand and outline this information you have just given for us on the blackboard?

A Sure. (Witness complies.) First of all, do you want me to compare the vaginal swab, the three known blood specimens? I will put the total set of blood characteristics of Ms. Gilfilen to the right. I will start with the left as being the vaginal swab.

MR. MILLER: Excuse me. Your Honor, may we approach the bench?

THE COURT: Yes.

(WHEREUPON, counsel and defendant approached the bench and the following proceedings were had before the Court and out of the hearing of the jury.)

MR. MILLER: I feel that the amount of time that is going to be consumed in this far outweighs the relevancy of it. He has testified as to the crux of his examination. I don't believe we need to confuse the jury with all of these figures and numbers.

MS. SELBY: Well, I think it is a difficult piece of scientific evidence, and I think if he would lay it

out for them on the blackboard and show them how each one compares with the other, it would be easier for them to understand it. I have been over this testimony, of course, with Mr. Zain on at least one occasion, and it took me, you know, several times of talking to him to get it straight in my own mind. I'm sure the jury, hearing it one time, may have difficulty grasping the significance of this testimony. I think by having him lay it out on the blackboard, it might aid them in understanding the scientific testimony.

THE COURT: I'm going to permit him to testify and explain how he arrived at his conclusion via the diagram.

(WHEREUPON, counsel and defendant returned to counsel table and the proceedings were resumed in the hearing of the jury as follows.)

MS. SELBY: You may go ahead, Mr. Zain, and outline your information.

THE WITNESS: (Witness complies.) This is basically what we were talking about on the stand relating to the information which I recorded. KG stands for Ms. Gilfilen. Mr. Richardson (indicating), Mr. Gilfilen (indicating), vaginal swab (indicating). So we've got the whole array of A, B, O typings except for an AB. This is how I exactly reported in my report, that the depositor of the semen, there is no way for me

to originate that the blood type 2+ - 1+ is by itself a specific blood type or whether it is a combination of maybe two specific blood types on their own. In other words, you can get a 2+ - 1+ by itself or you can also get a 2+ - 1+ by the combination of a 2+ individual and a 1+ individual. In the same respect, if you are a 2+ - 1+ individual, and that's what is in your body fluid, and it is mixed with the body fluids of another individual that is a 2+, it would not be able to know it is that. If it is mixed with another individual that is a 1+, there again, I wouldn't be able to say specifically.

So therefore, when I issued my final report, I put all the possibilities that could be had to, you know, whoever it might apply to, if anybody. So that is the specifics on the explanation of what we have here, from the standpoint of what was reported and identified from the vaginal swab. And, of course, in all the blood staining, just the fact of what I have right here, an O 2+ - 1+ was consistent with all the blood staining and all the evidence I previously mentioned, which make the blood typings the same as Ms. Gilfilen's, and not the same as Mr. Richardson or Mr. Gilfilen or Mr. Karnes or Mr. Fisher or anybody else. That's why I reported that the blood typings were the same blood type of Ms. Gilfilen, not any other individuals which I had no blood specimens from.

BY MS. SELBY:

Q Okay, is it unusual to find three individuals involved in a criminal investigation who are non-secreters?

A Well, it is probably unique from the standpoint of what I've seen, you know, over the last twelve, thirteen years and thousands of cases. There again, if you just look at what is internationally published as statistics, which they are not my statistics, they are just simply the percentages of the population of which would be a secreter versus a non-secreter, and of course, common sense says they are much more likely to have a secreter individual because eighty percent of the population and twenty percent of the population, so it is unusual, but anything is possible.

Q With respect to the genetic markers and the frequency of finding these various characteristics in individuals, what can you tell us about that?

A Okay, from a non-secreter individual, say like on the swab, that is a PGM 2+ -- I'm going to put this up here. These are just the blood typings. Let's put it this way, an individual who is a non-secreter and a 2+ - 1+ falls into a lesser population than if it's the 1+ or if it's a 2+. And what I'm saying is, a non-secreter is twenty percent of the population and a 1+, say, is around forty, so that is eight percent of the general population would be a non-secreter, 1+. And, of course, in the sexual assault cases where you take into consideration that the semen had to originate from a male individual, the population in the state is approximately forty-six to forty-eight male compared to the reverse on the female population. So we would say -- I think the final

outcome, the way I figured -- I may have it up here with the rest of my notes -- is around four percent of the male population would be a non-secreter 1+.

Q So then inversely ninety-six percent of the male population --

A Would exclude.

Q -- would be excluded?

A That's correct. And the percentage gets higher, because a 1+ is a more common than a 2+ - 1+, and is more common than a 2+ blood type itself, just like with A, B, O typing. An A is less common than O, but a B is less common, and an AB is more rare than all the others combined. So the same principle applies on the blood typings. That basically -- the population distribution are based from biological standpoint of gene frequencies, and gene frequencies are based on specific populations that have to adhere to inheritance laws by genetics. Statistics are just probable and possibilities that are an accumulation of numbers. So when you use gene frequencies you are giving an approximation of what you would expect and what you would find.

It is more likely to have a larger group of people with a non-secreter 1+ than it is to have a non-secreter 2+. I think the 2+ non-secreter falls in the realm of -- well, less than one percent. So you would exclude ninety-nine percent of the given male population, say, for example. It is pretty much a general term, general information.

Q Okay, you can take your seat.

A (Witness complies.)

Q Now, in obtaining these markers from the vaginal swab, did you utilize the entire vaginal swab?

A No, I did not. The basic protocol which I set up in the bureau years ago was to conserve the sample as much as possible for two reasons. One, we were to analyze and gain as much information as possible with what we had to work with and to preserve as much as the evidence as possible for re-examination purposes, because over the years we have had evidence re-examined by independent experts in other parts of the country, for whatever reason, and never had any disagreements which I was sort of proud of and respected. And secondly, with DNA analysis coming around in the last couple of years, we were also being that much more cautious on evidence when we could, from the standpoint of how we originally received it and keeping evidence for DNA analysis. So I made it a protocol that we tried to save at least fifty percent or more of evidence when it was submitted to the laboratory. For example, if you -- in this particular incidence, you had a vaginal swab. Half of that vaginal swab was used for analysis which I performed at the lab. The other half was utilized for additional testing and it was done for DNA testing, more specifically.

Q What is DNA testing?

A Earlier I said that we would have a hundred

percent exclusion that always applies. But methodology and types of testing are reaching a point where we can also most positively identify body fluids -- or blood characteristics having originated from an individual.

DNA testing has been called a variety of terms. It's been called everything from biological fingerprinting to identical match, to just a variety of terms. There has been a lot of publicity on it especially in the last year or so. Theoretically, and even more factual than theory to some degree, DNA is specific to a point, excluding identical twins and mutation. So other than that, it is pretty much an identical type test. DNA is the building block of every nucleated cell in the body. It is what causes us to exist in the forms and shapes that we are. DNA makes up the A, B, O blood typing system. DNA makes up the PGM blood typing system, and DNA makes up the secreter status. It is the raw material, the building block, if you will, that is genetically inherited at the time of conception. And the evolutionary trait carrier, if you will. It is the main horses of the human race. How is that?

Q And if I understand you correctly, each person has their own particular DNA; is that correct?

A That is correct, as well as animals, plants and everything else. It is the main -- I think what probably most people are familiar with, they've heard about at one time or another about a double helix, it looks like a stairway. That

is what was posed by Watson-Crick years ago as a model of what DNA molecule looks like. DNA is the chemical sequencing that makes up everything that we utilize.

Q Has the West Virginia State Police Laboratory gotten into the field of DNA testing yet?

A No, ma'am, it has not. I have referred and done testing with, primarily one company, which is the closest one to here is in Gaithersburg, Maryland. It's called Cellmark Diagnostics. That is where primary DNA testing was being done from this area. Although there is another company named Life Codes and another one called Forensic Services in California. And, of course, the facility where I am employed now will be doing it very shortly. So the limitations as far as this type of analysis are just that. They are limited.

Q And are you trained and have you participated in DNA analysis?

A Yes, I have on my own. I went to a particular workshop in Canada with the Canadian Society of Forensic Scientists, which was a DNA workshop on methodologies and techniques that were being used at the Center for Forensic Sciences in Toronto, as well as I went to another course that was taught by Doctor Bob Ginslen and Doctor Henry Lee, which are at New Haven University at West Haven Connecticut, and there we analyzed samples which ranged from semen and blood to bone and tissue samples, as well as I have been on hand and delivered evidence and watched analysis at Cellmark

Diagnostics.

Q Were you on hand when the DNA testing was performed in this particular case?

A It just so happens by coincidence that I was. I had been ordered by the Court to take evidence to Cellmark Diagnostics for DNA testing, which I did. I was ordered to stay during the testing procedures for these particular samples that did not involve this particular case, and while I was there, they informed me that they were running the analysis on this particular swab which was sent to them. I was there and was able to get the final results at the time, present during the analysis. The results were inconclusive from the standpoint that markers were identified that were consistent with Ms. Gilfilen, but no other markers as far as the semen depositor were identifiable.

Q Okay, when you say the markers were not identifiable, what does that mean?

A They simply did not identify any patterns other than Ms. Gilfilen's even though there was semen present. I might explain to you, that when laboratories are doing DNA testing, they do not do the preliminary examinations. No lab will test for semen, no DNA lab will test for sperm cells. And at this point I would like to say that one of the big problems in DNA testing on this particular vaginal swab was due to the minimal amount of sperm cells which were present. And I said earlier that blood typings from body fluids were identified

from the seminal plasma, not from the sperm cell, that's correct. In the reverse DNA typing is done from the sperm cell itself and that is why it is more specific and identical because if you identify the genetic makeup of a sperm cell you are pretty much locked in on who that sperm cell came from.

So they did not really have a sufficient quantity of evidence, even though they tried to obtain information from the sperm cells that were present on the swab, they were really insufficient in number to obtain any additional patterns other than what was identified from the vaginal secretions which were also present on the vaginal swab.

Q Based on the DNA testing, then, is Mr. Richardson included or excluded as a depositor of the semen?

A There is really no information to yield any answer to that. It was more or less an inclusive result as to the semen depositor. It is really invalid. An invalid test from the standpoint that it doesn't give any other information. That the secretions from the swab were identified as Ms. Gilfilen's and no information from the semen or sperm cells were identified.

Q What factors would contribute to the fact that nothing could be identified from the sperm cells that were present?

A One, due to the number of sperm cells, which I previously mentioned, would be the primary factor as far as DNA typing from it. Factors that could effect the number of sperm

cells, again, is another incidence. It could be effected, one, due to just the condition from which the swab was actually taken from. One, exposed to some extreme heat temperatures, water -- you know, a lot of water, moist conditions, as well as any natural drainage that may have occurred from the individual. Also the number of spermatozoa that were original. You know, originally deposited from the standpoint of ejaculation. A person may have had a low sperm count from that standpoint. So there are a variety of instances which could effect the number of sperm cells that were present. And on viewing the slides, which I did, there weren't a great number of sperm cells identifiable, but they were intact, which would mean that intercourse from the standpoint of sperm still being intact was not a great length of time.

Q When you talk about heat, would heat from a fire sufficient to burn the body destroy sperm cells?

A It would aid in -- to answer your question, I want to explain this. That in a death you have not only environmental factors, but you have metabolical factors of the body itself that start breaking down and causing a lot of things to happen. PH changes in the body, in the body fluids, just like in blood you have your clotting factors which cease to occur. These type of metabolic functions that quit and start breaking down due primarily to a lot of bacteria that is present in each of us. It stays under control most of our lives will start a degradation process. So there again, the

natural function and life in sperm cells when they do enter the body is that they start degrading, they start being broken down, but for a variety of reasons, the same also applies if intercourse you know, and sperm cells are present when the person is no longer alive, you will have even more type of a traumatic metabolic change in the function of the fluids where the sperm cells may be present. So you have a variety of factors that will cause decomposition and then break down, as well as the environmental factors which I mentioned.

MS. SELBY: I have no further questions. Thank you.

THE COURT: You may inquire.

CROSS-EXAMINATION

BY MR. MILLER:

Q May it please the Court. Mr. Zain, are you now employed in a law enforcement capacity? I want to know what to call you, Lieutenant?

A Just call me Mr. Zain, Mr. Miller, just like in our telephone conversations. I'm not employed with a law enforcement agency. I will be commissioned as a law enforcement/peace officer in the State of Texas, but it's really not, it's like an officer of the court, like yourself. It wouldn't be in wearing a uniform and this type of thing. I'm classified as a chief serologist and supervisor and analyst with the medical examiner's office in Bexar County.

Q Okay, let me get something clear in my mind on

this DNA. I understand it is a very complicated process, but in this case, it told you nothing?

A As -- we had a conversation a while back, you and I did, and we went over the reports and you were asking me as far as inconclusive results or what did that mean, and I think to the best of my recollection I told you exactly what it meant, it was just inconclusive. They didn't have enough to work with, or they didn't have any information one way or the other.

Q Now, I am terribly bad in math and science and you will have to forgive me. I was a history major. I'm having trouble with these figures.

A Okay.

Q For example, you say -- I believe you said thirty percent of the male population would have the PGM factor plus one?

A Right.

Q And I think you said that was what, four percent?

A I said non-secreter -- excuse me. Non-secreter, 1+, for example, would be 8.3%. I found the piece of paper I was talking about, because this is what I was explaining to you over the phone. That is why I kept it. 8.3% of the general population being a non-secreter PGM 1+, that would be the percentage. And the percentage just expresses the gene frequencies that we are talking about here. And by gene

frequencies, we're talking about blood types. Therefore, forty-eight percent of 8.3 would give you the male population which would occur with these particular factors.

Q Forty-eight percent of --

A Would be what, 3.39, something like this. I calculated it out here.

Q So what you're doing, you're taking the general population and created a sub-category, called male -- I mean, the general population, non-secreter, plus one?

A Yeah.

Q And then broken that down further, non-secreter, plus one, male?

A That's correct. Simply because we are talking about something that is unique to the male. If you were talking about blood we couldn't do that, because it would have been taken into consideration the first go around.

Q So what you're talking about is, that this four percent of what it is --

A Right.

Q And this breaks down to this, honing in on here, that is general population for the State of West Virginia, general male population for that State of West Virginia?

A That's correct.

Q What is the number of male population in the State of West Virginia?

A Well, I would say forty-eight percent of one

million, nine hundred and seventy-four some thousand people. Say, two million people, so you're talking -- you can exclude ninety-six percent of that, and you can do it a variety of ways. But when you're talking one in four people in what, in a hundred.

Q About four people in a hundred?

A Right.

Q And you're saying the number of males in the State of West Virginia --

A Would be about a million males.

Q Be about a million males?

A Yeah.

Q So we want four percent of that, is that what you're saying?

A I'm saying you exclude ninety-six percent of the male population, which say, ninety-six percent -- we've got more women than we do men, so let's say it's nine hundred thousand, then you take nine hundred thousand, and ninety-six percent of that, and what you have left over would be what we're talking about.

Q I'm still not following you as far as I understand it. What I'm after is, a number, not a percentage point. A number.

A Well, the combination of those markers, of what we're referring to as a PGM 1+, non-secreter, is four percent and that is four people in a hundred.

Q Four people.

A So you've got forty people in a thousand, you can extrapolate it right on out.

Q So in other words, while we have what appears to be a rather low percentage point in terms of real numbers, that could be a rather large number; couldn't it?

A Certainly.

Q So as a result of your studies and things, and you tell me that you work from a standard of not inclusion, but non-exclusion; is that the idea?

A From how I work is simply the standpoint, on identification of information from evidence, it is to gain as much scientific evidence as possible to really not include someone but to try to exclude someone. And the harder you try to exclude an individual by gaining as much information as possible, if you don't exclude them, you are going to include them even more. In other words, if you don't get rid of them, you are going to bring them in even tighter. So that is the bottom line on that. We try to gain as much information to whichever, if it excludes somebody, that's a hundred percent exclusion. For example, if -- use Mr. Richardson, he is a B non-secreter, so we're not worried about the A, B, O typing. If Mr. Richardson was a 2- PGM, he would be excluded a hundred percent. If he was a 2- - 2+ he would be excluded a hundred percent. If he was any other PGM marker other than the ones I have put as possibilities under the vaginal swab, he would be

excluded in my opinion. The same for Mr. Gilfilen or anybody else that would fall under that category.

Q I believe there is an football story that says if you don't know which person has the ball you just grab them all and throw out to get the one with the ball; is that the idea?

A No. It's a little bit more complicated than that. I could have put down what I identified as the 2+ - 1+ non-secreter, but wouldn't be the true scientific fact. It would not include the possibilities that exist. And seeing how the possibilities exist greater for a 1+ individual than they do for a 2+ - 1+, or a 2+, according to the gene frequencies that those blood types exist in any given population, West Virginia coincides with the -- the six year study that I did here coincides with national and international population studies, and that was the purpose of it. But for years we had used out of state gene frequencies, and I accumulated data so that I could confirm that the gene frequencies we were using, and also have something in state because it had never been done before.

Q Excuse me, I'm sorry, but you're answering a question that I didn't ask.

A I'm explaining the frequencies.

Q I didn't ask you that either. What I want you to do for me, and let me see if I can put it in the simplest possible terms. That out of the male population, I think we're

talking about four in ten or something like that, out of the male population, non-secreter, PGM plus one, it could have been any one of that number that deposited the spermatozoa in the vagina of this victim?

A That's correct.

Q Okay, thank you. That's all I wanted. Now, I understand you did this study yourself, did you not?

A That's correct, the data was started years ago.

Q And you used the statistical method called random sampling?

A No, we're not getting into statistical methods, we're talking about biological methods, using the Hardy-Weinberg Equilibrium and Laws of Inheritance which deal back to the Mendelian Laws. It really doesn't have anything to do with statistics and the only reason that we project percentages is so that people can have a visual insight as to what the genetic displays are, not statistics.

Q So actually you didn't deal with probability curves?

A No.

Q Standard deviation from the norm?

A Standard deviations from the norm are incorporated in the Hardy-Weinberg Equilibrium.

Q Oh, I see.

A The statistics from the standpoint, like I said earlier, is just more or less an accumulation of numbers. If I

said we collected a thousand people and they were A, B, O type A, there are other things that are going to fall into laws, mathematical laws, not just statistics of random chance and ratios and proportions and whatever.

Q Obviously you are a scholar and I am not attacking that.

A No, I'm not.

Q What you're saying, then, is that your study was in terms of incorporating previous scholarly work with valid statistics -- is that what you're saying? I mean, in other words, they had already done all of this stuff about standard deviations and mean modes and all of that?

A In biological and genetics there are set laws that information have to fall within, or they are not valid. In statistics, like you said, it's like random chance, how many men in this population could have been the father. You use a lot of that in paternity cases, but in the type of studies and information in which we put in these reports --

Q And there is just one final question --

A Yes, sir.

Q -- that I want to clear up. When we're talking about a small percentage of the total population.

A Okay.

Q And this is male, non-secreter PGM 1 --

A Okay.

Q Now, the three people that you dealt with who

had that; one was Mr. Richardson; one was Mr. Gilfilen; and one was Mrs. Gilfilen?

A Well, she would not be included.

Q She would not be included in the sub-group male, non-secreter, PGM one?

A Right.

Q So actually it's possible then to have at least two non-secreters, PGM one, living within a hundred and fifty yards of each other?

A Yes, sir, it is possible.

Q And it's possible to have more than that number living within a mile radius of each other?

A It is possible.

MR. MILLER: I have nothing further.

MS. SELBY: We have nothing.

THE COURT: May this witness be excused?

MS. SELBY: Yes, thank you very much.

(WITNESS STANDS ASIDE)

THE COURT: Call your next witness.

MS. SELBY: We call Mr. Huey. Off the record.

(WHEREUPON, discussion was held off the record.)

(WHEREUPON, a short recess was taken.)

THE COURT: Call your next witness.

MS. SELBY: The State would call Mr. Huey.