SUPERIOR COURT OF THE DISTRICT OF COLUMBIA

CRIMINAL DIVISION

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UNITED STATES OF AMERICA :
vs. : Criminal Action Number

Clifton Crawford : F2103-05
Defendant, :

(EXCERPT- TESTIMONY ONLY)
- - - - - - - - - - - - - - - x VOL. 2
Washington, D. C.
June 29, 2006

The above-entitled action came on for Motion, before the Honorable Wendell Gardner, Associate Judge, in Courtroom Number 116, commencing at approximately 11:38 AM.

THIS TRANSCRIPT REPRESENTS THE PRODUCT OF AN OFFICIAL REPORTER, ENGAGED BY THE COURT, WHO HAS PERSONALLY CERTIFIED THAT IT REPRESENTS HER ORIGINAL NOTES AND RECORDS OF TESTIMONY AND PROCEEDINGS IN THE CASE AS RECORDED.

APPEARANCES:

On behalf of the Government:

JOHN SOROKA
Assistant United States Attorney

On behalf of the Defendant:
CHRISTOPHER MCKEE
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P R O C E E D I N G S

(EXCERPT- TESTIMONY ONLY)

THE COURT: Step up please, Doctor.

Whereupon,

CATHERINE THEISEN

having been called as a witness for and on behalf of the Government, and having been previously sworn by the Deputy Clerk, was examined and continued testimony as follows:

THE COURT: Good morning. Let me remind you that you are still under oath and Mr. McKee is going to examine you. I would ask the witness to state your name for the record.

CROSS EXAMINATION

BY MR. MCKEE:

Q Good morning, good afternoon detective -- I'm sorry -- Dr. Theisen. Would you please state and spell your name for the record?

A Yes. First name, Catherine, C A T H E R I N E, last name Theisen, T H E I S E N.

Q Dr. Theisen we left off with talking about how Mr. Crawford's known sample was the same profile as the four other individuals in the SWGDAM database.

A Correct.

Q **That** was exactly the same as the letter C in the 16311, correct?

A Yes.

Q And those four other profiles belonged to African-Americans?

A They did.

Q Do you know the geographic location from which each of those samples came before the database?

A Let me look at my notes to at least see what laboratory they came from?

Q Very well.

THE COURT: While she is looking at that can I ask a question. If something came from a laboratory and let's say the person was in Michigan, or from DC, or was on vacation, in Michigan, is the data that we receive from here where the person lives?

MR. MCKEE: I was going to explore that, Your Honor. I think we'll be able to answer that question.

BY MR. MCKEE:

Q Dr. Theisen, have you had an opportunity to review your notes?

A Yes, and the information here does not give us the information to answer your question.

And, to answer Your Honor's question, again we get those samples from different laboratories, and no we don't have information of where geographically they are from.

In Terri Melton's paper that we discussed yesterday the sample selected in numerous regions of the United States were consistent with one another, but again where they are collected doesn't necessarily ever mean originally where they are from.

Q And the position that I assume is that in your opinion an African-Americans for any part of any region in the United States would be the same for statistical purposes as the database anywhere else?

A Yes, that is upheld by a published study.

Q And, that is the Dr. Melton study?

A And, Bruce Bedowule and Mark Aller as well.

Q Now with respect to the four profiles though that match directly or consistently with Mr. Crawford's it is possible that all four of those came from the mid-Atlantic Washington D. C. area correct?

A Correct.

Q And, the database -- is it also possible that if the database had more profile than the 1148 without the 148 profile that it had of mid-Atlantic contributors isn't it possible that that could increase the opportunity --

MR. SOROKA: I think counsel may have misspoke when he said 1148 of such known are mid-Atlantic contributors. I don't think there is any evidence that it is 1100 mid-Atlantic contributors.

MR. MCKEE: Your Honor, I will rephrase it.

BY MR. MCKEE:

Q Dr. Theisen, my previous question was they could all be from the Mid Atlantic, correct?

A That is possible.

Q It is also possible that if there were four --

MR. SOROKA: I object. Which ones are from the mid-Atlantic region; all 1100 or are we talking about four for that hypothetical?

THE COURT: He said four.

MR. SOROKA: That's all.

BY MR. MCKEE:

Q Correct. Dr. Theisen we talked about the possibility that the four could have been that are in the database of the 1148, okay?

A Okay.

Q And, my question is that since we don't know the geographic location of the individuals that are in the database for the 1148 that if there were more mid-Atlantic contributors that that may increase the likelihood to see a match to Mr. Crawford?

A I don't see how that follows, I am sorry. Because the study that I submitted yesterday shows that African American sequences -- the distribution of types is consistent from their regions from around the United

States. It can't follow that we would expect the overall frequency of a particular type to change significantly.

What we also know is that as our database has increased over the years, the types that were common when the database was smaller coming from a variety of regions still remain relatively common as the database increased. Types that were rare, still remain rare. So I think all of these together tell us that it really doesn't matter where in the United States African-American samples are coming from. The estimate of the frequency not going to be changed significantly.

Q That is because you are relying on those studies that tell you there is no regional difference, correct?

A That is correct.

Q Now, however you would agree with me that history plays a role or played a factor in the mitochondrial DNA profile, correct?

A History of what.

Q Family history matters, correct?

A I guess I have to ask you to rephrase that. I'm not sure what you are asking.

Q We determined yesterday that mitochondrial DNA is tracked down through the maternal line, correct?

A Yes.

Q And, so the family history of who the mother is

is passed down to the children matters, correct?

A I testified that mitochondrial DNA types are shared among maternal relatives, yes.

Q And you would agree, or would you not that anthropological history matters with regard to people with mitochondrial DNA?

A Again, I don't know what you mean by matters.

Q It has an impact.

A On the individual's type.

Q That is correct?

A What has an impact on an individual's type is what his mother's type is.

Q And, potentially where that person is from, correct?

A A type is a type. Nothing affects that type. A person is born with that type. So, again, I'm not getting what you are saying about that it matters.

Q Dr. Theisen, where a person is from, their family history, their place of origin, matters with what genetic makeup they are correct?

A Again, I have trouble with the word matters, but I can say is that different types do occur in different frequencies in different racial and ethnic groups.

Q Thank you.

Now, moving to the SWGDAM database yesterday we

established that there are 5071 individuals from various population groups in the current SWGDAM database.

A Yes.

Q And, those groups are broken down into people in general terms of African descent, caucasian descent, Asian descent, Native American descent, and Hispanic descent, correct?

A I am right now looking at my notes which reflect that database search results and can you repeat those groups again please?

Q Yes; African descent, Caucasian descent, Native American descent, and Hispanic descent.

A Yes, that is correct.

Q There are also smaller subgroups within the SWGDAM database, correct?

A Yes, that is correct.

Q I believe there are 14 in all of them.

A Yes, I don't know them all off the top of my head, I could count them, but yes, each group has a subgroup.

Q So there is a subgroup for Japanese, and a subgroup for Pakistani. You mentioned some of those yesterday, correct?

A I don't believe there is a subgroup for Japanese or Pakistani. Japan is -- Japanese are a subgroup of

Asian.

Q So there is one for Japanese?

A Yes, but it is a subgroup. It does not have sub groups.

Q It is a subgroup?

A Yes.

Q And, Pakistan is a subgroup?

A Yes.

Q As you also testified to yesterday race does matter with regard to SWGDAM database, correct

A Again, I'm having trouble with the word matter. What I can say is the frequency with the different mitochondrial DNA types are different among the different racial and ethnic groups?

Q That is why you all break them out along racial categories?

A Yes.

Q I want to focus on African Americans for right now. Now, in this case besides the four times you saw in the African American population groups that was in the database a comparison to Mr. Crawford's there were also 13 more African-Americans with one base bearing difference to Mr. Crawfords profile, correct?

A Yes.

Q And you also reported out in that same report

that there were eight profiles from Sierra Leone, there were only two base pairs, correct?

A That was not in the report. That was as a result of the database search.

Q That is correct, I'm sorry. Not in the report, in the search results which show whether something is one or two base pair differences?

A Correct. Can you tell me what page that is on?

Q Right. That is on page 10 of 12 and 11 of 12 of the mitochondrial search results.

A Yes.

Q Thank you. So if I understand currently that database is made up of individuals from all-around the world, correct?

A From some we will say selected locations in the world.

Q And there are just seven labs total that samples were collected from, correct?

A Samples came to now for example the FBI lab obtained samples from numerous places within the country as well as elsewhere.

Q And four of those, several, four of the seven laboratories that received samples from unknown places are in the United States, correct?

A Yes, I wouldn't say unknown places. Those

records do exist, as far as which laboratories they came from.

Q And, right where the laboratory is, do you know where all of the samples came from, do you know whether it is a blood bank or maternity clinic or something like that?

A I don't.

Q And of the 5071 do you know the exact number of the samples from the U. S. citizens, people from the U.S.?

A No. I don't know -- I don't believe citizenship data is even collected. When say for example a blood bank sample is collected, that is not a question that we ask.

Q I mean broad, as in citizen they come geographically from the U. S.

A Well, for example, of the FBI laboratory samples include many of these from other countries so and those records do exist in the laboratory.

Q Yesterday you said that some samples come from Maryland, correct?

A I don't remember if I said that. I believe they do Adfil (ph.) in Maryland and I believe some samples come from people in Adfil.

Q That is where the laboratory is located, correct?

A Correct.

Q That doesn't necessarily mean that that's where the people are from?

A I believe at least a few are from Maryland.

Q Do you know how many?

A No.

Q I guess where is the documentation of the fact of where the people are from. You keep saying that it is available. Is that available to the public?

A No, it would take a discovery request I believe to get that information. Again, as I testified yesterday and today we do not know exactly where each sample came from. We know what laboratory submitted it to us, and if it is collected from a blood bank we will never have that information.

Q And, so yesterday when you testified that some come from Virginia, it is the same answer as some come from the FBI laboratory which is located in Virginia, but not necessarily the sample is from Virginia, is that correct?

A Correct.

Q I am going to ask you about a series of geographic locations where these profiles may come from. Now isn't it true that of the African American profiles in the database 454 come from unknown geographic locations, 322 from Texas, 185 --

THE COURT: First of all, that is a compound question. It may be some way or some other way you are going to ask all the different ones at the same time.

BY MR. MCKEE:

Q I will break it down and I'll ask it this way. Had ever heard that 454 of the samples are of unknown geographic locations?

A Not specifically. Could I see where you're getting those numbers from so I can better answer the question?

Q I am just asking you. Court's indulgence.

I am just asking you that. I don't think there are any published studies of any type.

A I can give my best estimate that those numbers are on the individual records for each individual sample in our database in the laboratory. That is the best I can answer.

Q Has anybody provided you with any of the geographic location information at the FBI in preparation for your testimony here?

A No.

Q Are you aware of whether that was requested or not?

A You and I spoke on the phone about the same questions you asked me about the geographic location. What

I told you then is what I testified to now, is that any information we have exists in the data sheets for the individual samples in that database and that would be available on request.

Q And, with regard to making assessments about the African American population, would I be correct in the samples that are collected from places outside of the United States would not bear much on the question of African Americans, being able to assess African Americans?

A That is correct, African-Americans would be in the same.

Q I wanted to ask some questions about heteroplasmy. You stated yesterday that you cannot exclude Mr. Crawford even though he was a C at the 16311 location and that the evidence sample has a C and a T, correct?

A Not quite. What I testified to is that I could not exclude a person, a known reference source who has a C position as being the source of an evidentiary hair whih had a T and a C at that position.

Q That was because according to you might be heteroplastic and a the test just did not detect a 16311, is that correct?

A What I saw was that the hair was heteroplastic. What we know and that the scientists, forensic scientists,

and not forensic scientists know from publications dating back nearly ten years is that a person can demonstrate in certain tissues only one base of a particular position CRT for example, can have hairs, that may show either the other base or a mixture of those two bases.

Q When you tested this gentleman's known sample, Mr. Crawford's known sample, he was homoplastic at that location?

A Homoplasmic.

Q Homoplasmic at that location, correct?

A Yes.

Q And, because of that sort of variance there is it true that there are two possibilities. Let me ask you the first one. One possibility is that Mr. Crawford of the known sample contributor's is heteroplastic or that he has two mitochondrial DNA types, a T and a C, at 16 311, and you didn't detect it in the test?

A I'm sorry, can you repeat that?

Q I'm sorry. One possibility is what you had previously explained is because of the various different parts of your body, different mitochondrial DNA it may be both a C and a T, but it depends on which sample you look at?

A Yes, that is one possibility.

Q The second possibility though is that he is

homoplasmic, and just a C, and you would never find a T in there?

A Yes, because I can't distinguish between the two possibilities. That is the reason why I cannot exclude him as being the source of that hair?

Q But, you could test Mr. Crawford and do a number of different tests on him to find out whether you ever find out whether he shows heteroplastic, correct.

A One can do that, but it still doesn't take away from the fact that his hair is heteroplastic and whether or not I could test thousands of samples perhaps C and T, or T or not. I could never exclude him as being the source of that hair.

Q When you take a random sample of his hair, and if you don't see it at all ever coming back heteroplastic in calculating a frequency of which he can include whether he is heteroplastic or --

A Absolutely not. The questioned hair has a C and a T. In other words some DNA strands have a C and some have a T. Because I know that he does have a C, no matter how many tests I do, I cannot exclude him as being the source of that hair.

Q And, so you're not even if you tested every hair on his head, if you didn't have a T that wouldn't satisfy you, is that correct?

A Absolutely not. Because he has a C I could never exclude him as the source of the hair which also has a C.

Q Now, when the FBI started using mitochondrial DNA for forensic purposes scientists thought that heteroplasmy was very uncommon, correct?

A We did. We and scientists who study mitochondrial DNA not in a forensic context.

Q And, both of those areas, both forensic scientists and a larger scientific community have found that it is more common, correct?

A Yes.

Q But at one time your protocols were more conservative in the tense of ruling out someone, if you found heteroplasmy?

A Yes, and that protocol was written before we discovered another, discovered that we can with improved technology see heteroplasmy.

Q So the change in the protocol to allow this now being unable to exclude is based on the assumption that because you see a D and a T in the hair, it possibly is a T?

A It is not an assumption. He has a C, the hair has a C as well as a T. Therefore I cannot exclude.

Q Okay. Did you understand that for the purposes

of the jury, as the judge was asking me yesterday there is a connection being made between this hair and this gentleman, correct?

A Correct.

Q The fact of the matter is this man here is a C, and the hair is a C and a T, and you assume that he might have a T somewhere, correct?

A It is possible through our studies, and many other studies we know that it is a possibility. Therefore, I cannot exclude him.

Q Now, you testified yesterday that you do see some variation in the frequency of certain mitochondrial DNA profiles between for example, African American database and Caucasian database, correct?

A Correct.

Q And, seeing that variation is what helps you maintain separate databases for the two, correct?

A Help us maintain, it is widely maintained and widely in force, all the different database search results. We don't make any assumptions as far as the race or ethnic group of the contributor, even if the sample is hair, and so we report the three major groups. The database searches out the three major groups.

Q And, you always report out the three major groups?

A We always report out the three major groups. If their database matches with any other reported group, those are reported out as well. The results of all the searches are kept in the notes of the case.

Q Is it your understanding that every sample is compared against every one of the categories and sub categories of the database?

A Yes, that is how the search is done.

Q And the database search that we have shows the results of all of those searches.

Q And, that means that it went through every single one of the 5,071?

A Yes.

Q And the reason you separate it out and give the three is because that helps you to say or communicate about how common or rare a profile is among the African American community, correct?

A No, not exactly. It gives an idea of how common or rare the type is in the general U. S. population and that general U. S. population made up to a larger extent of those two groups.

MR. MCKEE: Thank you. No further questions.

THE COURT: Redirect.

REDIRECT EXAMINATION

BY MR. SOROKA:

Q Dr. Theisen showing what has been marked as number 7, what is number 7 please?

A Number 7 is the FBI laboratory report referring to mitochondrial DNA results of the test done in our laboratory. Q And this report is prepared by these two samples?

A Yes, these two samples.

Q On page number three, we have been talking about all these markers, C and T and all, that is basically what the results are in each stage of the marker?

A Yes, there is a table here reflecting a series of letters and numbers which together as a whole represent the mitochondrial DNA type of the hair and the known marked sample.

Q And the heteroplastic, you talked about a C and a T on the questioned sample, how is that illustrated?

A That is illustrated in the column marked Q 7.1 at the bottom of the log that is noted HV-1 and is noted 16311, followed by the letter Y. The letter Y is a internationally accepted code which means that both a C and a T were observed.

Q Now, on this report it has a HV-1 and HV-2 classification.

A Yes, those are two different parts of the mitochondrial DNA, the type or sequence in our laboratory.

Q Why do you sequence both?

A Those two regions are very well characterized. We have a lot of information on both of those. The region would total about 600 different positions that we characterize. And, by characterizing as much as we can, that gives us the most power that we have today with the information known to exclude somebody as being a possible source of a sample.

Q Just so it is clear when you say exclude someone, we are talking about this particular quarter inch hair fragment in the sample from Mr. Crawford. You are not able to testify based on mitochondrial DNA that hair belongs to Mr. Crawford, right?

A Absolutely not.

Q And, basically the testimony is that you can exclude certain percentage, but not Mr. Crawford?

A Yes.

Q And, I think your testimony in this case was that you can exclude --what was the percentage there?

A Again, let me refer to the table so I get it right.

I will read it in the upper bound frequency estimate, and so what I would say is that I would not expect this type to appear in more than .39 percentage of Hispanic population; .17 percent of the Caucasian population, and

.69 percent of the African American population.

And, if we wanted to convert that I know Your Honor was concerned about this yesterday, the two numbers that may be a little easier to understand I would not expect this type to appear in approximately four out of 1000 Hispanics, two out of 1000 Caucasians, or seven out of a thousand African Americans.

Q So that means you have 1000 people in the room and you took their hair, your statistics would say 993 wouldn't--

A I would not expect more than 7 to match.

Q Dr. Theisen you talked about in reference to Mr. McKee's question geographic location does not make a difference, in what the scientists have seen in terms of mitochondrial DNA?

A It doesn't affect significantly our estimate of how rare a common type i, that is correct.

Q Is that generally accepted in the scientific community?

A Yes, it is.

MR. SOROKA: Thank you, doctor.

WITNESS: You are welcome.

MR. SOROKA: I have no further questions.

BY THE COURT:

Q I just want to ask you something, because you

said that -- I thought you said, and you can correct me if I am incorrect, that as far as them identifying hair that mitochondrial will say a person is excluded or not, right?

A That is correct.

Q And, as far as nuclear it doesn't talk in terms of exclusion. You talked in terms of I think something more definitive yes or no?

A It has a potential, yes and in many situations yes, you can definitely say that.

Q You testified, am I to understand that mitochondrial was a -- well in terms of identifying it -- I might be using my words, but I think this was your thought at any rate, that between the two types of comparisons or tests, that if you were trying to identify an individual that nuclear would be the better option?

A Yes, as long as we had a sample that we knew that would have input from the hair fragment, would not have enough nuclear DNA to do that kind of testing.

Q What I am talking about doing, and as I am asking these questions, you have got a whole job, whole head of hair to make the test. I am not talking about any shortages anywhere. I'm just talking about a comparison between the two. My understanding is that you said that mitochondrial was not as good as nuclear if you want to actually identify the individual.

A You cannot -- to go further -- you cannot use mitochondrial DNA to identify an individual.

Q Right. So the two tests, if I was trying to identify an individual, the preferable one would be the nuclear?

A Yes, by far. There is no question about that.

Q Okay. I just wanted to make sure that I was clear on you saying that. You seem to suggest that it was sort of a secondary or maybe corroborative tool than the nuclear, not that it is preferable to nuclear in trying to identify somebody, and show some additional information?

A Yes, we typically don't do both tests on a single sample. If the single sample has enough for nuclear we are definitely going to do that.

Q You don't do both.

A We don't do them. We don't do nuclear, if you don't have sufficient sample, that is the only situation we will use mitochondrial.

Q I see.

THE COURT: Can you two just step up here for a minute.

(BENCH CONFERENCE- REPORTED, NOT TRANSCRIBED)

Whereupon,

DR. BRUCE BUDOWLE

having been called as a witness for and on behalf of the Government, and having been first duly sworn by the Deputy Clerk, was examined and testified as follows:

THE COURT: Good afternoon, doctor. How are you today?

WITNESS: Pretty good, and you.

THE COURT: Please keep your voice up so everyone can hear your testimony.

DIRECT EXAMINATION

BY MR. SOROKA:

Q Sir, please state your name and spell your last name?

A Bruce Budowle B U D O W L E.

Q By whom are you employed?

A By the FBI.

Q What is your occupation?

A I am a senior scientist at the FBI Laboratory in Quantico, Virginia.

Q How long have you been employed by the FBI?

A 22 years.

Q At the FBI what kind of work have you done?

A I have done a lot of different things. Mainly it has been involved as in development of methods for

identification of body fluids or tissues that might be found in crime scenes, predominantly in genetic marker identification tools for everything from the methodology to the interpretation to the quality assurance and validation of work.

Q And, you said that you are a senior scientist, what is a senior scientist?

A I guess it means I was a junior scientist at some time or something. A senior scientist has sort of a free floating position to deal with all sorts of issues that may arise from basic science to challenges, to knowledge or to interpretation of results or whatever may arise.

Q And in particular in terms of your education what is your education?

A I have a doctorate in genetics from Virginia Tech which I received in 1979 and then I did a post doctoral fellowship at the University of Alabama in Birmingham for genetic risk factors in various diseases such as juvenile diabetes, melanoma, leukemia. And then I went on to the FBI from there.

Q Let me show you what has been marked as Government's -- for identification showing what has been marked as No. 8. What is No. 8, please?

A That is my résumé or curriculum vitae that

describes some of my education, some experiences and publications and presentations, and things I have done over the years.

MR. SOROKA: Your Honor, I move No. 8 at this time.

THE COURT: Any objection?

MR. MCKEE: No objection.

THE COURT: So ordered. Admitted without objection.

BY MR. SOROKA:

Q Dr. Budowloe, let's specifically talk about publications. Have you published anything in the general field of DNA, forensic DNA?

A Yes.

Q How many articles have you published?

A Totaling in genetic marker identification, DNA, the total is over 400. Probably in forensic DNA probably about 350 or so of publications.

Q Are you on any editorial boards in terms of journals?

A Yes, several journals.

Q What are those?

A Forensic Science International, Legal Medicine, International Journal of Legal Medicine, Bio techniques, Forensic Science Communications to name a few.

Q On your résumé it says that you are the chairman of the DNA Commission on International Society of Forensic Homogenetics?

A Hemogenetics.

Q Hemogenetics.

A Yes.

Q And, what is that?

A It is an international society that brings people together to work in genetics, in genetic identification and either for medical, paternity or forensic purposes to discuss issues, policies, science in this particular area to come up with recommendations.

Q I see you are also on the DNA Advisory Board of DNA identification?

A I was on the DNA advisory board. It ceased to exist in the year 2000. In 1994 Congress passed the DNA Identification Act that was to develop standards. One of the purposes was to develop quality assurance standards for forensic DNA testing laboratories in the United States. And, a board was formed as part this requirement and I sat on this board to develop and actually had a major responsibility writing quality assurance standards for that board.

Q How many years have you worked on issues related to mitochondrial DNA?

A Probably for 15 years.

Q And, can you briefly describe your involvement with mitochondrial DNA?

A Again, it is everything from technology to the interpretation of the evidence to the population genetics to statistical interpretation and what have you.

Q Have you published in any peer review journals?

A Yes, sir.

Q Doctor, you talk about population studies, what do you mean by those kind of studies?

A Basically when one does population genetics kinds of studies which means looking at populations trying to get an understanding of the genetic variation that exists for various genetic markers of interest so one can extract that information to be able to predict or get some sort of inference of how common or rare a particular genetic profile may be with respect to populations.

MR. SOROKA: Your Honor --

BY MR. SOROKA:

Q Doctor, have you testified before on the subject of mitochondrial DNA as an expert?

A Yes, many times.

Q Do you know how many?

A I have lost count.

Q And, in what type of courts?

A State, federal, international.

MR. SOROKA: Your Honor, at this time I offer Dr. Budowle as an expert in the field of mitochondrial DNA.

THE COURT: Any objections?

MR. MCKEE: No objection.

THE COURT: So ordered.

BY MR. SOROKA:

Q Dr. Budowle, would you briefly describe the validation process that the FBI went through in mitochondrial DNA analysis and interpretation?

A It involves several steps. One, of course, is to find out what are the technologies and the state of the art at the time that one actually goes out and begins this work. Find out who is doing what, how they are doing it. Then what we have to do is refine that technology, and make it robust. So there is a lot of variation in the methodology, the chemicals, the steps involved to make it work so that it will work time and time again as a technique. We don't want to implement something that fails half the time or three-quarters of the time.

We want it to work and get sufficient DNA to obtain results.

The other parts of it are then working on the removal of the DNA from the kinds of materials that one might encounter, particularly in mitochondrial DNA, it is

important to extract it from the hair shaft, bones, teeth, and the kinds of materials that would apply and these being more limited in DNA quantity than blood or semen or saliva may have. In addition to that then we have together within the proper protocol and we have to test out again so that people will carry out the protocol in a clear and concise independent detail.

After that, one obtains a result and that result needs to be compared with reference samples to come up with interpretations of what is proper to include it as potentially coming from the same source, or whether there is a situation where there is insufficient information to render interpretation which we generally call inconclusive. In the areas of inconclusive or exclusion that would be the end of the analysis.

Onward from that though, there is a failure to exclude that some may call match or some other term, all meaning that one cannot exclude from the same source, then it is incumbent upon us to provide some inference of how common, or rare the profile is that would be generating data from populations so that we can get that information to do that kind of work. And, in all that there is quality performance steps showing that people are proficient and so on and so forth. So there are a lot of different steps to come to where are today.

Q And of all those steps, the validation of all those steps results have all been written and published?

A Yes, they have been published in peer review journals and in other publications.

Q And, is there any criciticsm of those studies?

A Those studies, there is has nothing been published on those, and when you come to the courtroom obviously you will find some criticism in the scientific literature that has been held up for almost a decade now as not being criticized.

Q How about the interpretation of the results, the population studies, how is it that you relate your results from the scientific testing to the significance of the population?

A Basically by collecting samples of individuals who declared themselves of a particular population affinity and then characterized by the population category, and then asking the question how often does one see this particular profile in this collection of individuals. And, then of course there are some correction factors to ensure that you're being conservative and not overstating the evidence.

Q When you say conservative, what do you mean by conservative?

A If one were to just place out a value without

putting in proper limits on that value, one may overstate and suggest that it is more rare than it is. If one didn't create the right kinds of data sets, and use them in not the right fashion, and without an understanding of them, and didn't have sufficient samples on them with proper bounds on that, one could possibly say that it was more rare than could be in the population. They want to be sure with confidence that the profile estimate we give is one that would be generally conservative, and not overstate the significance of that result.

Q So, in other words saying that it gives the benefit of doubt on the area of not being rare?

A Basically it is almost always rare, just by the nature of the margin we are using and the population of interest has been just that. And, you don't want to make it -- if it were one in a thousand, assume you don't want to say one in every 10 of individuals would be of a particular type.

Q What is the SWGDAM database?

A It is a collection of mitochondrial profiles from various population categories.

Q Now, are these profiles taken randomly?

A No, no one can take samples randomly. Randomly would mean I would have to go out and randomly knock on every third door of the neighborhood, and say I am the

FBI, and I am here to take blood from you, and obviously that can never happen. It has to be done more in what is known as a convenient fashion in that samples are collected from paternity tests or blood banks or whatever from various regions in the country and then evaluate to see if they are or not.

Q Is there some benefit of taking the fairly convenient samples and say targeting certain areas of the population?

A One can argue per se on that, and you can look at the data to answer those kind of questions. There would be certain situations that would be important moreso to target such as native Americans, and certainly having a population of Navajo Indians and looking at their data would not be the same as looking at data for say Algonquins say in New York. You would want to be able to first of have them know all based on what we know about the history of the populations. On the other hand in more cosmopolitan and larger populations where we have larger diversity, diversity being more variation of types population it is less of an issue, but still you want to get some that have competence to see if your inferences are correct based on what we know about the population histories.

Q In terms of what you were just talking about in

terms of Native Americans, is it some scientific data that shows there is a difference between Algonquins and Apaches?

A Yes. Remember science isn't something that just pops up out of nowhere. It is more like built on foundation that is like a pyramid. It is a solid base, linear base, adding on to the base, and when you get up to this point at the end so you have these mini stones down here, we are working up to the point. So, basically we are using lots of knowledge of population genetics and history of the populations. And also on the way it is being applied for the inferences being used. If I were using it for another application I certainly wouldn't be doing it exactly the way I would be doing it in forensics.

Q What would be the difference?

A Well, there is discussions about population geneticists that are interested in the history. For example, you know we all have genetic fossils enough to tell us something about our past. I listened to some discussion and read transcripts on those kinds of issues in this jurisdiction before. For instance, someone might be interested in the history of an African-American from where they may have arose from originally their ancestry from sub-Saharan Africa. And, if I were doing that I would need a different kind of database to use, I mean

different inferences than if were were doing forensics.

So, although we are both interested in population genetics we are more like two ships passing in the night, where the person who is interested in the ancestry of individuals needs to think about the rare types so that they don't misidentify an individual's origin.

Whereas a person who is in forensics, actually tends to minimize the impact of rare types to do away with them in a sense, if you want give a more conservative number for the benefit of statistics. So there are two different applications, so they don't have to have the same meaning in the way they are being used.

Q So someone who is interested in ancestry one, would use the mitochondrial DNA and pin it down to a specific person, specific area, as specific as possible?

A They are more interested in the specificity and origin of things where forensic scientists are more into generalization for inferences, and not into specificity of individuals for mitochondrial purposes.

Q And, when you say not in the area of specificity does that create, generate doubt as to whether you are making a wrong call on something?

A No, but I think it creates confusion in the understanding of the application. When we are dealing

with anything you have to understand how it is being applied. Sort of using an analogy every once in awhile about like maybe more pertinent in these days, and we are sensitive to it is the miles per gallon on an engine. There are two engines, engine a and engine b. The government runs tests on them to say engine a gets 30 miles a gallon, and engine b gets 25 miles a gallon. That makes engine a a more desireable engine today because you get more miles to the gallon.

If you put engine a into a ten pound car, and you put engine b into a one ton car, the total car now engine a -- engine car gets less mileage because of the larger car. Where the b now with the smaller engine car gets more mileage.

You can't just take the fact that you have engines or just populations and use them, you have to put them into context of how it is being applied, and interpreted, the same way you do a car.

Q Now, in terms of for purposes of mitochondrial DNA, let's take for example the caucasian population, is the forensic DNA and mitochondrial DNA, is the area where someone lives important?

A Well, it is not where someone lives that it is important. For forensic purposes, it is the population make up for the genetic diversity where the crime has

occurred is the important issue.

Q Now, in terms of differences between people with mitochondrial DNA among people within a group, is there a -- how far back would you go, for instance, to determine whether somebody's mitochondrial DNA came from a certain area in terms of forensic mitochondrial DNA?

A Do you mean by how many generations?

Q Yes.

Q Generations, yes.

A That is another example of the differences between anthropology and forensics. Forensics is not interested in how far back you go, because it doesn't allow you to make inferences about the population over the time. It is more temporable than modern.

In other words, we need to know what the variation is today, not what the variation was a long time ago. So, it is the populations as they may exist now, and what that may be.

Q Now, when you say the area in which the crimes were committed, how small or large an area are you talking about?

A Now you get to the well of the situation. Ideally if you take it to the nth degree, let's face it, we are all ethnically distinct, and no population database represents either one of us absolutely because each one of

us has our own variation of data that has been collected by our own histories from going whatever back.

However, we can make -- again, what we are trying to do is get the idea with a population area is something common or rare given the fact that we have this combination of individuals. We can never tell what the exact genetic makeup is where a crime is committed because there is lots of things that are going to change that from situation to situation. It could be the apartment building, it could be floor of the apartment building, it could be a city block, it could be a County. These are all the things that are very difficult to define in any one case.

However, we can take population estimates and this is why probably general population estimates are good because they give you an idea of what the variations would be as a sort of guide or a bound. It could be over here for African-Americans, over here for European Caucasians, over here for Hispanics, and the value of interest is probably somewhere within that value. And that would be the best way of doing that because there's an uncertainty in every single case in a DNA marker or application.

Q In terms of the application the FBI makes what is the -- we are talking about the cite of the crime, what is the cite of the crime?

A That could also be an issue, too. You can have -- I don't know enough about the details involved in this case, but you can have something that starts in Virginia, and move into and went across Washington and went somewhere else, you can have a person who was kidnapped in Vermont, put in a truck and taken through New York and dropped off in New Jersey, so the crime scene can be in multiple areas if you think about it. The individual kidnapped could have been a resident of Ohio. The person who was kidnapped could have been a resident of Maine. So, when you get to these types of things you have to take them into consideration, that the crime scene may not always be in one place. It could be.

A murder in the basement of the house is another potential when you say the crime occurred here. Crime could have been somewhere else, and someone could have dumped it in the house. These are all sorts of things we have to think about when you are trying to make inferences and the difficulties in saying defining the population as it is on the city block. Let alone the fact that the kind of information often doesn't exist, one can't just use the census study that is done for a state or a city, to determine what may have happened in a specific locality.

Q In terms of the SWGDAM database and the results

of the FBI, what is the significance of the database being approximately 5000 samples?

A There's no significance to that. That is what it is in its real phase. At a future point it will be 8,000, 9,000 10,000 samples and keep growing as long as they have resources to contribute to it.

Q Based on your experience would you expect to see a great difference in terms of the exclusion rates or rarity of certain DNA types.

A The exclusion rates are not going to change. The rarity will change slightly because the vast majority of these types in particular populations are rare. They don't occur often. Look at African-Americans, one or two percent I believe is one data base you look at. In Europeans it is more more around the most common sites around the four to six percent range. Those are not going to change. What we are going to do is get better estimates on the rare types, and in fact the vast majority of the ones we hae today that have not been seen or only seen once are going to become more rare with larger sets. We don't know which ones exactly they are at this point until we do that study, but by standard statistics they almost all have to become more rare. However, since we don't know that you have to build in conservative values from the start regardless of what they

could be in the future. When databases get larger, you get finer resolution of those rare types. The most common ones aren't really going to change.

Q In terms of the expression -- court's indulgence --confidence rate, what would that term mean, what is the confidence rate?

A Well, there is no such term as a confidence rate. I think you mean confidence interval. Because of this issue, and we talk about rare types, and something being-- some types being two percent, or being the common ones, and ones being in your data set as zero, we don't know for sure what the real values on those are. We might under sample them by developing a population and we might over sample them from the population. We are not concerned if you over sample them because that would give you a conservative estimate of the true value in the population.

Where if we conservatively under sample them and instead of being zero, it is actually two of the thousand people in the population or one and it should be three or something. So we can use standard statistical practices that have been around for hundreds of years to correct for the potential sampling given the size of their data set. And, what level of confidence we have, how large that value could be and if missed it, or not sampled it well

enough for this particular group. So, if I have 1,000 individuals and I didn't see it is possible that it is one in a thousand, two in a thousand or whatever, so I can give you a certain high degree level of confidence of what could be the highest value I would have to see given that sampling.

And, put that value in place as opposed to just what I can observe. You build-in a little bit of a cushion for the problems of sampling error that does occur in any genetic marker system.

Q So that would be the situation where you see on these reports that come from the lab that say zero occurrences among the caucasian population of this particular Genotype, you wouldn't say that the percentage of the sampling could be zero?

A What you say is I have not observed in my data set, but because of the potential not sampling it, because that is just the nature of any kind of sampling studies, I wanted to view a value that I can give you that I can have confidence that the frequency in this data representing a population would be greater than this. It doesn't mean that is the true value, just means that it is something from that point downward.

Q Now in terms of the works of -- have you heard of the works of Dr. Ricky Kittles?

A Yes.

Q Did you in fact before your testifying read his testimony from a previous hearing?

A Actually, I was involved in the previous hearing myself, and testified I guess I was fortunate or unfortunate how you look at it -- I had the opportunity to testify beforehand, so I am familiar with his testimony and his affidavit and some of his work.

Q That was in the case of United States v. Ida Chase

A Yes.

Q Now, Dr. Kittles expresses an opinion about certain elements of the database and the African-American population and you are familiar with his opinions and his writings on that, aren't you?

A Yes.

Q How would you characterize those writings in terms of their use in forensic mitochondrial DNA?

A Again, I think this is what I was talking about before in the two ships passing in the night. I think he is applying his experiences for identifying the ancestry of individuals as the proper approach for identifying the rarity of the profile in a forensic case. So, while it may be meaningful to pursue that, and we can argue about his numbers, I think he has underestimated his numbers

for that purpose. But it is irrelevant to us.

For that purpose, I think it is one thing. What he is doing is trying to apply his experience that is inappropriate for forensic use. So, while appropriate in trying to define ancestry of African-Americans, no problem. It is just that I think it is misapplied in this area.

Q Dr. Budowle, the data we have talked about, the database that talks about the whole body of data that we have talked about the forensic mitochondrial DNA, is there general acceptance in the scientific community of first off the procedures used in determining whether what the mitochondrial DNA sample is?

A These procedures and modifications and similarities thereof are being used by laboratories all over the world, throughout all of Europe, in Asia, in Africa and East Asia Australia, and the United States, South America, Canada for mitochondrial typing in forensic applications.

Q In terms of the population element in relation between the actual results and the general population of the SWGDAM database is the use of the SWGDAm database scientific and widely accepted in the scientific arena?

A Yes. The same thing again. These laboratories that are using them for mitochondrial DNA as a forensic

tool is using them in the exact same way throughout the world.

Q When you say throughout the world, the databases are being used by -- in other countries?

A That or similar databases. If I am in Spain, the Spanish will develop databases to reflect their geographical or geopolitical definitions. If I am in China Chinese are doing it. In Australia, Australians ae doing it for their population. New Zealanders will do it for their population and so on.

MR. SOROKA: Thank you, doctor, I have no further questions.

THE COURT: It is about 10 after one so what were you talking about before?

MR. MCKEE: I had asked Dr. Kittles about his schedule, but we will return after lunch for that.

THE COURT: So, we will have lunch and come back at 2:20.

(RECESS FOR LUNCH)

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A F T E R N O O N S E S S I O N

DEPUTY CLERK: Resuming on Your Honor's calendar, United States vs. Clifton Crawford, Felony number 2103-05.

MR. MCKEE: Christopher McKee on behalf of Mr. Crawford who is coming forward.

MS. DHARIA: Premal Dharia, also on behalf of Mr. Crawford.

MR. SOROKA: John Soroka on behalf of the United States.

THE COURT: Good afternoon, doctor. Please keep your voice up and directed to the microphone.

CROSS EXAMINATION

BY MR. MCKEE:

Q Good afternoon, Dr. Dubowle.

A Good afternoon.

Q Dr. Dubowle, you testified on direct examination that you are a senior scientist at the FBI Laboratory, is that correct?

A Yes.

Q As the senior scientist you are the lead person at the FBI regarding essentially all types of DNA testing, is that correct?

A I don't know if I look at it that way. I'm sort of like the garbage man of the lab actually sort of to do what anyone else may not want to do or may not be able to

do. I certainly have knowledge in the area of DNA.

Q Right. You are sort of an authority then on this collective knowledge of a lot of things. You are an authority when it comes to DNA in a broad amount of areas, correct?

A More than most, yes.

Q And, you have written and consulted and testified about nuclear DNA?

A Yes.

Q And you have consulted, written and testified about YSTR DNA, correct?

A Yes.

Q And the same is true of SNPS analysis, SNPS? That is single nuclear a tie - ism, (ph.)correct?

A Yes.

Q And the same is true for mitochondrial DNA, correct?

A Yes.

Q Since you are familiar with a variety of different types of DNA, you understand that the study of one type of DNA is often related to the study of other types of DNA, correct?

A It all depends. There is some similarities and there are some differences that are peculiar to the markers, that you have to take into consideration.

Q But, it is all about genetic makeup, correct?

A I don't know what it is.

Q All of I guess the DNA as a broad category is about genetic markers, correct?

A It is about genetic markers and technologies and applications and practices. It is more than just a genetic marker. You have to take the whole package.

Q And, would you agree with me that a good researcher and scientist in the field would look at different -- would have knowledge of the different types DNA?

A For what purpose?

Q Well, if they were wanting to be familiar with say one of the areas like mitochondrial DNA that it is good that they have some research and knowledge of other types of DNA like nuclear DNA.

A Well, again it is good for what. If I want to know how to type mitochondrial DNA, I don't necessarily have to have experience on SNPS technology per se if I am doing sequencing on mitochondrial DNA. If I want to do SNPS typing, of mitochondrial DNA, whatever -- I don't even know if you know what SNPS are -- if I want to do SNPS typing the technology would be the same, but the interpretation would be different. So, again, it is good for what purpose and you have to define what that "good

for" is.

Q Essentially I am trying to get at --to be knowledgeable about a lot of different kinds of DNA is perhaps a good thing for a researcher who is even focusing on applying one area of DNA like mitochondrial DNA.

A Maybe a better way to answer is to always have more knowledge is better than to have less knowledge.

Q And, so with regard to DNA, DNA is always sort of broken down into the most sort of common definition, or basic definition, is that DNA are really sort of the building blocks of who we are, correct?

A DNA is really sort of like a template for us to start building who we are?

Q And, therefore our DNA sequences or DNA codes, they sort of define who we are, correct?

A Only to a degree. Again, I look at it more like they create the clean slate. Where they create if you are building a house, they might put the frame in place, but that doesn't mean that the house is going to be all painted blue or it is going to be a two-story house, or it is going to be a three story house. There are other factors involved when you are building a house so it gives you the general kind of frame and then you work from there.

Q And the sort of development or discovery of DNA

has been would you agree an incredible breakthrough in science for telling us and providing us with a lot of information about that template or slate?

A And continues to be so, yes.

Q And, would you agree that the sequencing of DNA has expanded the knowledge particularly for medical doctors in how they can determine by looking at the genetic markers who may or may not be susceptible to disease?

A That is one way to improve it,yes.

Q You testified on direct I believe that when you started out in the field, and that is when you are at University of Alabama at Birmingham you are looking at studies with DNA that related to leukemia, correct?

A Actually it was genetic markers. At the time DNA was not really the most viable technology, so we were sort of once removed looking at protein markers, anything from like HDA (ph.) histocompatibility (ph), markers those when you had transplantation like a kidney or liver why some people would reject or accept these kind of markers or other kinds of protein markers that are related to the genes to be able to infer something about the risk of individuals who have specific diseases.

Q Okay. And today it is incredibly useful to look at DNA for medical illness?

A Absolutely.

Q Also one of the most significant things about that DNA or genetic building blocks is that it shows to have much variation and difference, is that correct, from sequence to sequence?

A Again that all depends, at what level are we talking about in the application. A good portion, almost all of our DNA is exactly the same. That is what makes us humans. So in that sense there is not a lot of variation. There is only a very small percent that actually varies from one human to the next.

Q Let me take this to mitochondrial DNA. There is variation and difference in mitochondrial DNA, correct?

A From individual to individual. Our general theme is variation. Some individuals may have exactly the same, but it depends again on the scenario.

Q Now, are you a genetic anthropologist?

A I wouldn't call myself that. I dabble in some of that, but that is not where I spend my time.

Q Are you an expert in African-American culture and sociology?

A No.

Q And currently you -- and I think you were offered as a forensic scientist, is that correct?

A Actually, I think he offered me strangely as an

expert in mitochondrial DNA, but I don't know what that means.

Q But you are a forensic scientist, correct?

A Actually, I am a geneticist, who happens to be working in forensic science. I have experience in population genetics, statistics, collective biology, forensic science, and so forth, but it is a wide area of things.

Q And, you testified that you are at the FBI and you have been at the FBI for 23 years, correct?

A Yes, 23 long years.

Q It is fair to say you are both professionally and personally invested in the discipline of forensic DNA, correct?

A I guess I don't know what personally invested means. I think I am invested in the retirement system more than anything else, but I am not sure what you mean by vested personally.

Q You worked in the area of forensic DNA for those 23 years, is that correct?

A Probably a couple of years it was not DNA, but 20 years or so, yes?

Q So both the study of this, the writing of this, the testifying has been something you have professionally been doing and has also consumed a lot of your time,

correct?

A Yes.

Q Now, with respect to the SWGDAM database, you were one of the individuals involved in the creation of the database, correct?

A Partially. It wasn't my main responsibility. It is actually other individuals, but I have had some input and review of it from to time.

Q You are in fact a former chair of the SWGDAM Technical working group, correct?

A Right, but SWGDAM didn't actually create the database. The FBI created the database and SWGDAM adopted it at a certain point in time.

Q SWGDAM is actually related to a lot of the work of the FBI, correct?

A I'm not sure what you mean.

Q Some of the people who you work with regard to SWGDAM are people from the FBI, correct?

A That is correct?

Q And, you have testified in how many admissibility hearings, on mitochondrial DNA, just mitochondrial?

A I stopped counting so long ago because after a couple hundred testimonies in general one blurred into the other so I couldn't begin to tell you, but a good number

of them.

Q That is in general numbers, and how many just in rough estimates on mitochondrial DNA?

A I couldn't even tell you. But it is a good number. Q Mitochondrial DNA has not been used for forensic purposes as long as say nuclear DNA, correct?

A I would have to answer yes and no for that. For the FBI and some other forensic labs, no, but actually for a lot of the issues of the identification of missing persons from like for instance, Argentina and the missing generation where a generation went missing and children of them were given to other individuals trying to repatriate back the living children to maybe their grandparents, remains from or remains have been used in mitochondria early on in the process so there may be some overlap there, and that kind of thing.

Q How long for the FBI?

A The FBI did some research in the early '90s and implemented in 1996, so it has been about ten years in operation.

Q Since 1996, is it fair to say that you have gone around the country whenever called upon to defend the FBI and the law-enforcement communities use of mitochondrial DNA for law-enforcement purposes or forensic purposes, correct?

A Well, that is not really correct. We are never called upon, I would never be here ever, so it is not the only case. It is in select cases when there is an issue that may be there. It is not there to defend the FBI or whatever it is to provide information on whether or not the methods are reliable or not, they could not be responsible.

Q But one of your primary focuses of your professional life right now is to testify at admissibility hearings to defend the use of mitochondrial DNA, correct?

A No, it is not my primary focus at all. I actually rarely testify. I think in the last couple of years I may have testified three times. It is really not my primary focus, but every once in awhile there's an issue that arises and when it does, it is appropriate and it is something to consider.

Q Then in addition to testifying you publish articles through your work at the FBI, correct?

A Yes.

Q And, those articles that are published all have been cited at admissibility hearings as part of your defense for the use of mitochondrial DNA for forensic purposes?

A Some of them are, yes.

Q Isn't it true that these articles are also cited

by materials like the Department of Justice manuals in support of law-enforcement positions to use mitochondrial DNA for forensic purposes?

A I don't know that they are, and I have not seen those publications, but it is possible.

Q Now, if I understand correctly, your position is that there is a tangible use of DNA technology, and knowledge for forensic purposes, correct?

A Yes.

Q And the forensic question -- you got into this a little bit on direct -- the forensic question is who may have contributed the crime scene DNA that is observed perhaps in any criminal case, correct?

A Well maybe, maybe not. I think the forensic, the ultimate forensic question which is the ultimate question is guilt and innocence. So, we have to take a step backward. That is not what we do as scientists for DNA. Actually what you do as a forensic scientist is you run a test in an attempt to exclude an individual as being the source of the sample. And only when you fail to exclude do you get some remnants of that. DNA is a very powerful tool to attempt to exclude somebody. So, that is why it is used as a primary biological characterization tool.

Q But, it is also used as a tool to also make links to individuals to crime scene samples, correct?

A To give you an association of potential sources but, you have to be very careful. The first attempt is the attempt to exclude, and only when you fail do you try to convey what that means that two may share the same profile or portions of a profile. It may be a mixed sample or whatever.

Q And, sometimes like in nuclear DNA you may say it is a one-in quadrillion chance that somebody else could have been linked to that evidence sample, correct.

A Well, we would never say it that way. We might say that we don't expect to see that in one in every quadrillion individuals.

Q Is it fair to say that those are roughly the same things using different words?

A No, actually the statistics realm and implication and interpretation actually have quite different meanings. So, we are very careful of how we are conveying information. But, to the lay person it may sound the same, but this is a DNA for nuclear you had a cadre of markers that are currently used, it is very unlikely that two individuals except for identical twins would share the same profile.

Q So, it would be fair to say that when jurors, lay people hear this they make links?

MR. SOROKA: Objection, Your Honor, on what lay

people hear. This witness doesn't know what people hear.

MR. MCKEE: I will withdraw the question.

THE COURT: He withdrew the question.

BY MR. MCKEE:

Q Now, in the application of DNA for forensic use though the focus is on evidence, correct?

A Yes.

Q And, DNA can help answer the question of how common or rare a profile is in populations that have access to a crime scene, correct?

A DNA by itself, the particular genetic marker and the profile that is derived from the evidence can give us inferences about how common or rare we can say something about that particular evidence.

You see what I mean if I have a blood stain, and I type it and one in every five people can carry it, because of what I type in there and how common that is it tells me something. It may be logical there is other information there, that I can't extract, but could extract at another time or in the future may do more. I could derive more information. So it's just not DNA. It's a specific test and the particular results the genetic markers you import and the other conservative ornamentation variances that one puts into place, that one wants to be sure that they don't overstate it is part of

the process, too.

Q Well, when DNA is presented in a case and you and your colleagues have testified it is helping to shed light on how common or rare a profile may be in regard to an evidence sample, correct?

A In some situations and also sheds light on that it could not have come from a particular individual.

Q It does do something to help us understand about identity, correct?

A Yes.

Q And, if you were in Washington D. C. and you know that a crime is committed in Washington D. C. you want to know how common or rare any profile from that evidence is in the racial or ethnic populations in the D. C. area, correct?

A Well, we would like to know generally speaking because there is -- as I said on direct, there are a lot of issues generally speaking, how common or rare it might be in major population groups that define the area.

Q For D. C., major populations that define the area I believe in -- well, what are those in your mind?

A African-American, Caucasian, Hispanic would be the main ones. If it was in the middle of Chinatown you might have east Asians, or Chinese depending on the situation.

Q And, what is important for you to then know as you are analyzing this is what is the African American population then in the District of Columbia or who have access to that crime scene?

A Ideally, yes.

Q And -- strike that. As we think about these racial categories African American, Caucasian, Hispanic who may have access this is why racial break downs are important to the database, the SWGDAM database, is that correct?

A Actually, we call major population categories because when you get to some populations they are not really racial. By definition, if we use Hispanic is a geopolitical group for instance. And so, we have to talk about it as a major population categories. But based on large amount of data about populations particularly U.S. populations, and some I worked on myself, and others have, these are categories that makes sense from our knowledge of the ethno history to divide that in them as a first sweep to try to understand what is going on.

Q With the use of SWGDAM, they use a big -- you use a big term for Hispanic, is that correct? That is a geo political population?

A Yes.

Q You are not saying that all Hispanics are the

same, correct?

A No.

Q There are currently 5071 profiles in the SWGDAM database, correct?

A Correct.

Q And, this database has been at the level of 5071 since which year?

A It has been at that for I would say three or four years. I can't remember the exact year now, maybe a little longer.

Q So, there have not been any additions, deletions from the database, correct?

A I don't believe there have been. There have been some modifications, but there haven't been any -- maybe one or two sample kind of things, maybe some.

Q You are familiar with protocols for the mitochondrial DNA database, correct?

A In general. I don't remember off the top of my head specifically.

Q Were you ever involved as being chair of helping either promulgate the protocols or be a part of the protocols?

A I probably was involved in some aspects of them. I just don't remember the exact details today.

Q Is it fair to say that under the protocols that

the FBI for the mitochondrial DNA database part of the protocol, calls for the constant review of the database?

A Well, there is a need to review. It is not necessarily a constant review of the database because if you review it, and it hasn't changed and you obviously don't have to review it again. But there is a point of review in the database.

Q Isn't it true that within the protocols that databases are defined in dynamics, that is things that change?

A In some respects, yes, because you know you will add to them if you review them to find a hair, and you want to fix them. So over time they are dynamic in that sense.

Q Isn't it true that under the FBI protocols it calls for them to be regularly updated?

A I don't know what you mean by being regularly updated.

Q Well, under the protocols it calls for updates to the forensic database to occur approximately twice per year?

A Okay. Yes, if you are going to add more samples to the database, what we don't want to do is add them on a daily basis. So, for instance, if you have -- let's just round it off -- if you have 5,000 samples and I type 20

more samples we don't want to put into the database the 20 samples on Monday and then later we can put in more samples, and then later we can do five more samples. As you can see, that it would be really hard to keep recordings of the status of the database from when it was reviewed because if you change it too rapidly, it would sort of anchor in what we're doing.

So, if there is going to be a change of the database where more samples are going to be done it will be done on an every basis. However, if there are no additions there's nothing to do. So if I say I'm going to do it twice a year, if I have samples, I would do it on the six month mark, if I have more samples I will do it on the next six month mark. If I don't have any samples I won't do anything. That's what that means.

MR. MCKEE: Your Honor, may I approach the witness?

THE COURT: Yes.

MR. MCKEE: Your Honor, I marked what is marked Defense exhibit number 5.

BY MR. MCKEE:

Q Dr. Budowle, I would like you to look at Defense No. 5, and I would like you to look over it, and when you finish please just look up.

A (Witness complies)

Q And, do you recognize Defense exhibit number 5?

A Actually, I don't recognize the exact language, but it sounds familiar to me as things we may have done in the past and discussed, very consistent with what I just described.

Q Okay. So, it is consistent in the sense of--

THE COURT: Just a minute. What is it that you are talking about? Would you ask him to identify what that is? Is it a letter, an article? What is it?

BY MR. MCKEE:

Q Dr. Budowle, would you explained to the court what Defense exhibit 5 appears to be?

A I can't tell you for sure because it is just one page out of one from a document that says on there Mitochondrial DNA Protocol Manual Database Rev.4, issue date 7/99, page one of one, but it doesn't have a cover page or anything like that. So, I can only tell you what it says on there.

Q No. 13 is mitochondrial DNA database, right

A Yes.

Q This is how your protocols generally look as far as formatting they usually have a number and a title to what they are, correct?

A That would be correct.

Q And, so what we are looking at here appears to

be a page from the Mitochondrial DNA Protocol Manual which explains how the DNA database should be maintained, correct?

A It might be. Again, I don't remember off the top of my head and of course that is only one page out without all the others, so I would just like to kind of leave that as a caveat, so I am not sure.

Q Do you have the protocols here with you?

A I don't know. That is not inconsistent with what I understand they do.

Q Now, sir I want to talk to you about the Washington D. C. area. Now you are of the opinion that in Washington D. C. the racial makeup of the population is relevant to consider what kind of place of values on database category should apply, correct?

A That is not correct. I said the population area where the crime was committed is relevant in an ideal situation. And, my opinion is that it is impossible to reconstruct exactly where it is where the crime was committed. So, therefore, the populations the general population groups are at best approached to help define how common or rare something would be.

Q I would like to focus on the African-American population. Is it true that you believe that the SWGDAM database category for African Americans is totally

sufficient to tell everything that we need to to know about African-Americans around the United States?

A Well, Your Honor, I don't know what is totally sufficient to tell us what we need to know about anything. My opinion is that this database is appropriate and useful for determining how common or rare a profile may be. If we use the statistical approaches that we may use to assess how common or rare something may be.

Q But, it is your belief that the African American category, the 11 -- or 1,148 profiles in there are sufficiently representative of the African-American community?

A For forensic purposes for how common or rare it is, under the protocol we use it is sufficient for inferring how common or rare something is.

Q What are the articles that inform your opinion as to that belief?

A It is studies that we published ourselves and others in the mitochondrial DNA on African-Americans, and their applications of forensic interpretations using databases for determining how common or rare it is, which there are numerous ones per se.

Q How about the ones that haven't been published by you at the FBI community, are there any articles?

A Absolutely. That fits right into the whole

anthropological studies, population studies from others and African-Americans, all help on that basis for me to understand that this application why this is a reasonable database to rely upon.

Q Do you have the name of any articles, or any other authors?

A I didn't come prepared with that. All I can tell you is I would have to go back and go through a library search of most of the papers that I have in my file and give you that information. But you can't open up a journal without some population studying mitochondrial DNA. There's hundreds of them. It is not just one paper, and just the FBI papers. It is papers from the Afro Caribbeans in England which is sort of a similar makeup, there are studies from sub-Saharan Africa, studies on population admixture.

Q And, all those articles, all those various articles should inform how we understand African-American populations, correct?

A Absolutely, and that is what I use as a foundation of the way we apply it for our purpose, for our database in the basis being reasonable for those inferences.

Q You are aware though that there are some disagreement or some scientists disagree with the position

that you take that the database is representative?

A I have only seen that again in the courtroom scenario, not in the published literature scenario.

Q You have never read any articles about any difference with regard to the makeup of databases?

A For this forensic application when it is done, I don't believe so.

Q Dr. Budowle, do you know with regard to the African American category in the SWGDAM database where the profiles come from, the 1148?

A Some I don't know off the top of my head, but I mean we have some information on what laboratories that analyze them, and so they would have some knowledge of that. And, generally the laboratories that analyze them, and I say generally, it is not always true for that, where they reside is where the samples come from, but not always.

So, if it was Illinois State Police it is very likely they came from Illinois. But if it was a paternity testing lab that services the country then it is just a general set, it may come from anywhere.

Q Therefore, it is hard, there is no real geographic source of the profiles defined?

A In some there are, and some there are not. In fact that is one of the values of our database in a lot of

respects, because when you have something that comes from a geographic area and you ask the question forensically how common or rare is a particular profile in this data set, and then you have these ones that are ill defined and you come up with essentially the same values under this forensic application under the way we use it that actually supports the utility. Because if the theory was that there is this dramatic difference for forensic inferences that we would expect to see great differences between this one general undefined set, and this more defined set.

But, for forensic practices and the way we do the statistics we essentially come up with the same value, plus or minus a third degree of a percentage point. It really doesn't change.

Q If you just took your approach, which essentially I guess you are saying is your approach to this solves all of our concerns and all of our problems about perhaps regional differences. Why wouldn't that be true then to just use the Spanish database with all that protection of the application to figure out frequency?

A Actually, I am glad you brought that up, because that actually can occur. If you take the Spanish database which is a European Caucasian data set, and you compare that to the European U.S., and you do the forensic calculations on how common or rare it is, you come up with

essentially the same values. Even though Spanish database is not the same ethnic makeup as the U. S. Caucasian, because we also have Poles, Irish, German, French whatever it may be the number comes up very similar because it all has to do with the nature of the genetic marker system we have.

One thing you observe with mitochodria is, you look at a type. Let's say I type -- let's say a small data set just to get an idea of 200 individuals which is reasonable for inferences in forensics, and you will get a more conservative estimate. But, let's do it with 200. Almost all of them are rare.

Now, if I went to another data set, and arguably another 200 from another place that was genetically different almost all of them are rare. So no matter what I ask, if I ask for a profile, if almost all of them are rare and I search at least one database of one genetic constitution I'm going to say it is rare. If I search it against another database with a different constitution I am going to say it is rare.

So, even though there are these genetic differences it goes back to again what I was talking about earlier about the two ships passing in the night. You're asking different questions, so under the approach that we are doing, and the question you are asking, those genetic

variations that occur, that are at defined levels. There are population geneticists, anthropology, evolutionary geneticists, whatever, we are interested in those rare types to define things. But, in reality forensics were mollifying the rare types to define things. That is why the database approach of Spanish and others would work quite well for a U. S. database.

Q Dr. Dubowle, maybe I was confused. I thought on direct examination you said that that is why internationally they don't use the SWGDAM database because they have their own database because it relates to the population in their area?

A What I said was the general approaches that we use using a database of a general population of individuals to determine how common or rare something is. However, people in their areas do generate their own databases. If I am in Spain, of course I want to use a Spanish database. If I am in France, I would want to do that. However, as a European I compare that data amongst the populations to see if there is really some dramatic differences for forensic purposes, and those studies have been done.

I have been involved with studies of nuclear markers, and Y markers, and so forth to get the degree of the variation. And, when there is notable variation there

are standard genetic practices so they can statistically correct with them what exists now. So, if one wants to make that kind of inference and can show it, there are formulas to use to allow us to calculate and build that into the process.

Q Let me go back for a moment to the SWGDAM database, and to the fact that we do not know where all of the samples come from, okay. If you procedurally just made an adjustment to the database you could get geographic location for samples, correct?

A I don't know what you mean. If I don't know where they come from now there's something that I could do. If I knew where they originated from by laboratory donation I could give you that information and some of that is known.

Q Well, when you first started out creating the SWGDAM database, you asked about racial identity, correct; where people disclosed whether they were African American, Caucasian, Hispanic correct?

A Yes.

Q That question was put around the sample so that the samples would have been meaning with regard to racial category, is that correct?

A Yes.

MR. MCKEE: Your Honor, Court's indulgence for a

moment.

(BRIEF PAUSE)

Q Dr. Budowle, that same question about geographical location was not set within the parameter of that question asked, correct?

A I'm sorry, I am lost.

Q I am sorry. You did ask for the samples without racial category, correct. correct?

A Population affinity would be a term I think.

Q And, therefore a question about geographic location could be put forward to someone about where they come from, correct?

A One could do that. We took the approach of where it was generally obtained from connect.

Q That doesn't tell you anything about where it -- the actual sample come from?

A You see, that is the whole issue in the American population, but the migration in any one day people move around and back and forth and migrate through an area and travel and back, so it is not necessarily where a person comes from.

If I got a sample from Michigan, and a person was living there for a year, and says, oh I came from Florida, the fact he came from Florida, doesn't help me define what is going on in Michigan. Better to have what

that sample is collected in Michigan at that time frame, to define what is going on in Michigan.

When we get something that is collected from an area or region and also from non descript and compare them, that gives us a better understanding of a forensic issue of how common or rare something is.

In theory you can say -- I don't know where your heritage goes back to, but you can help me out here. Let's say you came from Croatia or something like that, the fact you came from Croatia adds no value to me today for the U. S. population for making differences.

Q How about if I tell you I was from Pakistan.

A You tell me where you belong, and that is where we will put you.

Q Okay. What if I told to though regionally where I came from. What if I told you I came from California what kind of the Hispanic subgroups -- you would have to agree that there's regional difference between the Hispanic population in the United States, is that correct?

A Well, there is and there isn't. Here is the problem with the Hispanic population. Generally speaking Southwestern Hispanics have more Caucasian and native American ad mixture. Southeastern Hispanics have more Caucasian and African ad mixture.

However, there is a lot of mobility in the

Hispanic population, and now let's say I want to talk about Hispanics in Washington D. C. Do you know where they came from? Did they all come from one, or come from the other.

Q What if I told you they were mostly from El Salvador.

MR. SOROKA: Objection, Your Honor.

MR. MCKEE: He put a question to me, Your Honor.

A I am asking rhetorically.

Q Sorry.

A Because I am not allowed to ask you questions.

Q Very well.

A Do we know where they came from, no we do not. Therefore again general estimates become more meaningful in those kind of situations. However, some of that can be derived -- we just published a paper on Southeast and Southwestern and if one has any questions or interest in one case one could use that data.

Q Didn't that paper actually come to some what of a conclusion that sort of this big huge umbrella to say all Hispanic is really too broad, because there are regional differences?

A We knew there were regional differences before we started. We know about the history of the populations before I even did one mitochondrial DNA profile.

Q How about in the African-American community regional difference?

A In what sense?

Q Are there regional differences? There are for Hispanics, are there for African Americans?

A There are genetic differences in different regions of the country for African Americans, absolutely. No one would discount that. That is not the issue for forensics. The question is if you have those differences and you calculated the rarity of a profile observed from evidence in the cases using any of the databases would you come to a different conclusion about how common or rare it is. That would not change with the differences that we observe today.

Q Do you have any published on the regional difference in the SWGDAM database with regard to African-Americans to support the position you just said?

A I haven't taken it that way. I have looked at that data, and asked those questions by going through the data, and others could, and you can break it into that, but I haven't done that specific thing because it hasn't been that much of an issue because it is so obvious to the forensic community.

Q Court's indulgence. You would agree with me though that other scientists outside of the forensic

community have studied whether there are regional differences in the African-American population?

A I would agree with that, yes.

Q And, in fact a central part of molecular anthropology is about studies about that kind of regional difference of population?

A Actually, probably more important is the epidemiology and risk prognosis and drug therapy and determining the cause of the diseases.

Q Epidemiology is about the cause disease, correct?

A Yes.

Q Court's indulgence. Because I'm going to ask about a couple of studies. Are you familiar with an article called Interpreting African Genetic Diversity authored by Dr. Ricky Kittles, and S O Y K E I T A, Keita?

A I think I have read it before, but without having it in front me, tell you what is going on there.

Q Are you familiar with the article the African Diaspora, Mitochondrial DNA and the Atlantic Slave Trade.

A Yes, I have read that before, but again without it in front of me I wouldn't be able to give you the details about it.

Q Again, that appeared in the American Journal of Human Genetics. There are several articles, Dr.Salas, S A

L A S, Dr. Richards, Dr. Lareu, L A R E U, Dr. Scuzari, S C O Z Z A R I, Dr. Coppa, C O P P A, and a couple others. Are you familiar with the people who contributed to this article?

A Very much so.

Q Are you familiar with the article that appeared in Nature Reviews Genetics entitled Genetic Analysis of African Populations and Human Evolutions and Complex Disease?

A Yes.

Q By Sara Tishkoff, T I S H K O F F, and Scott Williams?

A Yes.

Q Now are you familiar with the article from Genetic Epidemiology entitled Adjustments for Popular Structure and Admixed, that is A D M I X E D, populations?

A I don't know for sure yet. Give me -- let me see if I remember the authors to see if I remember.

Q The Department of Anthropology and it is Dr. P F A F F, Pfaff.

A I don't remember that one off the top of my head.

Q It is fair to say that there are a number of articles that are written about assessing the African American population, correct?

A Or do those kinds of population studies for evolutionary purposes and technological purposes. As, I recall those papers don't deal with the forensic question of dealing with the myriad of profile found at the crime scene and making inferences.

Q Dr. Dubowle, you keep saying that it is like inferring that anthropology is somehow frozen with just looking at the past, but anthropologists look at populations today and extrapolate about things in the past, correct?

A That is the only way anthropologists can do it if we don't have the population from the past today, that has nothing to do with that at all. It has to do with what anthropologists are doing is right for anthropology. There is no disagreement about the variation that exists. We all know this variation exists. We all accept this variation exists. We take that into consideration when we develop the ways that we make inferences so that it is accommodated in the process. And so the whole process is built on that knowledge base.

Everything you have asked about population variation is not new. We have known that for a long time. It is not new today, it wasn't new ten years ago, it wasn't new 50 years ago. It is part of asking the question about what you do in anthropology, and ask

questions, it is very meaningful. What you do in forensics and ask questions is very meaningful. You might ask them the say way and come to the conclusion. That is what we have to focus on for getting it right or wrong.

Q Dr. Budowle, if we are talking about the reality of regional difference, and we are talking about a database that is not representative of regional difference, don't you think that would be important?

A You have to realize that there's regional differences in things but from history whatever, there is a lot of good studies on the admixture of -- I have done studies on Caucasian and African admixture, Hispanic admixture and how it varies from north to South and the degrees of that. That is all known.

Q So, you have done that in terms of Caucasian, but not African American?

A No, I have actually published papers in that. I was involved in a great study on juvenile diabetes in Caucasian admixture in the African population more than 25 years ago, showing that there's different amount of Caucasian genes in African-Americans that contract juvenile diabetes compared to those who are healthy and don't contract that disease. We have known about those things for a long time.

I have done studies showing that the Caucasian

American genes and Africans with different genetic markers is less in the South than it is in the north. We know these things and that is part of my knowledge base in developing the approaches that we use so that we don't overstate that kind of variation.

Q Dr. Budowle, not everybody agrees with your opinion about how acceptable that is, correct?

A In the forensic community I don't think I agree with that, and I have yet to see a published paper that says that wouldn't be an appropriate approach. I have, as I said, in adversarial studies said the same things, but I don't know how that legitimizes something until it has actually gone out.

We've been doing this ourselves for ten years, the British, the military for 15 years and these are the approaches that have been used for that very purpose, but you have to deal with it the way -- how the data is extracted and used. Using a quite different manner we are trying to construct population variation for anthropology purposes.

Q Dr. Budowle, let me move on to confidence intervals. The bottom line means about a confidence intervals is about how confident you want to be correct, is that a fair statement?

A No.

Q Well, how would you explain it?

A That's a better way to ask it. As I said earlier, if we take a database and we ask the question how often do we see something in this data set, that is a factual statement. We have collected x number of samples and we say we see 0, 1, 2, 100 whatever that may be. That is not the true frequency in the population. We know that standard statistics, the nature of the genetic markers, and the size of the database so we want to do any correction for sampling error to say that we aren't overstating the significance of it based on observation alone. That is sort of the way to correct for how high could a particular profile be given this data set size, and we would have missed it in the collection of samples.

Q Is there anything different between '99 and '95?

A There is a difference between '99 and '95--,

Q Let me ask you this, are they both scientifically acceptable applications of the competence interval?

A Sure.

Q Dr. Budowle, your experience with the SWGDAM database, -- Dr. Budowle, let me ask you this question, would you agree with me that a sample must be representative to have statistical importance?

A Representative to what? Representative I mean--

Q Of what you are trying to calculate.
So, it has to be representative, under the theory of statistics, it must be random, it must be representative, correct?

A I think now you are misrepresenting things because a sample to be random is extreme. There is no random human population sample, they cannot be collected.

Q Sir, I was not asking you about human population. I was asking from a statistical standpoint?

A Not necessarily. Things don't have to be random for you to do statistics on them.

Q Would you agree though that a sample must be randomly selected. You just can't go to one blood bank in Berkeley, California, and use that as your total database and say that that is representative of all of America.

A Again it depends on what you are trying to apply it for. If I am interested in trying to deal with the ethnohistory for the migrations of populations of the U. S. the answer would be no.

Q How about for forensic purposes?

A But, for forensic purposes given the knowledge we have today, I would say that that would be reasonable.

Q You could go to just one blood bank in Oakland, California and that would be representative of the entire African-American population?

A That is not what I said. I said for forensic purposes to make inferences of how common or rare it is, that would be a reasonable database to use.

Q Would you agree with the proposition that there are no absolutes in biology?

A I would agree with that. There is one absolute.

Q And, that is there are no absolutes?

A There are no absolutes.

Q And, so you can't be sure that regional location within the African-American community does not affect frequency estimates in your database?

A One can never be absolute 100 percent sure of anything. However, you can have a high degree of competence based upon the sampling data conducted today, that that would be reasonable for the forensic application.

Q In 2004, you became aware of questions being raised about the representativeness of the SWGDAM database to the African-American community, correct?

A I am not sure --

Q This isn't the first time you've ever heard this about the question about how representative the database is for the African-American community, correct?

A In any setting?

Q In any setting.

A That is true.

Q And, you are aware that Dr. Kittles is one of the voices raising some complaints about the regional database representation in the African-American community?

A I am not quite sure because as I said, it was only in the forensic -- in the adversary setting where I have seen any of this raised by Dr. Kittles. I have yet to see him -- he has a large data set, I have yet to see him do those calculations, with the inferences that we are trying to extract with that data set, or make the data set available so that we could compare it to our data set and see if there would be differences.

Q Have you ever gone to Dr. Kittles and ask him if you could look at his database?

A I haven't asked him for it per se. What I am saying is I think we have a good enough sampling to do for our purpose, but if Dr. Kittles has had that concern it would really behoove him to make it available or show us the calculations on an equal marker basis with the same kinds of collection strategy to ensure that it is not all related individuals or whatever to be able to see if there really would be a difference. I would welcome it.

Q And, just so I can understand do you necessarily disagree with Dr. Kittles about the research and the research of others regarding this issue of regional

differences in the African-American community?

A No, I don't. As I said all along as part of my basis of developing methods that we use today.

Q It would be true sense there have never been any adjustments in the African-American database since the year 2004 that there hasn't been any kind of study, research or work done with regard to representation in the database. I know you believe it is perfectly fine.

A Fine for this application, if I want to use it for other applications it is fine. But, I know it hasn't but it is not because we don't want to add more, it is just a resource issue and time. That is the main thing.

Q But under the protocols that the FBI it permits for and actually suggests because it is dynamics and they should be making changes in updating, correct?

A As I explained to you just a few minutes ago that is correct, if there are samples to put in. And the purpose of that is not that you have to do it every six months, that if you're going to do it you need to do it on a well defined time interval because just as in a case like this, if I get a case here, and I come in on June 1st, and I testified to the database of 5,071 then on Tuesday I have five samples and that becomes 5,076 and then I come in a week later, and I have 10 samples and it becomes 5,086 that really isn't stable and that gets

confusion.

Q That is why it should be every six months?

A Let me finish. The every six months is a way of being archived and documented and if there are going to be samples added it should be done on that kind of interval. If there are no samples to add you just don't do it until it is time for the next interval.

Q You talked about some future goal that you have in mind that this database will go to some 10,000 some day. I think that is what said on direct, correct?

A I said it would grow, what the exact numbers I don't know, but yes I would like to see it grow.

MR. MCKEE: Thank you, no further questions.

THE COURT: Redirect.

MR. SOROKA: I don't have any redirect, Your Honor.

BY THE COURT:

Q Doctor, let me ask you a couple of questions. Doctor, have you ever seen an instance where -- let's take this case for example. Don't have to have everything exactly correct, but you have a nuclear DNA result and you have a mitochondrial DNA result, could it be that -- is it the same person who actually does both of them, or one person does the same test?

A Typically the labs are separated now because

when you become familiar with your particular method so you have one grouping doing nuclear, and one doing the body.

Q So the nuclear group, does the personnel does their thing, and then they get a result and a mitochondrial group does their thing and they get a result. Now, have you ever seen a case where the mitochondrial or vice versa the nuclear did not support one another.

In other words, one is saying well, as I understand it and you correct me if I am wrong, that is the person that sample came from that one person, and the other study says to exclude that one person, and the other study says we can't exclude this person.

Have you ever said, well one of them says, it is that person, and the other one says you know we can't exclude this person. Doctor, has that happened to you?

A Actually it is expected and it does happen. I guess to give a good example is this, if you have a nuclear DNA and we have the whole set of markers done, and just one in a quadrillion, and you haven't yet seen a mitochondrial type that has been in conflict with that, as far as excluding one or the other.

However, with the mitochondria we can't see that. And, the simplest one is I don't know if you have a

brother or anything but your brother and sister have the exact same mitochondrial type issue. So if I type the mitochondrial and there was a hair from, I cannot exclude you, your brother, your sister, your mother. But, with a nuclear DNA, I would unequivocally excuse you very quickly because one is not as resolving as the other or as powerful as the other.

Q So in effect in one sense depending on the variables in the data one could be used as a confirmatory or non confirmatory support of the other?

A For identity purposes depending on which was being used, yes, but it is not so much about a reliability of one versus the other.

We did some -- I did a paper where the mitochondrial DNA in hair because hair comparisons are done routinely in forensics. No one knows exact meaning of the value of a hair comparison per se, and probably in some of our hair we saw differences, and some others we may not because they don't understand as well the differences.

But when you look at the mitochondria, some hair results that we could not exclude, the mitochondrial excluded them because the mitochondria are better as a tool.

Now, if they took the mitochondria and the have

done the nuclear DNA there may be situations where they're not. Now, there are other situations where they are actually helpful. For example, when there are missing persons, and we find remains there was a case where a bone is 20 years old, ran mitochondrial DNA, which is the type in which you search against a missing person database of mitochondrial types, against living people and the mother of the bones, of the remains of the person missing was in the database, and made a mitochondrial match. That alone was not sufficient to be able to give absolute identity that this remains was the daughter of this woman.

So then STR's were done and only five of the total STR's that were typed gave results because it was old bones. So, that upped the number to a 90 something percent confidence level, but not enough to where we could opine identity. But that information alone said we have some belief. And then they went and got the dental records, and the dental records confirmed the source. So, you see how you could use information, and you can't say one is better than another. It is how it needs and so forensic cases are like that. We gather information, and what may seem meaningless at one with point adds value somewhere else.

Q A couple of other questions I want to ask you, too. You said it matched a sample in the database and you

said--

A Profiled a match in the database.

Q Now, when you say that it profiled a match from one that is in the database you are saying for example I got this this hair spun around and whatever they do with it, and got a result. And the same profile I have here is similar or the same profile I have in the database?

A Yes.

Q But, that doesn't mean that the profile that we have in the database is in any way related to the person that you got the hair from?

A That is correct. It is possible that they could be related, but there's no way you can tell one way or the other and more likely they're not. It is more by just what is the chance doing that in a particular population. No inference should be made from the database about the relationship of that person.

Q Now, one other thing that I didn't quite understand. If I have a lab and I am trying to get some result on a mitochondrial artifact, or a mitochondrial result that I got bone, teeth whatever it might be, and you got this database right for the FBI right, well if I am a lab, what I do I do, pay you to use your database because I have done my own database?

A It is freely available.

Q And, I could use your database?

A I personally put that data on the web over four years ago and somebody has access to it, to do several things One is to make it available for use. And, also if there are mistakes in the database by putting it out there people find it and we can improve on things. That is the whole process of getting better quality.

Q Right. So you are basically saying that this fellow here is talking about tools or something. He said well the data base is on the computer and you got a problem with it showing us how this leads erroneous information, just send it to us and we will look at and see if it could be corrected?

A What I'm saying is if he has got a database and he has got this claim that this is really a dramatic difference that is inconsistent with all of the work the forensic community has done for more than a decade, in the U. S. populations, calculate it in there, show us, and it is a lot easier to say then what it might be. That is what we have done with lots of data bases, subsets of the data that we have in ours and inherent in others. As long as you are doing it with the question of what it is, compared with what is in your forensic paradigm.

Q All right.

MR. MCKEE: Just a couple of questions.

REDIRECT (Cont.)

BY MR. MCKEE:

Q Judge Gardner, the first sets of questions that he asked you about were about how nuclear and mitochondrial may help you arrive at --

THE COURT: He's a doctor. You said Judge Gardner.

MR. MCKEE: I said Judge Gardner asked you the question. I am sorry.

BY MR. MCKEE:

Q Judge Gardner asked you the question with regard to what kind of information you could derive from nuclear and mitochondrial with regard to a sample, and whether the would be in conflict, something like that. Is that your understanding of what the question was?

A I don't think he asked conflict. He asked corroboration.

Q Corroboration, okay. And, when we are talking about, we're talking -- when you were giving your opinion, we are talking about one sample, correct?

A Absolutely. For example, we are just talking in general terms. In this case we have a blood staine the STR's are on, and we have a hair on which the mitochondrial might be on, on as an example. And, therefore I would never combine those two into one

statistical value or say anything in corroboration in that case because they are two different items.

Q Right, and there might not even be a blood stain, it might just be a swabbing?

A A stain, I don't know for sure. I am saying hypothetically if you had a blood stain and a hair, you could combine those two because they come from two different sources. But one is going to use that information to confirm or refute a total hypothesis. So you may be there or not.

Q So there are two very separate frequencies that are estimated out of those two samples because they were two different individual sets?

A And, that is what I would review in that particular scenario.

MR. MCKEE: Thank you, no further questions.

THE COURT: Thank you for your testimony.

You may step down

(WITNESS EXCUSED).

MR. SOROKA: No further testimony on this motion.

THE COURT: Do you have anything on your side?

MR. MCKEE: Yes, we do. Defense for the purpose of the motion call Dr. Ricky Kittles to the stand.

MR. SOROKA: Your Honor, I want to remind the court that I asked the court to adjourn at 4:15 today. I

don't want to interrupt testimony.

THE COURT: Were you saying that he said that he wants to adjourn at 4:15 today.

MR. MCKEE: I don't want to interrupt testimony. During the lunch break I did talk to Dr. Kittles. Dr. Kittles was planning being back in Ohio first thing in the morning. However, if we do not finish today, I guess he will have to remain here. I leave that up to the court what we do.

THE COURT: We will get through as much as we can go through. Go forward.

MR. MCKEE: Thank you, Your Honor.

Whereupon,

RICKY ANTONIUS KITTLES

having been called as a witness for and on behalf of the Defense, and having been first duly sworn by the Deputy Clerk, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. MCKEE:

Q Good afternoon, sir.

A Good afternoon.

Q Could you please state your name and spell your name for the benefit of the Court Reporter.

A My name is Ricky Antonius Kittles, R I C K Y, A N T O N I U S, K I T T L E S.

Q Is it Mr. Kittles, Dr. Kittles? What is it?

A Doctor; I'm a Ph.

Q Dr. Kittles, where are you currently employed?

A At the Ohio State University in the Medical Center. Q And, what is your title there at Ohio State?

A I am an associate professor in the Department of Molecular Neurology Immunology and Medical Genetics. And, associate professor in the Department of Anthropology.

Q Are you in any other division at Ohio State University?

A Division of Human Cancer Genetics.

Q And, what kind of work do you do, primarily at Ohio State?

A The bulk of my work at Ohio State focuses on human cancer genetics, mainly prostate cancer and medical genetics. I explore the genetic contribution to disease.

Q How long have you been at Ohio State?

A I was at Ohio State for a little over two years.

Q And, you say you were at Ohio State for a little over two years? Where are you going next?

A I recently accepted a position at the University of Chicago in the College of Medicine, Department of Medicine, section of genetic medicine at the University of Chicago. I start August one.

Q And, what will you be doing at the University of Chicago?

A Pretty much the same thing I was doing at Ohio State. My research in the past, at Ohio State and also University of Chicago will continue to focus on prostate cancer genetics and trying to understand the impact of genetics variation in African American, the African-American population as relates to disease. And, also understanding the genetic consequences, what we call the genetic consequences of the African diaspora.

Q Why are you changing from Ohio State University to the University of Chicago?

A Well for some strange -- I do know why -- for some strange reason this year I was involved in a lot of significant research and so in my interactions with others and giving talks in the field, I was offered a lot of different positions in a lot of different institutions. I wanted to stay at Ohio State University, but I got one of those offers you just can't refuse.

Q Before you went to Ohio State University where did you work?

A I was at Howard University in the College of Medicine, Department of Microbiology.

Q What was your area of research expertise at Howard University?

A Pretty much the same thing. You know, I was involved in developing the National Human Genome Center at Howard University and the Genome Center's focus was to look at the genetic risk factors for complex diseases in the African diaspora. And, so we would look at diseases such as prostate cancer, cardiovascular disease, hypertension, diabetes, obesity and the like.

Q What were your titles at Howard University?

A I was assistant professor.

Q And, when you were working at the National Human Genome Center, what was your title there

A I was co-director of molecular genetics which is one of the sections in the Genome Center. I was also associate director for a major multidisciplinary study on the New York African Burial Ground project. That was a project that was due to a big construction that was going on in lower Manhattan in New York City the General Services Administration was building a office tower and they uncovered the skeletal remains of some really turn-of-the-century burial sites that consisted of enslaved Africans in New York, the early African slaves in New York City.

Because of that, the skeletal remains of about 450 of which were sent to Howard University for study. And, so the Department of Anthropology and the folks who

were doing genetics at Howard University were involved in understanding the biology, the genetics and the social cultural context of which that community evolved in New York City.

As I mentioned, before it was a multidisciplinary study. There were historians involved, archeologists, anthropologists, geneticists. And, so my role as a geneticist was to isolate DNA from skeletal remains. And, in particular mitochondrial DNA which is maternally inherited and Y chromosome DNA and trace those particular haplotypes to communities in Africa to see if they were in fact of African ancestry.

Q I'm sorry, I have to ask you to speak a little slowly because the Court Reporter is trying to record everything.

Now that work for that project was different from the work at the National Human Genome Center, correct?

A Not really. All of this is pretty much the same, but my research focuses on African descent populations, and so whether it is tracing the ancestry of the African communities or exploring how genes impact on decease it is all pretty much the same for me in a sense. It is a common focused.

Q And, how much of the focus is on mitochondrial

DNA?

A Lately it has been a lot, because I also have a company that explores the maternal and paternal ancestry of African Americans. It is a company based in Washington D. C. and we actually sequence mitochondrial DNA and do Y chromosome typings also for African-Americans who are interested in exploring their ancestry.

Q Just taking it a step back, when you were at the National Human Genome Center, how many projects related to mitochondrial DNA?

A There were a few, maybe a handful. I don't know exactly how many. There are about a hand full.

Q Do you anticipate working on mitochondrial DNA at the University of Chicago?

A I will continue to focus.

Q What are your major fields of study and research, if were were to just put them into categories?

A My training -- I have a Ph. D. in biological sciences from George Washington University here in Washington D. C. The major fields of study were human and population genetics, evolutionary biology and biological anthropology

Q And, what is genetic anthropology?

A Genetic anthropology is something that the study of the genetics of different cultures and ethnicities of

different groups.

THE COURT: I suppose at some point you are trying to qualify him as an expert. Do you have a copy of his curriculum vitae?

MR. MCKEE: Yes, Your Honor.

THE COURT: Do you have an extra copy?

MR. MCKEE: Yes, I have three copies. Your Honor, I will mark it as Defense exhibit number six.

I am sorry, Dr. Kittles.

THE COURT: Continue.

MR. MCKEE: Thank you, Your Honor.

BY MR. MCKEE:

Q What type of research do you do related to medical genetic.

A As I mentioned earlier mainly prostate cancer genetics. One of the things I'm going to do when I get to Chicago is expand that a little bit and look at heart disease in particular in rural Mississippi, Jackson Mississippi.

Q And, what research have you done that concerns the intersection I guess of race and genetics? You have been talking about how race impacts some of the areas of study. What is the intersection there?

A That is a common focus of mine. I try not to just look at genetics as a laboratory sort of experiment,

but see how it impacts, how we utilize genetics in every day society, and how genetics plays a role in everyday society.

I have written several papers on race and genetics, race and disease and genetic variation as it relates to skin color and other phenotypes or physical features that are racially defined.

Q How did you get into the field of study of medical genetics and genetic anthropology?

A I was always interested in genetics. I wanted to know why people look the way they do and act they way they act. I knew genetics plays a role.

Q Based on these areas of study, you have experience with population genetics, correct?

A Yes.

Q And, you also have an experience with statistics, correct?

A Yes.

Q How much of part of your work involves understanding and the use of statistics?

A Almost all. In one way or another I'm calculating something, whether it is an odd ratio frequency probability it is part of my everyday work.

Q Have you personally, Dr. Kittles, in the course of your study of research ever personally sequenced

mitochondrial DNA?

A Yes, I have personally sequenced it when I was at Howard University, at Ohio State University and I will continue to sequence it.

Q When you were talking earlier about your experience of sequencing the DNA from the burial project in New York City is that similar to sequencing a sample from a crime scene?

A Well, the burial site project was a little different because we actually had to isolate the DNA from the skeletal remains from the bones, so that was a little more difficult. Some people call it ancient DNA work. The fact that it is really difficult and you have higher levels of contamination or the probability of contamination, but that is one of the first projects I worked in terms of sequencing and mitochondrial DNA. Nowadays we just collect cheek cells and isolate the DNA from that, when we study living people. But, that project in particular was more difficult because those individuals were in the ground for like 200 years.

Q You would know though because of your training and experience how to sequence a mitochondrial DNA sample from a hair fragment?

A Yes. It is rather routine and it is well known where which areas of the mitochondrial DNA you should

sequence and all of that.

Q And, in your own experience of sequencing DNA you have used living populations, correct?

A Living and dead individuals, yes.

Q Do you maintain any data bases for mitochondrial DNA profiles of African Americans?

A Yes. I have in providing a service to the African American community for tracing your ancestry, I have accumulated data from several thousand African Americans.

Q Do you know actually exactly how many profiles there are in your data base?

A Over 5,000, close to 5,500 within the last three years.

Q And, you mention this company about African ancestry, what is your role in that company?

A Well, I am the co-founder of the company, and also the scientific director.

Q And, do you work in the business end of it or, the science end of it?

A I just deal with the science end. I am not a businessman.

Q Is African Ancestry is the only company that provides a service of enabling individuals to trace their lineage back to particular regions of Africa?

A No, there are many companies that provide that service to different communities. African Ancestry, my company focuses specifically on African Americans and right now we are the only ones doing it. Others explore mitochondrial DNA variation, and tracing mitochondrial DNA for Europeans. There is another company for Native Americans and Asians.

Q And, with regard to your company African Ancestry, is this a business venture or a scientific basis for tracing one's ancestry?

A I guess it is both really. Obviously as a private company it is a fee-for-service endeavor, but my main interest is to try and understand and quantitate and utilize information on genetic variation in African-Americans. And, so I have been through this company been able to get some insight on that level of variation and how it is distributed across the U. S.

Q And what relationship if there is any, does your work with African Ancestry have to do with your prostate cancer and medical research?

A If you think about it ultimately the history of disease in populations is due to several factors; the history of the population, and the history of the genes in the population. And so you always want to be able to trace back the genes of the ancestry of those particular

populations. There is a history of disease and a history of populations, and most of these diseases are due to genetic risk factors. And, so if we understand the history of the genes we will be able to determine more about the disease.

Q And, how is African Ancestry related to genetic anthropology?

A That is pretty much what we do genetic anthropology. We are exploring the genetic history of the African American experience.

Q Does this require you to work with other disciplines in the area of I guess anthropology. Does your work there at African American Ancestry get you working and involved with people from other disciplines?

A Yes. I really could not do what I do without interacting with historians, archeologists, anthropologists. As a geneticist, we look at the genes and their frequencies and the amount of variation that is there in the population and we have to place it into context. And, that is where the historians come in, and the anthropologists.

The social scientists are very critical to the study of the genetic history of populations.

Q Who in particular in these areas of disciplines have you worked with?

A I have worked with many different anthropologists and historians starting back with the New York African Burial Ground Project. But most recently and probably the most important collaborations and interactions I've had had been with historic history -- pardon me --the African-American Studies Department at Harvard University under the leadership of Henry Louis Gates, Dr. Henry Louis Gates. And individuals, other historians there that have worked on the transatlantic slave database which is housed at Harvard University. I think my interaction with that group and other anthropologist have been extremely valuable in terms of understanding the wealth of genetic variation that is within the African American population.

It is a lot of variation because if you think about where the African American gene pool came from it came from Africa, and Africa what we know in terms of genetics and history is a very big, very diverse and very rich continent in terms of human history.

Humanity started in Africa. There are more people in African than any other place in the world historically over the long history of humans. And, so because of that there is more variation there. So if African Americans are descended from that community, in particular West and Central African they may have a

wealthy of genetic variation in the population and we see that. I think there is no -- I know there is no debate on that one in terms of the scientific community. African-Americans have enormous amounts of genetic diversity, or genetic variation in the population.

Q Dr. Kittles, with regard to all this work have you ever been a recipient of any grants related to genetic research?

A Yes, many grants. I have been funded by the National Institutes of Health, the Department of Defense, Komen Breast Cancer Foundation. And, those grants dealt with mainly with prostate cancer or breast cancer, studies of diabetes or hypertension.

Q Do you have familiarity with grant review committees?

A Yes, I have sat on several grant review committees, and sub sections.

Q Can you identify some of those?

A I have sat in previous years on the Department of Defense grant review panel, and also I've been ad hoc reviewers on many different at least three different NIH grant review panels. That is the National Institute of Health.

Q And, with regard to publications Dr. Kittles, what subject areas have you published in?

A Issues of race and genetics, genetics of skin color, genetics of prostate cancer, genetics of obesity, hypertension, diabetes, genetic variation in the African diaspora.

I have studied a particular regional variation in South Carolina. I have published on even European populations like the Finnish population in Europe.

Q How many peer review articles have you written?

A Over 50.

Q And, how many peer review articles in the area of mitochondrial DNA?.

A Probably around 10 or so.

Q And, how do those various articles that related to mitochondrial DNA touch on the subject?

A Touch on --

Q Touch on the subject of mitochondrial DNA. How do those articles discuss mitochondrial DNA in the U. S.

A Well, the focus of the articles, focus of all of them was on looking at the amount of genetic variations in those particular populations. So, for instance, I have studied variation in Europe, mitochondrial DNA variation, and in some parts of West Africa and also in the U. S. And the sort of take home point from those papers was that you have to take into account the social cultural history of those communities in order to understand and utilize

that information of genetic variation.

Q Did any of those articles relate actually to the DNA mitochondrial sequencing that you had collected?

A Yes. For most scientific papers you have to write a methods section in terms of what you did, and you have to describe how you did it. So in the methods section, it dealt with mitochondrial DNA sequencing.

Q Have you ever authored any articles about the SWGDAM database in particular with regard to the mitochondrial DNA sequencing?

A Yes, I have recently.

Q And, what was the title of the article do you recall?

A Not offhand. I have to look to see exactly what it is.

Q Essentially what was the article about?

A It was about some of the problems with the SWGDAM mitochondrial DNA database and how non representative it is as a data base, and in terms of utilization, for forensic purposes.

Q And, that article was published in the public domain, wasn't it?

A Yes.

Q Dr. Kittles, have you ever been invited by the forensic community to contribute or discuss with them your

understandings of the SWGDAM data base?

A Just recently I was invited to participate in a meeting, forensic science meeting in I believe this was October sponsored by Promega.

Q Which Promega?

A Which?

Q Do you know which Promega it is?

A Promega is a company to develop some kind of kit for human identification kit.

Q So Promega provides the kits for DNA sequencing to the FBI, right?

A Right. And, they sponsored a national meeting every year, and this year I believe it is some where in Nashville and I was invited to give a keynote lecture.

Q And, your key note lecture would have been with regard to the kinds of information you are telling the court here about?

A They were interested in wanting to know more about the amount of variation in the African American population, so that is what I would have talked about. But, I am not going to participate because I have a conflict with another meeting.

Q What is the other meeting you have a conflict with? A American Society of Human Genetics which will be in New Orleans.

MR. MCKEE: Your Honor, at this time I move in Defense Exhibit 6, CV for Dr. Kittles.

MR. SOROKA: No objection, Your Honor.

MR. MCKEE: Your Honor, at this time I also move in Dr. Kittles as an expert on human population genetics statistics as applied to human population genetics and genetic anthropology and African descent populations.

MR. SOROKA: No objection.

MR. MCKEE: Court's indulgence.

BY MR. MCKEE:

Q Dr. Kittles, in all of this experience and knowledge that you have does it inform you of any kind of special expertise with regard to answering the question of the genetic makeup of African-Americans today?

A Yes. I have I believe extensive experience in understanding the genetic African descent populations. I've been to Africa throughout much of Western Central Africa so I have personally seen the physical variation. I have actually done sequencing and explored genetic systems, different genetic markers in African descent populations. And have analyzed data from those populations.

Q So, your expertise isn't just on historical African American populations, it also relates to people today, correct?

A Right. The bulk of what I have published on is present day African American communities.

Q Now, Dr. Kittles, could you just very briefly tell the court what your understanding of what mitochondrial DNA is and how it is passed down through regeneration?

A Well, mitochondrial DNA is a unique sort of genetic system that is maternally inherited. And by that I mean it is passed down from mother to daughter, mother to daughter and it is a very useful very good marker and is very useful for tracing maternal ancestry because of the way it is inherited.

While men have it, they get it from their mother, they do not pass it on. It is passed on through women and it reflects the history of your mother's, mother's, mother, mother, mother.

Q And, how is this different from nuclear DNA?

A Nuclear DNA has a -- mixes a bit more. There is a lot more nuclear DNA, and it actually mixes in what we call recombines. And, because of that there is no direct source of way to gauge the mode of inheritance for a particular piece of that DNA. It is a lot more difficult to do. You can do it, but it is a lot more difficult.

Mitochondrial DNA is straightforward. There is only one type of mitochondrial DNA and that is what we

call colonially inherited. That means it is inherited as is without any changes.

Q What does it mean if there is a match of mitochondrial DNA profiles between an unknown sample and a known sample?

A Well, it means that the known sample shares a common ancestry. If it is not the same person they sharea common ancestry with that unknown sample.

Q Does that mean that the known person contributed to mitochondrial DNA seen in the evidence sample or the unknown sample?

A They may or may not have because of the way it is inherited the person's siblings would have the same mitochondrial DNA and their mother would have the same mitochondria, and their mother's siblings would also have the same mitochondrial DNA.

Q When you are looking at a mitochondrial DNA sample and you're looking at a known and unknown how does one determine frequency for mitochondrial DNA profiles?

A They utilize a reference database in order to do that where you compare the profile from the known with that, with the profiles in the database to determine what the frequency is.

Q Is it possible to find the true frequency?

A It depends on the sample. It depends on how

common the sample is and also depends on how representative the database is. I think one of the critical issues here is how representative the database is. And, in order to have a representative database you should have some knowledge of the community in which the database should reflect. And, the knowledge is not just a sampling of 100, 200, 200,000 people but something about the history of that community would help you shape that database.

Q Is it your belief that the FBI's construction of the current SWGDAM database takes into account what we just talked about?

A No, in terms of my understanding of the SWGDAM, it does not.

Q I want to ask you about sampling. How does one go about sampling to obtain a frequency estimate?

A Sampling to obtain the frequency?

Q Right. How do you go about sampling? Is there a right way to sample and wrong way to sample when you're trying to create -- let's use a database.

A Well, when you sample from a community you try to minimize any bias, any form of ascertainment bias. So you don't go up to a college let's say, and then as the students to give their samples and use that for a database because it could be biased. Not everybody goes to college.

Also, you may not necessarily want to utilize a community DNA bank as a reflection of the region of the entire region. There are many different things that you should try to stay away from when you sample to construct a database. But one of the things that because of how the history of United States has been shaped one of the things you should take into account is regional variations. And, by that I mean especially as it relates for African-Americans.

In the U. S., race and segregation have been sort of these key events in shaping the structure of American society. And, so if you sample such as SWGDAM has been sampled and say this is a reflection of the African American population there's going to be some problems because you have some samples from somewhere in the mid Atlantic, others from out west some where, and others from where we just do not know. There hasn't been any sort of identification of where those samples came from.

They may not reflect the regional differences, the strong regional differences that we see, in not for just mitochondrial but also the Y chromosome data and nuclear data.

Q For sampling purposes then I guess is that opinion of yours that that impacts representation of the

database?

A Yes, greatly.

Q Do you feel that the SWGDAM database is representative of the African-American community?

A In terms of what I have read and the scientists that I've talked to, it does not appear to reflect that. There is some clear indication that a large portion of those samples are samples from some unknown location, and you have to know where those samples came from in order to fully assess the accuracy of their efforts.

Q If I were to tell you that they took samples from one community in Oakland or Berkeley, California would you think that that was a representative database for the entire country?

A No.

Q If you have a true and a random representative database could you estimate a frequency of a particular profile?

A I would have to agree with Dr. Budowle, there's no sort of random sample. You try to get as representative a sample of the community as possible, and you try your best not to bias the sampling as I mentioned by getting people who are related, or one socio economic strata and not the others. But that is not a random sample.

Q And, so you agree with Dr. Budowle that maybe it

is difficult to get random, but you still believe that representative is important?

A Right, right. Representative is quite important, and part of understanding what is representative is to understand the social cultural history of that population. For instance, if we for the mid Atlantic I think we should definitely utilize the historical data which for African-Americans which reflects one of many of the enslaved Africans that were brought to the mid-Atlantic came from one particular region in Africa.

Q Let me before we launch into that new area, let me just ask this one last question today. If a database were not representative could you do an estimate of frequency for a particular profile that would be valid?

A No.

MR. MCKEE: Your Honor, at this time I guess we will break and if we can resume -- I would ask Your Honor if we could resume in the morning, so that Dr. Kittles can return since we are keeping him over.

Thank you.

(Witness temporarily excused)

THE COURT: Let me ask you something. How much more do you have?

MR. MCKEE: I have quite a lot, Your Honor.

THE COURT: Well, I don't know if you all are

going to finish this tomorrow or not. But that is on you all.

Tomorrow is my last day so if you finish fine, if you don't fine.

MR. SOROKA: If we can start in the morning --

THE COURT: I have got other cases, that is not the only case that I got. As a matter of fact, I have got several things I got to do tomorrow. I want to see how far we can get.

MR. MCKEE: What time should we return?

THE COURT: Better time to return is at 9:30, but I can't guarantee that is when I am going to start at that time If I got a plea I am not going to let it get away, I will tell you that. That is all I can tell you.

MR. MCKEE: Thank you, Your Honor.

THE COURT: The reason I say that is because I told you all 9:30 this morning, and you know we had to go through all these other things before we finally got to you all. Really I told you ten o'clock this morning, and so you know some of the things I control, and some of them I can't. If the lawyers are here as soon as I get on the bench, then I can get a few things out of the way and I can start on you. If not, it takes longer.

So according to this thing right here spit out by the computer, nine things, two sentencings, and --.

MR. MCKEE: Your Honor, if I could keep it to an hour in the morning, could we do that and then do those other matters after. We will also defer our own matters until later in the morning if we could just to the one hour or so.

THE COURT: You might be able to do that. We'll just have to see what happens. Be here at nine thirty and see what we can do. Anything else?

MR. SOROKA: No, Your Honor.

THE COURT: Parties are excused.

(Whereupon the proceedings concluded at approximately 4:15 pm. to resume at 9:30 a.m. on June 30, 2006.)

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CERTIFICATE OF COURT REPORTER

I, CHERYL RANSOM-JONES, an Official Court Reporter for the Superior Court of the District of Columbia, do hereby certify that I reported, by means of the voice writing method, in my official capacity, the proceedings had and/or testimony adduced, upon the in the case of UNITED STATES OF AMERICA vs. Clifton Crawford, Criminal Action Number F2103-05, in said court, on June 29, 2006.

I further certify that the foregoing 122 pages constitute the official transcript of said proceedings, as taken by voice writing method, together with the backup tape (s) of said proceedings.

In witness whereof, I have hereto subscribed my name, this 17th day of July, 2006.

CHERYL RANSOM-JONES
Official Court Reporter