REPORT OF PROCEEDINGS BEFORE

STANDING COMMITTEE ON LAW AND JUSTICE

INQUIRY INTO THE OPERATION OF THE CRIMES (FORENSIC PROCEDURES) ACT 2000

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At Sydney on Thursday 26 July 2001

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The Committee met at 10.00 a.m.

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PRESENT

The Hon. Ron Dyer (Chair)

The Hon. Peter Breen
The Hon. John Hatzistergos

LINZI MARIANNE ADELINE WILSON-WILDE, Forensic DNA Specialist, New South Wales Police Service, Forensic Services Group, University of Western Sydney, Hawkesbury Road, Westmead, before the Committee.

CHAIR: The Committee is grateful to you for agreeing to give this presentation. As you refer to the diagrams, will you please articulate so that Hansard can take an accurate record.

Ms WILSON-WILDE: I will go through what DNA is, what it is all about, what it means, what a DNA profile is and what that means. I will also go over some DNA database statistics from the United Kingdom, New Zealand and Victoria so that we can get an idea about what we can expect from the DNA database in New South Wales to tie it together. I will start with biological material, which is essentially anything biological we look at crime scenes. Biological material is anything originating from a living organism, it is made up of cells, and some of the cells contain a nucleus. Inside the nucleus is DNA. I use the example of a fried egg. Imagine the yolk as the nucleus and inside the yolk would be the DNA. That is essentially what a cell looks like and where you find DNA.

DNA stands for deoxyribonucleic acid and it is basically the blueprint for life. It is found in every nucleated cell in the body. Red blood cells do not contain DNA; red blood cells do not have a nucleus. The white blood cells contain DNA. DNA carries the genetic information from one generation to the next and that genetic information is in the form of a code, or language. When the code is translated it determines physical characteristics such as brown hair or blonde hair and green eyes or blue eyes. DNA directs chemical processes.

Essentially DNA is the code that makes you, you. If we break down that code into subunits, there are about 3.3 billion pieces of code. It is an enormous molecule, which would be expected in order to make a human being. There are two main types of DNA that we use in forensic analysis and another that we do not consider. First, nuclear DNA which is found in the nucleus; second, mitochondrial DNA found in the mitochondria or battery packs of one's cell. The mitochondria, using the fried egg example, would be in the white portion. Mitochondrial DNA is inherited from one's mother. Children inherit exactly the same mitochondrial DNA as their mother. So, siblings will be the same and have the same mitochondrial DNA that they inherited from their mother and which she inherited from her mother.

Lineage can be traced through the maternal line using mitochondrial DNA. Nuclear DNA is inherited from both the mother and father and is inherited in different combinations. Therefore siblings are different although they have the same starting DNA from the parents, but they have a random combination of the parents' DNA. Because siblings inherit that random combination they appear similar, but not exactly the same. They have some DNA that is the same, and other bits that would be different, because it is a random combination. The exception is identical twins, who have exactly the same DNA.

DNA profiling cannot tell the difference between identical twins, but their fingerprints are different. The reason for that is that fingerprints are determined by one's DNA and the environmental condition in the womb. Because identical twins do not sit in exactly the same spot in the womb, the environmental conditions will be slightly different and therefore their fingerprints will be different. As I said before, there are 3.3 billion subunits in the DNA code. Because it is so enormous we cannot possibly look at the entire code when we do forensic analysis. It has taken the human genome research project about 10 years to decipher the code.

We look at specific sites; we target specific sites on the DNA molecule. The sites vary in length with different people. The technique we use to analyse DNA centres on analysing and measuring the differences in length. The sites that we look at are called short tandem repeats, and they are short lengths or pieces of DNA that are repeated end on end. The box shown on the diagram represents a piece of the code of the subunits. That is repeated end on the end so you get a particular length of DNA, depending on how many times that short code repeats itself. Different people have different numbers of repeating units.

On the diagram person A has four boxes, four repeat units, indicating a certain length of DNA. Person B has six boxes, so there is a longer length of DNA. Therefore we can tell the

difference between person A and person B. We can tell the difference between people depending on the length of their DNA. Being scientists, if the code repeats four times we call that a "4" and if it repeats six times we call it a "6", and so we end up with numbers.

CHAIR: Is there a limit on the length of the sequence?

Ms WILSON-WILDE: Only as far as evolution has determined. It will probably go up to over 30, we have not yet seen any that reach 40 in the sites we loot at. The process of analysing the short tandem repeat units is that we separate the DNA from the biological material of interest, that is either a person sample or a crime scene sample such as a blood sample. We measure how much DNA we have, and target those specific sites on the DNA molecule and then make lots of copies. We copy it time and time again. We sought those pieces according to size and analyse and measure their length.

The next diagram represents the copying process. We start with one copy of the DNA and after one cycle in our copying process we end up with two copies; next cycle we have four copies; next cycle we have eight copies; it is an exponential increase in the number of the copies of the DNA. It is a little like a biological photocopier in which we put the original and keep pressing the button until we end up with many copies of the original material.

After the copying process, we end up with millions of copies of the DNA molecule we obtained from the crime scene or the person sample. The next diagram illustrates the separation of the fragments according to size. It is called the gel. We put the DNA in the top of the gel and it flows down, a little like a sieve. The smaller pieces move quicker through the substance and the longer pieces get caught up. The small pieces are down the bottom and the long pieces are up the top. All we are doing is sorting them according to size, like I said.

The Hon. PETER BREEN: Is all this happening with an electron microscope?

Ms WILSON-WILDE: No. No, we are not quite so sophisticated. The copying process is done in a small sort of, maybe two briefcase-size, instrument. It is a little bit like an oven. It goes to different temperatures and we put in what are called enzymes. Using natural, biological processes in the body we use those enzymes to copy the DNA. The sorting according to size is done by quite a large instrument. It actually uses a gel-like substance, like a jelly.

The Hon. PETER BREEN: But how do you see it?

Ms WILSON-WILDE: The way that works is that when we do the copying process we add a fluorescent tab to each piece of DNA, and when it moves through this gel-like substance we have a laser down the bottom; we shine the laser onto the gel and it excites the fluorescent tab on the DNA molecule. That is picked up by a CCD camera, which is in every video—a CCD camera is a standard instrument. It changes electrons from the laser into a picture on your computer. Then you read it on the computer, and that is the image you end up with. Remember how I said that it was long pieces of DNA fragments? Each of these peaks represents a DNA fragment. It has a fluorescent tab on it, a fluorescent dye that is excited, a particular wavelength—UV wavelengths and other wavelengths.

Imagine moving through a gel with millions of copies of one fragment and it kind of moves through at a big mass, like a glump in the gel, so you end up with a peak where a few of the fragments are here, but most of them are in the body of the peak then a couple are taled up. All you are picking up is light that is excited from the laser that is attached to each of the fragments. The more light you have the taller that peak gets. The more DNA you have, the taller that peak gets. If you think about it in terms of a fragment as a particular length, the quicker it moves through the gel the sooner it will get to the bottom. So it is a time-to-distance travel ratio in terms of the quicker it moves through, the shorter the fragment. The next one comes and the next ones come, and they are longer and longer as they move through. This is length along here, so these pieces here are shorter than these pieces. Does that make sense?

CHAIR: Yes, I think so.

Ms WILSON-WILDE: The main thing is to think of it in terms of a short tendon repeats a particular length and we can measure that length, and this is the picture we end up with. This is one DNA profile. All these multicoloured peaks represent one DNA profile. The red is a standard that we put in, and the standards are known sizes. We can use the known sizes to measure the unknown sizes, which are the green, the blue and the yellow.

The Hon. PETER BREEN: Has anyone challenged the testing procedure?

Ms WILSON-WILDE: Yes, of course, in court.

The Hon. PETER BREEN: How did they go?

Ms WILSON-WILDE: Not very well. This kind of technology has been around for quite a number of years. You can essentially size down a piece of DNA to one unit, one code. Have you heard of the ATCG, adenine cytosine guanine?

The Hon. PETER BREEN: No.

CHAIR: For evidentiary purposes, what does the prosecution have in court? Does it have a photograph that emanates from this analysis process?

Ms WILSON-WILDE: You end up without profile, which I will talk about in a moment, which is a set of numbers. That is what they produce in court, simply a set of numbers.

CHAIR: Is that certified by an officer?

Ms WILSON-WILDE: It is certified by two DNA scientists. Every step in the procedure is checked and witnessed. Every stage is done by one scientist and checked by another, and it is all signed off. That is at every single stage there will be some sort of ticking off. There are also positive and negative controls run at every stage, just about. If your positive control is correct, that is a positive control, you know what the result is, you know what the answer is. If that is correct then your other results should also be correct. We have a negative control to make sure that there are no contamination issues or anything like that, because if your negative control is contaminated then your samples maybe contaminated, and the other way around. If your negative control is not contaminated then you can be sure that your other samples are not contaminated, remembering that each stage is checked and witnessed: two scientists are involved in every stage. That is again to ensure that there is no contamination. That is on top of a lot of other procedures, such as isolation of your samples and using sterilised equipment, and lots of in-house procedures that we go through to make sure that the result we end up with is the correct result.

CHAIR: Does an officer give oral evidence in court arising out of the analysis?

Ms WILSON-WILDE: A scientist.

CHAIR: Someone does?

Ms WILSON-WILDE: Yes.

CHAIR: The document does not speak for itself?

Ms WILSON-WILDE: No, very rarely. Sometimes it is accepted by the defence. I have had cases that I have not appeared at because it has been accepted, but if the defence wanted to call me as a witness then it can if it likes to do that. Sometimes the prosecution wants me to go through the work, then it can do that as well.

The Hon. JOHN HATZISTERGOS: It is prima face the evidence, is it not?

Ms WILSON-WILDE: I believe so, yes.

The Hon. JOHN HATZISTERGOS: It is up to the disputing parties to establish that it is not. But there are other issues, issues about the sample, how it was obtained, whether it was contaminated and a whole series of other side matters?

Ms WILSON-WILDE: Yes. You have to prove continuity and you have to prove that no contamination has occurred. That starts from the crime scene until the final result. If it is contaminated at the crime scene then you will get a mixed profile, potentially, as your end result and you can usually pick up some contamination issues.

The Hon. PETER BREEN: Can you give us an example of some contamination that might occur in the laboratory? Does that happen?

Ms WILSON-WILDE: I think there was a case in another State where a scientist talked over a set of samples and a mixed profile was produced. Part of that profile was the scientist profile. All scientists who work in a lab are DNA profiled, and those profiles set in easy access of any analysing scientist. Most of the labs have introduced face masks so that when anyone is working on samples in the lab they are wearing face masks to prevent that.

CHAIR: Earlier you said that there is always control present.

Ms WILSON-WILDE: Yes, and it came up in the negative control. What should have been negative, no result, came up as a scientist's profile. Then those samples have to be repeated, or taken into account in the analysis. This diagram shows one site here, a second site and a third site. You can see that they do not overlap in size. There is no overlap between the sites and the size of the fragment that is produced. This site here is what we call a ladder, and it contains all the most commonly known pieces of DNA fragments, the sizes that are very commonly known. You can see that they have numbers—12, 13, 14, 15, 16, 17, 18 and 19—that represent the number of times that unitive code repeats itself. So that 12 has 12 repeat units, 12 times that code is repeated. We have two individuals down below here.

We measure it by saying we have a piece here and if you follow this straight up it is at the same point as this one here. The one in the ladder is a 16, and if I follow it down the line I can see that my DNA fragment is the same size as a 16. I will term that piece of fragment a 16. Similarly with the next peak, I can follow that up to the ladder and I can see that it is the same size as the piece DNA labelled 17. I call that a 17. This individual at this site on the DNA molecule is a 16,17. Remember that you get half your DNA from your mother and half from your father. At any one site you can have up to two different pieces of DNA fragments. If you had one peak it meant that you got the same piece of DNA code from your mother as you got from your father. You could have a 16,16 or you could have a 16,17. The variations, the power in this system comes in the variation that you can have.

You all know the ABO blood group system. You can be A, B, O or an AB. If I can explain it in very simple terms: A means you have A proteins on your red blood cells, B means you have B proteins on your red blood cells, and O means you have no proteins on your red blood cells. You can get the code from your mother for an A, B or O. There are three alternatives. You will get one from your mother and one from your father. So, you could be AA, AO, BB, BO, AB or OO. So, out of those three there are six variations in the population. If you are an AA you have A proteins, so you are A blood group. If you are AO then you have the code for A proteins and the code for no proteins, which means you have A proteins because you have that code that produces A proteins. So, you are A blood group. Similarly with BB, you are B; BO you are B; AB you have both proteins so you are AB; and OO you have no proteins so you are O blood group.

The three variations produce six possible pieces of code that you may have if you translated that DNA code. If we take the first one on this graph, you have 12, 13, 14, 15, 16, 17, 18 and 19. So you could be 12 12, 12 13, 12 14, 12 15, 12 16, 12 17, 12 18, 12 19, 13, 13 13, 14 et cetera. You can see the large number of variations you can possibly be in the population on just one site. The system we look at is called Profile Plus and it has nine sites. So, you then multiply that by nine.

The Hon. PETER BREEN: Are these sites sections on the molecule?

Ms WILSON-WILDE: Yes, specific sites on the DNA molecule. If we look at these two samples, the first individual is 16, 17 and the second individual is 16, 19. So, they do not have the same numbers therefore they are not the same person. We can tell people apart by these numbers. I am sure you will all ask yourselves: What does it all mean? You have all these numbers and end up with a profile, what does it mean? Very little, is the answer. These sites are in what we term the junk areas of the DNA. They do not do anything. It is not a code for blonde hair, it is not a code for your arms or legs or the colour of your skin or predisposition for heart disease.

They do not mean anything; they are in the junk areas. The only way I can equate it is if you have something precious like a crystal statue that you did not want to break, you would put it somewhere safe like in a box with lots of cotton wool. Think of your genes, the bits that say you have two arms and two legs, that you are human, they are the important bits you obviously do not want to damage. So, your DNA has created this cotton wool to protect all of your genes. So, if anything goes wrong it is more likely to go wrong in these STR areas or other junk areas than it is likely to go wrong in your genes. So, I think of these STRs as the cotton wool of my genes, and of your genes. They do not really do anything. They are just junk areas.

The Hon. PETER BREEN: Where are the genes on the DNA molecule?

Ms WILSON-WILDE: They are scattered. Do not think of that as quite a DNA molecule. You have 23 pairs of chromosomes and they are just the big structures of DNA. Your genes are scattered throughout those 23 pairs of chromosomes. In between the genes are the junk areas. Think of a long piece of spaghetti and sections of that long piece of spaghetti or the code or where the genes are and in the middle are these junk areas. The genes are all through the DNA molecule.

CHAIR: When you describe them as junk areas, they serve a limited purpose of, shall we say, insulation or something like that?

Ms WILSON-WILDE: Yes, but that is about all.

CHAIR: Although you refer to them as junk, they are not totally useless?

Ms WILSON-WILDE: In terms of junk I just mean they do not actually code for anything. If you translate that code it is meaningless to the body.

The Hon. PETER BREEN: So they do not relate to things like hair colour?

Ms WILSON-WILDE: No.

The Hon. PETER BREEN: Do we know what they actually relate to? Do they relate to anything?

Ms WILSON-WILDE: Not as far as we know, no. If you get a mutation, a change in the code of your DNA that codes for, say, your heart, that will not produce a viable offspring. The child will die either before birth or just shortly after conception. So, changes in the genes do not actually go on to produce a living human being that can produce. Changes in these areas do not do anything so they change more readily and then they are passed on from parent to offspring and they can just reproduce with no repercussions. So, over millions of years we have lots of changes, lots of numbers being created, lots of applications have occurred with no repercussions. They just got bigger and bigger. Whereas changes in the genes will not produce a viable offspring.

The Hon. PETER BREEN: When you spoke earlier about 3.3 billion subunits in the DNA code—

Ms WILSON-WILDE: That is pieces of code.

The Hon. PETER BREEN: Is that on every DNA molecule?

Ms WILSON-WILDE: That is every DNA molecule. It is only approximate. It is about 3.3. It is a massive amount of information, which is why it has taken the human genome research project 10 years to decode it all.

The Hon. PETER BREEN: Do they used electron microscopes?

Ms WILSON-WILDE: No.

The Hon. PETER BREEN: How do they identify them? The same way?

Ms WILSON-WILDE: Yes, the same way. Exactly the same system. If you want to use the electron microscope you really only use that to look at the DNA as a stringy piece of molecule. You would not be able to see any of the detail in it.

CHAIR: You told us at the beginning that identical twins have identical nuclear DNA.

Ms WILSON-WILDE: Yes.

CHAIR: Is that a problem for crimes sites and suspects where an identical twin is involved and, if so, what do they resort to? Do they have to rely on some other thing?

Ms WILSON-WILDE: Such as fingerprints, yes. You cannot use DNA to tell the difference between identical twins. If one identical twin has committed a murder and left his blood at the crime scene, you could not take that blood and say it was that identical twin as opposed to the other one because you simply cannot tell them apart.

CHAIR: You said that DNA is only found in white blood cells.

Ms WILSON-WILDE: Yes. In the blood.

CHAIR: Is it possible to have blood samples at a crime scene, or anywhere for that matter, that consist only of red blood cells or will white blood cells always be present?

Ms WILSON-WILDE: They should always be present. Your white blood cells are intermingled with all of your blood. There should be at least one.

CHAIR: You say "should be"?

Ms WILSON-WILDE: I have never come across a situation. Your white blood cells are your fight-off defence. A certain percentage of your blood is always white blood cells. Even a small droplet of blood will contain many cells.

CHAIR: So you should have both?

Ms WILSON-WILDE: Yes. Certainly if you can prove it is blood, you have definitely got more than enough white blood cells in there. What you end up with after all this analysis is a set of numbers. You can then report that set of numbers on the DNA database and compare it to existing sets of numbers on the database. That is basically the essence of a DNA database. I have put together for you here a typical DNA profile. You can see all the numbers down the bottom refer to the number of repeat units at each site from one to nine. We look at nine STRs. I draw your attention to this first sight, which says XY. That is the only information we get about a person when we do a DNA analysis. XY refers to the sex of a person and it only indicates the sex. It does not definitely tell you what sex it is. It gives you a piece of intelligence information. XY refers to a male and XX would be a female.

I used to work at the Victoria Forensic Science Centre in Melbourne up until January 2000. We had a male scientist in Victoria who types as XX. So, he comes up as a female even though he is most definitely a male. I say that because it only indicates. That is the only information we get about a person. As I said before, the rest of the numbers just refer to those short tandem repeats which do not tell you anything about a person. It is an important point that we do not get any genetic information.

We do not get any information that refers to predispositions for cancer or heart disease or anything like that. There is no racial information, there is no height or hair colour or anything like that. It is simply a set of numbers that we can use to tell the difference between people, to differentiate between individuals.

The Hon. PETER BREEN: Why is 11,12 repeated towards the end?

Ms WILSON-WILDE: This is a made-up profile. What I have done to create this is take the most common variation, the most common numbers you find in the population. What we do is we go out in the population and sample, say, 100 or 1,000 people and we DNA type them. We work out how common is a 12 repeat, how common is a 13, how common is a 14. It just so happens that with these two sites the most common ones are 11 and 12. I did not want to take a profile from a person, so I just made it up. I chose the most common two variations at each of the sites we look at. Incidentally, each of the sites we look at are of different chromosomes and, therefore, they should be completely independent. It should be a completely not random but almost random system.

The Hon. PETER BREEN: You have 10 sets of numbers, is that representing 10 sites?

Ms WILSON-WILDE: If you include the XY.

The Hon. PETER BREEN: If you include the XY it is 11 sites.

Ms WILSON-WILDE: It is nine.

The Hon. PETER BREEN: Yes. Is it always the same 10?

Ms WILSON-WILDE: Yes. We use a commercially available system that we buy from a company to do this analysis. That system looks at nine STRs and that sex-indicating site. So, 10 in all.

CHAIR: The DNA profile comprises a recording of a progression of paired numbers that you have described as short tandem repeats?

Ms WILSON-WILDE: Yes.

CHAIR: You also said that two scientists signed off on each occasion the testing is done. How do you guard against mere typographical errors when inserting the numbers?

Ms WILSON-WILDE: What happens is that we actually have a computer software system that does most of the analysis for us and that computer software system actually assigns the numbers. We simply check off to make sure that it has done it correctly and then those numbers are transferred electronically. So, we try to get rid of the human typographical changes. If we have to have a transfer of numbers, that is also signed off. So, it is also checked. Anything to do with the DNA sample, the numbers, anything like that is always signed off by another person, a second person.

CHAIR: What sorts of things can go wrong in the analysis process to cause an incorrect analysis?

Ms WILSON-WILDE: Well, if there is a contamination. We have built into the system a very large number of checks, balances and safeguards. That does not stop an error from occurring—such as contamination—but it makes that result evident; it makes the contamination evident, so that you can see that that has occurred. If there is a contamination we can see that, and then we have to repeat the analysis. You go through a reanalysis of what has happened and then correct for future analysis. We also do blind controls. The scientists receive samples that they do not know are not casework. They have to do that. That result is known, so you can check the procedure or check the process.

Also, the DNA analysis is generally done by a different person to the person that is doing most of the casework. If a bloodstained top comes into the laboratory it will be examined for blood. If we find blood, that sample will be cut out and placed into a tube. That is sent off to someone else who

does the next stage. There are many people involved in the whole process. When you end up with a DNA profile, that comes back to the case manager who then puts the DNA profile in the context of the case. So, if there is an error, it will become evident. When we look the whole thing we will say, "Okay, there is something a bit funny going on here with the DNA profile. Let us have a look at it." That may then require that a second analysis be done—it is repeated.

CHAIR: I want to ask you a question about the role of the second scientist. Does that second scientist redo the analysis of the first scientist, or does he or she merely confirm that the first analysis done by the first scientists is correct, by checking their output in effect?

Ms WILSON-WILDE: They actually witness any transfer. They stand there and watch. They basically check that the first scientist has done what he or she should have done, and that it has been done correctly. It is more a matter of checking the procedure. They do not repeat the analysis. I would say, also, that certainly the laboratory in New South Wales is accredited by the National Association of Testing Authorities [NATA]. There is a set procedure that the laboratory must adhere to—controls, procedures, guidelines, checks and balances—and they have to do it to the way they should, as outlined by NATA.

CHAIR: Is that a Federal Government agency?

Ms WILSON-WILDE: It is a national agency. I do not think it is a Federal Government agency, but I would have check that. I am unsure. It is certainly a national agency and a lot of the laboratories around Australia are NATA accredited.

The Hon. JOHN HATZISTERGOS: My question relates to the length of the profile.

Ms WILSON-WILDE: The fragment?

The Hon. JOHN HATZISTERGOS: Yes. You said it is 10. Is that right?

Ms WILSON-WILDE: We look at 10 sites on the DNA molecule and the fragments could be virtually any length.

The Hon. JOHN HATZISTERGOS: In other countries do they look at a greater number than that? I mean, it is all a probability issue, is it not?

Ms WILSON-WILDE: In the end, yes. Some countries look at fewer sites—I would be guessing, but probably four. There is a quad that you can get, a different system. Some countries have more.

The Hon. PETER BREEN: Are they all the same sites? If you obtain a sample in Australia and compare it with a sample obtained in Britain, do you know that it comes from the same site?

Ms WILSON-WILDE: Some of them are the same. I think the United Kingdom uses a system called "third generation multiplex". I could not tell you off hand how many sites they look at. It is more than the profiler plus, but not much more.

The Hon. PETER BREEN: But, are they the same sites?

Ms WILSON-WILDE: A lot of them are the same. They are not all exactly the same but there is a core unit of sites that I think most people look at.

The Hon. PETER BREEN: For example, suppose you are looking to see whether a criminal in, say, Britain is responsible for a crime committed in Australia. If you compare the sampling that has been done in Britain at different sites, would you have a different result to the sampling done in Australia?

Ms WILSON-WILDE: They use some of the same sites as we use, so we can compare those similar sites. Of the nine, probably four or five are the same. We can use those and we can do further

analysis on any matches that we get and take it from there. We can certainly do that initial comparison.

The Hon. PETER BREEN: Your profiling would depend upon at least some other sites being the same as the profiling in another country, is that correct?

Ms WILSON-WILDE: If we were to compare them, yes. These are tried and tested sites. They have been around for a long time and the forensic community has chosen a number of them because they are stable, testable and repeatable. Even though different systems have been produced there is still a commonality in some of those sites because they are so well known and repeatable.

CHAIR: Is the testing methodology uniform in Australian jurisdictions?

Ms WILSON-WILDE: Yes. In Australia we all use the system called "profiler plus".

CHAIR: Where was profiler plus developed?

Ms WILSON-WILDE: It was developed in America by Applied Biosystems.

CHAIR: Is it is still used by that organisation in the United States of America?

Ms WILSON-WILDE: I think Applied Biosystems now uses a number of systems. At the time we made a national choice about which system we were going to go with, profiler plus was, I believe, the best—at that time. As we all know, technology changes, advances and gets better, and Applied Biosystems has now produced other systems that look at more loci, but if we were to go down that path we would have to go back and reanalyse all the old samples. There would be quite a significant cost involved in that. Profiler plus does look at nine sites, which is more than adequate. It gives you very, very powerful statistics and I questioned the merit of moving on to something that has more sites. I do not think you would get more evidentiary value.

CHAIR: Who participated in the original selection process?

Ms WILSON-WILDE: Representatives from all the laboratories around Australia.

The Hon. PETER BREEN: You use the expression "loci".

Ms WILSON-WILDE: Yes, sorry. That simply refers to the site. The sites on the DNA molecule are called "loci"—or "locus", which is singular—and you may hear the variations referred to as "alleles". That means simply: Do you have the code for A, do you have the code for B or O. A, B or O would be your alleles. That is jargon that you may hear.

The Hon. PETER BREEN: You are not referring to blood groups?

Ms WILSON-WILDE: As in AA, AO, BB, BO?

The Hon. PETER BREEN: Yes.

Ms WILSON-WILDE: That code is your allele. It simply means an alternative. At that site to what are the alternatives? It is more of a general term. At an STR your alternative would be 12, 13, 14. We would refer to those as "alleles". It is scientific jargon.

The Hon. PETER BREEN: Each those numbers you have there in the nine groups are all readily identified as being a particular site on the molecule, is that so?

Ms WILSON-WILDE: Each group is a site and each number represents a size of fragment.

The Hon. PETER BREEN: In respect of the first one, 15 is the site and 15 is the number of fragments. Is that the case?

Ms WILSON-WILDE: No, 15,15 shows the fragments at that site.

The Hon. PETER BREEN: How do you identify the site?

Ms WILSON-WILDE: We know what it is.

The Hon. PETER BREEN: It is the first one of the list, is that so?

Ms WILSON-WILDE: Basically, yes.

The Hon. PETER BREEN: Is it the first one of the list in Canada, Sweden, Australia and America?

Ms WILSON-WILDE: I do not know. These are identified sites. I have written them down just as the list, but if we do the analysis we know that this side here is a particular site. The only reason I have not named the sites is because, again, it does not mean anything. If I said, "D21,S11" that is a site. It is a scientific term that means chromosome 21, site 11. When you do the software it brings up the alleles for that site.

The Hon. PETER BREEN: To me, though, S11 makes more sense than 15,15.

Ms WILSON-WILDE: But, this one—29,30—is D21,S11. That is the site and at that site there are two fragments that this person has. One is a 29 and one is a 30. That person has two DNA fragments. One has 29 repeat units; the other has 30 repeat units. Does that make sense?

The Hon. PETER BREEN: Well, I can see that it makes sense to you, but for a layperson looking at a group of numbers like that, without any identification of the site, it is more difficult to understand. That is all.

Ms WILSON-WILDE: Yes. This is generally how we write it out, purely because this refers to the alleles found at the first sight. They are the alleles found at the second, third, fourth and fifth site. Telling you where that is on the DNA molecule does not give you any extra information. If we started to write "D21,S11" you would have D21,S11 for every single person. That could confuse someone into thinking that there are similarities, here there are not.

CHAIR: Before you continue to show us the overheads, I want to ask you a probity-type question. Clearly the scientists in charge of the testing process are in an entirely responsible position. What security checks are made in connection with their employment? Is there a mere criminal records check, or is there something more than that?

Ms WILSON-WILDE: You would probably need to ask someone from the Department of Health to clarify that issue. As part of my employment I was required to authorise a criminal checks and give my fingerprints.

CHAIR: Is there a rotation policy, as there is in the Police Service after five years? By that I mean if two officers have been working together for an extended period is there any policy to rotate them after a period of time?

Ms WILSON-WILDE: They all remain within the same laboratory but you do tend to move around the laboratory and do different tasks. You work with different people. You may have a team that gets swapped with another team. I think that is just a standard expansion of the laboratory. It just has to happen the way. If one team falls behind, then the your bring someone in to help them and so on and so forth.

CHAIR: A rotation would, in effect, occur in the ordinary course of work. Is that so?

Ms WILSON-WILDE: Yes, although the manager would remain the manager. That would not change over time. People move around because they get bored doing one job.

The Hon. PETER BREEN: Further to that probity question, are there any mechanisms in place for you to test where the sample comes from? I suspect that you have to accept that the police

officer, or whoever hands you the sample, has collected it from the crime scene. You do not have any procedures for checking where the sample came from, do you?

Ms WILSON-WILDE: No. It is for the police officers, in court, to prove continuity up until it is received by the laboratory. Once it is received by the laboratory, the state of the sample—how it is packaged, whether it is sealed, whether it has been signed—is recorded. From then on continuity within the laboratory is a laboratory issue.

The Hon. PETER BREEN: It is not like we see in American movies where people go out onto the site, take samples and bring them back to the laboratory? *Crime Scene Investigation* [CSI], I think it is called.

Ms WILSON-WILDE: CSI has a lot to answer for. It is not like that. I am a DNA scientist. I work for the Police Service at the Westmead crime laboratory. I do go out to crime scenes and give my advice. New South Wales has come a long way in the last couple of years in terms of analysis of biological material at crime scenes. Things like traced DNA, which I will go into later, have become major issues at crime scenes. I go out and give advice on those types of things. Sometimes I do some of the testing. I may collect a sample, which I have done, and I have given it to the police officer, who then takes it to the local station and books it in as an exhibit and it then goes through the normal process to the laboratory.

The Hon. PETER BREEN: So you could not have a situation where you are giving evidence about collecting the sample and at the same time you are the person who analyses—?

Ms WILSON-WILDE: I do not do the analysis. I do not work at the laboratory.

The Hon. PETER BREEN: Are there people at the laboratory who go to the crime scene like you do?

Ms WILSON-WILDE: No. That is why they hired me.

The Hon. PETER BREEN: So you would frequently give evidence about collecting samples and about continuity?

Ms WILSON-WILDE: I have not yet, but I am sure I will. I have only been working for the New South Wales Police Service since January 2000. I did some work on Wee Waa and a few other cases, none of which have gone to court yet. But I have given evidence in Victoria. Victoria uses a different system. We used to go out to crime scenes, take the samples back to the laboratory and then do the full analysis, and I would give evidence on everything from collecting those samples at the crime scene to DNA-analysing them and reporting the results in court.

The Hon. PETER BREEN: In Victoria, you would be involved from the start right through to the conclusion?

Ms WILSON-WILDE: Yes. But because the DNA laboratory is under the Health Department, it is a different system here.

CHAIR: Some submissions we have received have made the point—and I am not sure of the merits of this—that there is an increased risk of false matches within smaller ethnic groups. Is there any justification for that allegation?

Ms WILSON-WILDE: The simple answer is that unless they are an Aboriginal or Torres Strait Islander, no. A research project has recently been done by a statistician called Bruce Weir on population data that has been collected from all around Australia, which includes general populations. Essentially, if you are a Caucasian—that is, Greek, Italian, or a myriad of others, even Indian—there is very little difference, and certainly not enough to produce that. Then again, you can actually do statistical analysis that takes into account any possible inbreeding, which would produce those small inbred groups which might give you a different probability. But you can take that into account in your calculations if you feel it is necessary.

The Hon. PETER BREEN: Why do you exclude Aboriginals and Torres Strait Islanders?

Ms WILSON-WILDE: Because they are slightly different. The arguments are strange. If you have an Aboriginal or Torres Strait Islander for a suspect and you want to give evidence on his DNA profile that you found at the crime saying how common that would be in the population, one argument is: Should you use an Aboriginal or Torres Strait Islander database or a general database, which would theoretically be made up of a lot more Caucasians? If you use a Caucasian database, you may be reporting that that DNA profile is rarer than what it is in the Aboriginal database. If you calculated it in the Aboriginal database, you would find that it is more common because they have the possibility of different variations, those alleles.

The Hon. PETER BREEN: That is a tricky area, if I may say so.

Ms WILSON-WILDE: One argument is: Do you report an Aboriginal or Torres Strait Islander database or do you report both, that is, work it out using an Aboriginal database and work it out using a general database? The other argument is: If it was not that person, it was someone else in the general population, so should you use a general population database?

The Hon. PETER BREEN: What is the practice now? What do you do?

Ms WILSON-WILDE: Different labs do different things. You would probably have to ask the Health Department how they actually analyse it. I personally think that once you get into the chance of one in a billion, it is irrelevant what it is beyond that. I would just report that it is greater than one in a billion and leave it at that, because I think five billion or 10 billion is meaningless to a jury. Once you get over one billion, it is extremely strong evidence. If you are in doubt, I would report both databases and say that it is somewhere in the middle.

The Hon. PETER BREEN: Are there separate databases for other ethnic groups?

Ms WILSON-WILDE: I believe that a couple of the States have databases for Asians. There is Aboriginal, Asian and Caucasian in general.

The Hon. PETER BREEN: In New South Wales there are two, I assume, one being for Caucasians and the other being for Aboriginals and Torres Strait Islanders?

Ms WILSON-WILDE: I think they may use a Northern Territory database or a Queensland database, one from a different State. It is very difficult to get samples to make a database for Aboriginals and Torres Strait Islanders, as you can imagine, with rights on the results and so forth.

The Hon. PETER BREEN: Is there currently a database for Aboriginals in New South Wales?

Ms WILSON-WILDE: I do not believe that there is. If there is, it is one taken from another State. As far as I am aware, they do not have a New South Wales Aboriginal database, that is, for Aboriginals living in New South Wales. They would use a database made up of Aboriginals living in another State.

The Hon. PETER BREEN: If an Aboriginal in New South Wales were a suspect in a crime and there was DNA information at the crime scene, would that analysis be done according to an Aboriginal database in New South Wales, or would it be done according to a general database that covers the whole population?

Ms WILSON-WILDE: That is good question. I do not know. You would have to ask someone who would produce those statistics. I do not want to give you what I think.

CHAIR: Why would it be considered appropriate to have a separate Asian database in another State?

Ms WILSON-WILDE: I think they have just calculated it using that database. When I was working in Victoria we did some work creating a database for the Vietnamese. We were

subcontracted, and I went over to Vietnam and trained all the DNA scientists in Vietnam. As part of that, we created a DNA database for them. We DNA profiled about 100 or 200 people. As part of that, we were allowed to then use that database for ourselves. We do not generally use it, but we have it there should the defence or the prosecution require it.

CHAIR: We had better allow you to proceed with your overheads.

Ms WILSON-WILDE: As I said, this method is called Profiler Plus. It looks at 10 genetic sites: nine of them are STRs and one site indicates the sex of the donor. The method is very, very sensitive. It can obtain results from items handled, such as phone and knife handles. I will go into that in a moment. Where can we find DNA? DNA is found in blood, semen, hair, skin, faeces, urine, vomit, bone marrow, and cells present in saliva, sweat and tears. Saliva may be found on cigarette butts, chewing gum, masks and balaclavas, stamps and envelopes.

Sweat or skin may be found on clothing and items handled. Very good sources are things that rub against the skin, that would collect the skin. A balaclava around the mouth area particularly will pick up saliva and skin. You will potentially get a good DNA profile from collars and cuffs or anything like that, from the skin. I am holding a laser pointer. If I were to swab this laser pointer, you would potentially get my DNA profile from the laser pointer because I have been handling it for over an hour and my skin cells would have transferred to the laser pointer. It is important to note that the DNA is the same in all the cells of an individual. Whether you collect DNA from the blood, hair or semen, it would be the same; you would get exactly the same DNA profile.

The next overhead shows DNA success rates. DNA is only useful in the investigation of a crime if you find biological material and get a DNA profile from that material. If you do not find any biological material at a crime scene, DNA will not help you to solve that crime; it can do nothing. You must have something to compare it to. And it is not 100 per cent. Blood is over 90 per cent. Obviously, blood is a very good source of DNA. With regard to semen, the overhead shows 50 per cent, but that is because it includes mixture issues. If it is a vaginal swab or something like that, you can have vaginal secretions which can dilute the semen, or potentially you will not get any. But if you found a neat semen sample on a bed sheet or something like that, it would be over 90 per cent.

The Hon. PETER BREEN: What are you using the percentages to represent?

Ms WILSON-WILDE: The chance of getting a DNA profile. If you collected a blood stain at a crime scene, what is the chance that you will get a DNA profile from that stain. Saliva on a balaclava is about 43 per cent. So out of all the balaclavas we would get from a crime scene, about 43 per cent of them would give us a DNA profile. These figures have been reproduced with the kind permission of the Forensic Science Service in Tasmania. Saliva on a drink container is about 51 per cent. Saliva on a beer bottle is about 28 per cent. This is around the mouth area, where the person has been drinking, so the sample is of the saliva and cells in the saliva and the skin cells there.

As you can see, cigarette butts are very good sources of DNA, about 67 per cent. People have them in their mouths for quite a long period of time, and they soak up the saliva. Hairs are about 25 per cent; they are very low. The reason for that is that we have three phases to our hair growth. Only one of those phases will give you DNA. When your hair sheds, it is basically dying hair. The DNA is in the cells of the root that holds the hair in place. Once the hair is dead and it is shed out and it falls away, that root area is dead and you cannot get DNA from it. If you pluck the hair, you have a very nice, substantial root, and you can get a full DNA profile from a plucked hair. Essentially, you need to the growing hair, not the dying hair.

The Hon. PETER BREEN: When samples from bodies that have been buried are analysed, for example, how is the DNA preserved?

Ms WILSON-WILDE: I will talk about that later. These are nuclear DNA results. Motor vehicle steering wheels are about 8 per cent, which is quite low. Factors there are things like the sun shining in through the window, potentially UV light, heat and moisture in the car, which all serve to not preserve the DNA. Handles of weapons are about 70 per cent; non-handled weapons or other areas of the weapon, whatever that might be, are about 80 per cent. Gloves are about 30 per cent. Clothing in general is about 26 per cent. Handles on doors and cupboards are about 16 per cent. Headwear is 29

per cent and finger marks are 9 per cent. That is where you have, for example, a smudge on a glass pane and a fingerprint examiner dusts over it. You can see that there is a smudge and you can swab that smudge.

It is not uncommon to find potential evidence and not get a DNA profile, as you can see from these results. A lot of factors are involved in whether you can get a DNA profile. One of them is that different people exude their DNA at different rates. Some people can touch something for only a few seconds and you can get a result. Other people can touch it for five minutes and you will not get a DNA profile. It depends on the individual, and it depends on the environmental conditions at the time. Humidity levels, UV levels, weathering conditions, and things like that, will all affect the chance of getting DNA at the crime scene.

CHAIR: Would hair be most likely to be of use if, for example, it had been pulled out during a violent altercation?

Ms WILSON-WILDE: That is right, yes. If the victim had grabbed hold of the offender's hair and pulled it and had the hair in their hands, yes, it would be very good. Mitochondrial DNA is the second type that we look at. It is inherited from the maternal line only. It is not as discriminating as nuclear DNA. With nuclear DNA you get random combinations from your mother and your father. So siblings are different, whereas with mitochondrial DNA you will have the same as all your brothers and sisters, the same as your mother. So you really cannot tell them apart. It does not have the ability to distinguish between individuals that nuclear DNA does. But it is very sensitive. If you go back to the fried egg example, in the yolk you have one copy of your nuclear DNA. The mitochondrial DNA is in your battery packs, the batteries in your cell, in the white area. You will have between 1,000 and 10,000 copies per cell. There is a lot more DNA there to work with.

CHAIR: Why do you use the expression "battery packs"?

Ms WILSON-WILDE: The mitochondrial DNA is involved in producing power. That is what the mitochondria do. They produce energy for the cell. The tale of a sperm cell has to move around and there is a lot of mitochondria in that area to produce all the action. You need energy to function, to do anything. The mitochondria produce that for the cell. There are lots of copies of the mitochondrial DNA in every cell. That is why it is very useful with human remains—bones and what have you. The mitochondrial DNA is used for the analysis of buried human remains because there is a much greater chance of obtaining a DNA result from the mitochondria than there is of the nuclear.

Indeed, they have got DNA profiles from mummified Egyptian remains from the pyramids and such. They can get a profile because the DNA remains in the bones and there are so many copies. But, as you can imagine, if you have so many copies of something contamination becomes an enormous issue, because it is a lot easier to contaminate something. When they are doing a mitochondrial DNA analysis of a hair shaft they will work on one's sample alone, just one at a time. That is to stop contamination. If you are working on only one sample at a time you cannot contaminate it.

The Hon. PETER BREEN: Would you be able to use mitochondrial DNA as evidence in a court case, or would you have to use nuclear DNA?

Ms WILSON-WILDE: Yes, you can use mitochondrial.

The Hon. PETER BREEN: Do you have to draw a distinction and explain to the court that there is a difference?

Ms WILSON-WILDE: Oh yes, that will be explained. The mitochondrial DNA is not as powerful so you do not get the massive, one in a billion figures. It is completely different. We would not use it as a routine method. It is very expensive to do. There are not many places that do it. We would only use it to identify remains and things like that or on hair shafts.

The Hon. PETER BREEN: So it would be unusual to use it in evidence in a criminal matter, would it?

Ms WILSON-WILDE: Rare. It is used, and used successfully. If you can get mitochondrial DNA from the mother you can say that they match and therefore there is a very good chance that these people are related on the maternal line and therefore prove that the remains are those of the person. So you are identifying the body, which is used in criminal matters. A single hair may be found in the suspect's premises or vehicle. A mitochondrial DNA analysis can be done of that single hair, which would be no good for nuclear DNA because there is no root on it, the wrong growing phase. The mitochondrial DNA analysis can show that that hair is from the deceased because of its relation to the mother and maybe to some other piece of material. Maybe they have found the body.

The Hon. PETER BREEN: Is it absolutely accurate or can your only say that it is possibly from the same line?

Ms WILSON-WILDE: The power of it is less. You will get a result of one in a few hundred or one in a couple of thousand. That is all you can say. You can say that it matches and you can say that it is consistent with and the chance of it being someone else is one in a few hundred or one in a thousand. It is basically a piece of evidence. That is all that it is. That is all any DNA evidence is: one piece of the puzzle. That is all it ever should be viewed as. If we compare success rates of mitochondrial DNA to nuclear DNA we immediately see that the hair shaft is up above 85 per cent whereas with the nuclear it is only about 25 per cent. So the chance of getting a result is a lot greater. If that is all you have in a case then I would do that analysis and I would see what I could get.

CHAIR: That is because in the other case you are relying on the hair root, is that the position?

Ms WILSON-WILDE: Yes. Faeces it is over 80 per cent, aged bones over 90 per cent—this is where buried remains and things come into it—and teeth are apparently good but I do not have any figures. They are very good sources. The nuclear DNA is extremely sensitive. This means that police officers and other people—the general public, everyone—have to be more forensically aware because contamination can be an issue. We can get results from trace amounts of DNA. We do not need much. Theoretically, it is one cell. All you need is one copy to get a DNA result, theoretically. In practice, obviously, we need more than that. But contamination can occur when the DNA from a case or a donor sample becomes mixed with DNA from another source. It could be from anywhere—someone passing by or something like that. Particular when police first get to a crime scene, they have to be more forensically aware than they ever were before. This is something that we are trying to push and educate police on. Every time I give a lecture I talk about contamination issues.

CHAIR: So they have to take very much more care to seal a site, prevent people coming in and so on?

Ms WILSON-WILDE: Seal down the site and log people who came in and out so that if there is a contamination issue we can address that and work out who it is likely to be. Who were the people who had access to that scene? A long time ago you needed a bloodstain of the size of a 20 cent or 50 cent piece in order to get a result. Now you do not even need to see it—non-visible stuff. You can get a result from something that you cannot even see with your naked eye. So how do you know where the evidence is? Recently there was a case in Darwin—I will not tell you do much about it because it has only just happened—in which there was a fantastic DNA result. There was an attempted rape or sexual assault of a young woman.

The whole incident lasted for about 20 minutes. She was beaten quite severely. In the process the offender grabbed the back of her shirt and held on to her so that she could not get away. A struggle ensued. When the laboratory received her shirt it was very heavily blood-soaked. This is where communication comes in. The police had told the scientists that the perpetrator had grabbed on to her and they had struggled. The scientists saw an area on the back of the shirt where it was scrunched up as if someone had grabbed hold of the material and held it tightly. So they sampled that area and got a full DNA profile from it that matched the suspect. You could not even see the samples. It is where his hand was. The skin cells on his hand were transferred to her shirt.

The Hon. PETER BREEN: If a police officer in that example had picked up the shirt by that scruff and contaminated it—

Ms WILSON-WILDE: You would have got a mixed profile.

The Hon. PETER BREEN: How would it be of any benefit to know which police officer picked it up? Is not a contamination a contamination and therefore the sample is useless?

Ms WILSON-WILDE: No, not really. Say there is an alleged rape and you take a vaginal swab. You are rubbing the inside of the vagina and you are getting semen cells and cells from the female as well. You can end up with a mixed profile. But there will be enormous peaks from the suspect because there is lots of semen there and you will have small peaks from the victim. You can very clearly see that the big peaks are from one person and there is a small component in there from another person. We call it a major component and a minor component. It requires analysis by the scientist. That is where it is a difficult analysis but an experienced scientist can tell the difference. This is not always so.

Something may have been touched so many times by so many people that it is rubbish and you cannot tell who is in there. I have had cases like that. I have had to say, "I cannot comment on who is in what. This is the DNA profile that is obtained. It is a mixed profile of at least X number of people and that is all I can say." But sometimes I can say, "This item has been touched by two people and I can clearly say that the two people are this person and this person." If I can get the DNA profile from the police officer I can say, "These components of the profile belong to the police officer." What do I have left? I can separate it in that way. Then you can do a statistical analysis on that. Your figures come down. You might not get one in 10 billion; you might get only one in one billion or one in the million or one in a few thousand. It all requires interpretation by an experienced scientist.

The Hon. PETER BREEN: Does the computer work out the percentages?

Ms WILSON-WILDE: No. You can get a statistical program that can calculate them for you or you can do them by hand. You can sometimes tell the difference between them, not always. It is on a case-by-case basis.

The Hon. PETER BREEN: So even with two people, you still could draw a conclusion that it is impossible to identify the profile of the offender?

Ms WILSON-WILDE: You could do a statistical calculation on it if you have two people. If you can see the alleles of the offender in there you can do a statistical analysis. Given these results, what is the chance of obtaining these profiles that the suspect has given all the ones that I have here? You can do an interpretive statistical analysis on it. You can get some sort of idea but it would be a lower statistical weighting. It brings it down much, much more. The evidence is not as strong but the fact that you cannot rule him out is evidence. There is one thing that DNA will definitively do: it will definitively exclude someone. If you had a mixed profile and you cannot see the profile of the suspect in there anywhere, he is excluded from having contributed to the profile. So it is a definitive exclusion. It has worked very well in a number of cases.

CHAIR: That is a very big plus.

Ms WILSON-WILDE: A very big plus, and it is really underplayed by a lot of people. Giving evidence in court you never talk about the five other people that you have already excluded. That never comes up. I will talk further about that later. There is a general warning that care must be taken to avoid contamination when identifying and collecting DNA evidence. There is always potentially evidence there. Whenever I am examining any item from a crime scene I wear a mask, coveralls and gloves. I take a lot of precautions and a lot of procedures are in place for me to do the examination. I do not want to talk to people. If people want to come over and talk to me I do not let them because they may contaminate my work, and I do not want that occurring. That occurs in the laboratory as well. We all know why we are here. The Crimes (Forensic Procedures) Act 2000 was enacted on 1 January and it allows for the taking of forensic samples from suspects, convicted offenders and volunteers and allows for participation in a national database.

That leads me on to other databases, other legislation that has been introduced in other countries and what they have. The United Kingdom database began on 10 April 1995. Legislation there allows for a police officer to demand a buccal swab or an inside of the cheek swab—they are the

buccal cells—on a charge for any recordable offence. The UK database contains approximately one million individuals. It has about 100,000 crime scene stains. More than 129,000 samples have been destroyed following exclusion or acquittal. That is an enormous amount of samples that have been brought in, DNA profiled and then destroyed. Either they did not match or they were acquitted in court.

The Hon. PETER BREEN: Do those figures mean they have destroyed the sample and the profile or just the sample?

Ms WILSON-WILDE: They destroy the sample and break the link to the profile. They keep the DNA profile but you do not know whose profile it is. It is for statistical purposes.

The Hon. PETER BREEN: Can you explain how they do that? There does not seem to be any point in keeping a profile.

Ms WILSON-WILDE: It is not used for matching. It goes into another database. You get that sequence of numbers and you load it onto another database. Then you can work out how many 12s you have and how many 13s, and what number of variations you have at each site. Then you can work out how common it is. You can do that statistical analysis using that statistical database. You do not need the identity for that. So, you delete the name and any personal details and simply keep the profile, because the larger your statistical database the more accurate your results are, and that is a key point.

CHAIR: So the UK police can only take a buccal swab and nothing else?

Ms WILSON-WILDE: They can take hair and other samples as well. They have hair, blood and other ones but it is just different circumstances. This is an automatic thing. When they are charged with any recordable offence it is an automatic thing, a fingerprint is done and you take a buccal swab. It is slightly different to the way we do it here.

The Hon. PETER BREEN: The buccal swab came from the Wee Waa experience?

CHAIR: Well, it antedated it.

Ms WILSON-WILDE: The English came up with a nifty little swab that they use for the inside of the cheek. It looks a lot like a toothbrush. Indeed, that is what we used in Wee Waa. But prior to Wee Waa England had been doing it since the mid-1980s.

CHAIR: Do the Americans use that as well?

Ms WILSON-WILDE: I am not sure what they use. I think they use a different type of swab again. We now use a different type of swab. Simply as technology changes you use the best available at that time. So we moved away from what the English were using to another system, which is more applicable for our own environment. I will tell you what that is after. While we are talking about these things, I can tell you an anecdote. The first time DNA evidence was ever used was a case in England in the mid to late 1980s. It was the rape and murder of a young teenage girl. About two years later a second girl was raped and murdered. For the second offence an individual had been put up as a possible suspect. He had been seen in the area.

He was brought in for questioning and after 15 hours of police interrogation or questioning he confessed to the crime on the second girl, but he refused to confess to the crime on the first girl. So, they went to Sir Alec Jeffreys, who was just Alec Jeffreys at the time, at Leicester University, who was doing some research into DNA analysis. They asked him to look into the case. They gave him the two crime scene samples and a sample from the suspect. When he did the analysis he said, "Yes, whoever did the first murder did the second murder. They were committed by the same person, but it is not your suspect". So, the first time DNA was ever used in a criminal investigation the person who confessed to the crime was excluded. I saw an interview with him about it and he said, "Well, after 15 hours it was easier to confess".

CHAIR: It is not really trivia, though. I understand a lot of people have been released from death row in the United States.

Ms WILSON-WILDE: That is right, and I have a slide on that later. The potential is enormous. There are lots of anecdotes. It is such a powerful thing. It definitively excludes you from having committed a crime, and that is an extremely powerful ability. The English database is enormous. They essentially lead the world in DNA analysis and databases. I went to Birmingham, where the headquarters are, and it is an enormous setup. They have hundreds of people employed and it is worlds away from anything we have in Australia. It is just huge. They have more than 100,000 persons to scene matches from their database. They have more than 11,000 scene to scene matches. That is where a person has committed more than one offence.

CHAIR: Is that facility in Birmingham for the whole of the United Kingdom?

Ms WILSON-WILDE: Yes. They are obtaining approximately 800 matches per week. Essentially it supports the contention that criminals often commit a spectrum of crime. They are not just committing one crime, they are committing a spectrum of crime. A person guilty of committing a minor crime may be guilty of committing something more substantial. I think the case in point there is the Mr Stinky case. An offender was operating in Victoria and had committed some rather nasty murders, I think it was actually rape-murders. He came to New South Wales—this is another argument for a national database—and was picked up for the rather minor offence of urinating in public.

When you think about every Friday night when office workers cannot be bothered going to the toilet inside and urinate in the alleyway. That is all he was picked up for, urinating in public. He was fingerprinted, it was not a DNA test, and his fingerprints were then uploaded onto the national fingerprint database and he was matched to the murders in Victoria. He was picked up for the very minor crime of urinating in public and was linked to something else, and they had no idea. I think he was a suspect early on but he had dwindled out of the picture.

In the UK approximately 10 per cent of matches have provided major crime linkages and about 90 per cent of the links they have are for burglaries, robberies and car theft. So most of the matches you get on a database are for minor crime and, if you think about it, they are the crimes that affect quite a broad spectrum of the community. Interestingly, about 80 per cent of criminals plead to a crime where there is DNA evidence. The cost savings in court and in investigation times are enormous if a person who is confronted with DNA evidence pleads guilty.

This is a diagrammatic representation of matches that the UK has obtained over the years. You can see it is essentially almost an exponential increase. In the first year there are hardly any matches, and there are not many in the second year. Only in the third year do we get a significant amount of matches coming up. I have some figures, suspect to crime scene, the red. In the first year it is 461. In the second year it is 2,231. In the third year it jumps up to 16,673 matches. In the fourth year it is 22,293 and in the fifth year it is 33,371. So, we can see that huge increase after the third year in the number of samples. We will find a similar thing here. For the first couple of years the database will not be that effective, it will not produce the masses of matches everybody expects it will.

CHAIR: Are you saying it will take time to develop what you might call a critical mass?

Ms WILSON-WILDE: Yes. You need samples from suspects on there, hence the testing of convicted offenders, and you also need the crime scenes to compare them to. You have to get all that onto the database, DNA profiled, and then the results placed on the database. It is not until you get a significant number in your database that you start seeing those matches.

The Hon. PETER BREEN: How do you get a crime to crime figure on a database?

Ms WILSON-WILDE: One sample from a crime scene matches a sample from another crime scene. It will identify repeat offenders. Maybe at one crime scene you have no idea who committed that crime but it matches a break and enter somewhere else. Perhaps you found a blood sample there and you have a suspect. You can therefore link up crimes that way. That is how we can

sometimes link up minor crimes to major crimes. We know someone is operating and we are waiting until we get a suspect that we can match it to.

CHAIR: The figures for crime-to-crime matches in the UK appear to be much more stable from years three onwards.

Ms WILSON-WILDE: Yes, they are.

The Hon. PETER BREEN: I suspect that is because there are many more criminals who commit different crimes than commit the same crimes.

Ms WILSON-WILDE: They are probably taken out, I would say. If you have a suspect and it matches to five crime scenes—I think they do their statistics where that will be five matches as opposed to crime to crime. You are double counting then. So, these crimes are where there is not a suspect. I can give you the figures for these if you like. In the first year it is 348 crime to crime matches. In the second year it is 876. In the third year it is 3,357, in the fourth year 2,491, and in the fifth year it is 2,814. So they are fairly stable. We are often asked how many matches has the database got? We do not expect that it will get many until the third year, two or three years. Now, mass screens. The UK has conducted about 144 mass screens in respect of homicides or rapes. They have actually made more than 53 matches—I think it is more like 75 matches they have made so far. Out of those 53 matches they have got 20 matches for murders and 33 for sex offences. So, it is about one in three or one-third. Mass screens are done when there is absolutely no other evidence. When an investigation has gone nowhere and the police do not know who committed a crime they conduct a mass screening, as we did in Wee Waa. The police were able to obtain a match, and that gave them some intelligence from which they could continue their investigation; it points them in the right direction and excludes people who may have been suspects but were not guilty of an offence.

CHAIR: In the United Kingdom were the mass screens done on a voluntary basis?

Ms WILSON-WILDE: Yes, all on a voluntary basis.

The Hon. PETER BREEN: Does anyone know why an offender volunteers to be screened?

Ms WILSON-WILDE: I do not know, but it happens time and time again. Perhaps it could be related to a child who did something wrong and was burning with guilt because he or she believed that everybody knew about it. Maybe the offender thinks that if he does not volunteer everyone will know, maybe he feels that he is walking around wearing a big sign. We have no idea, so we are oblivious, but they know. The other possibility is that maybe they have convinced themselves that they did not do the crime, maybe they believe that they did not do it.

The Hon. PETER BREEN: In Wee Waa the offender volunteered as a result of the testing, it was extraordinary.

Ms WILSON-WILDE: Yes, that is right. Maybe some offenders want to be caught; and that may have been the case in Wee Waa.

The Hon. PETER BREEN: It is also true that he would not have volunteered were it not for the mass testing.

Ms WILSON-WILDE: That is right. If we had not done the testing in Wee Waa I suspect that that case would be unsolved. Approximately 90 per cent of principal suspects have been found amongst the first 250 persons of interest profiled. The resource and cost implications are self-evident. The catchcry is that this is intelligence-led policing, intelligence-led screening. A sample is taken from everyone in a town but those samples are prioritised. With 500 samples, and from the information obtained at the crime scene and any other information, such as witnesses, the first 50 could be the first priority. So those 50 samples are DNA analysed and if a match is obtained the remainder of the samples are not analysed.

The samples are in batches and are prioritised, it is intelligence-led. In Wee Waa we got 497 samples and started analysing the first batch of 42. The rest were never analysed. You do not go into a

town and mass screen everyone and analyse all the samples, that would be a waste of money. That is where that top point comes in, that 90 per cent are found in the first 250 people profiled. It is all about prioritising and then analysing and seeing what you get.

And the New Zealand database has operated for about five years and has approximately 0.3 per cent of the population, just over 10,000 samples, on its DNA database. When they put a crime scene sample for a break, enter and steal on the database there is a 30 per cent chance that it will match something else, whether another crime scene or a person sample. It is a 30 per cent hit rate for volume crime; that is quite high. In England the rate is about 35 or 36 per cent, which is similar to New Zealand. It does not take many samples to get a percentage of hits coming in.

CHAIR: How was the sample taken in New Zealand?

Ms WILSON-WILDE: I am not sure, but I think it was blood. The Victorian DNA database has operated for about three years and has a total of 6,185 samples. Just under 2,000 of those are convicted offenders and just over 3,000 are crime scene samples. They have a small amount of suspect or accused persons, simply because if a person is acquitted the sample is removed. If a person is convicted of an offence the sample is transferred into the convicted offender database. It is a working database.

The Hon. PETER BREEN: If the person is acquitted the sample is removed. Is it removed from the system altogether or does the profile remain?

Ms WILSON-WILDE: The DNA profile stays in the statistical database but it is not matched to anything, no linking occurs. So it does not make up the database essentially.

The Hon. PETER BREEN: If someone is acquitted in dubious circumstances do the police keep the sample on the database just in case?

Ms WILSON-WILDE: No. The scientists who do the testing are civilians, like myself, they are not police officers, and we have an emotional detachment from a case. Also, penalties are incurred if a sample is retained on the database. My reputation and my career is not worth that, I would remove it. Not doing so is punishable by two years imprisonment, and that is an incentive to remove it. I know that they remove them in Victoria.

The Hon. PETER BREEN: Do you know of any other jurisdictions which keep the samples of people who are acquitted because of the circumstances of the acquittal?

Ms WILSON-WILDE: No. Under our legislation if the samples are required to be deleted they are deleted. The Northern Territory law does not require them to be deleted, so they keep them, whether the person is acquitted or not. Basically the Northern Territory does not delete any samples because they feel it is too much of an administration issue and is costly. It is costly to remove samples because it takes the scientist some time and effort to get onto the database, to check all the details to make sure it is the right one and to change it to the correct category. That has to be done for every sample.

CHAIR: What is the statistical correlation between matches and court convictions?

Ms WILSON-WILDE: I am not sure.

CHAIR: Presumably fairly high?

Ms WILSON-WILDE: I presume so, although in England they are getting 800 matches per week—I prefer to call them "links", because a match does not mean that the person committed the crime. There are many reasons why a person's DNA may be at a crime scene. In England a lot of links are not followed up because they do not have the manpower to do so. That is a secondary issue. It takes a lot of manpower to do something with a link, because it has to be investigated as a normal crime. Essentially we are not getting 800 new crimes that have to be investigated, because some would be under current investigation. It is a lot of work and someone needs to take responsibility for that and make sure it is followed up.

In England they have a lot of problems. If the match is across jurisdictions, whose responsibility is it? They are currently addressing a lot of issues in the United Kingdom. In Victoria they have 1,567 matches to date and 357 of those are person to crime scene, 210 are crime scene to crime scene. They have had five murder matches and 10 sex offence matches. That is very good, because they have only a small database and have not been operating for very long. Obviously, they are getting the links. About 13 per cent of person to crime scene matches are for major crime. That is not a significant amount but it is enough to make it most definitely worthwhile.

In New South Wales we have tested approximately 4,100 inmates and only five have resisted. The back capture of samples has begun and the laboratory has samples. In a rape case with no suspect they kept some samples from that investigation and stored them. They believe that between 10,000 and 15,000 samples are in storage. At the moment they are in the process of analysing those samples so that they can be entered onto the database; they are unsolved crimes too. They have begun loading the samples to the national database; it is all beginning.

The Hon. PETER BREEN: Does the legislation provide that the five offenders who resisted give a sample if required?

Ms WILSON-WILDE: Yes. The legislation requires that they give a sample and the general procedure is that they are asked to give a buccal swab and if they refuse they are given a number of cooling-off periods and are spoken to by the governor and other individuals.

CHAIR: How long are they given to cool off?

Ms WILSON-WILDE: Quite a few days. They can think about it and they are told what will happen if they still refuse. The next stage is that a senior police officer, sergeant or above, can authorise the taking of a hair sample–plucked hair—by force. In one case a prisoner shaved off all his hair, shaved his complete body, and that took him seven hours. He said no to the buccal swab. In that case the police got a court order and took a blood sample. The reality is that if a person must give a sample, as the legislation states, the easiest, least painful and least obtrusive way to do that is by a buccal swab. It looks like a round lollipop, it is made of soft foam, and it goes into the mouth and rubbed against the inside of the cheek.

The police officer takes that swab and presses it against a special paper and card. That card is stored. That special card stops the growth of mould and fungus and can be stored for a long period. That procedure was invented in South Australia. It is an excellent process for our climatic conditions and we can store the swab in a plastic bag and transport it for long distances in hot conditions, such as we have, and it will maintain its DNA profile.

CHAIR: Some weeks ago my attention was drawn to a television program, I think it was called *Insight*, which dealt with the testing of prisoners mainly interstate. It was critical of the regime operating in Victoria.

Ms WILSON-WILDE: Yes.

CHAIR: Looking at the program, there appeared to be a number of people in the room in which the testing occurred. Only one prisoner was present but there were police and/or prison officers in full riot gear, which seemed to be quite over the top. Could that happen in New South Wales?

Ms WILSON-WILDE: No. Victoria has different legislation, it was the first to introduce that type of legislation put. Victoria is not an ideal process. They take blood, and that is the first difference, that is like a fingerprick. A prisoner can resist, even if there is a court order and there are no repercussions. In New South Wales we have built in that if they resist the court order that is punishable by an additional 12 months prison sentence. If someone in Victoria is about to be released within a couple of months and knows that he has committed other offences and does not want to be matched to those offences, he will resist.

In New South Wales he knows if he resists that is an extra 12 months on his sentence. So that is an incentive not to refuse. We have also built into our procedure a buccal swab, then the

counselling, and the cool-down component and then the hair and we have actually done a lot of education as well.

Prison Services have been very much on board. They have produced a video and pamphlets. There is lots of access to information about what it is all about. It is a very informed procedure. I am not sure of the procedure in Victoria in terms of education of prisoners, but the whole process in New South Wales is different. Indeed, I believe it has been a real success story as evidenced from the fact that we have had only five resist it out of 4,100. It is very good.

The Hon. PETER BREEN: This suggests that you are about halfway through the prison population. Is that right?

Ms WILSON-WILDE: That is correct, yes, about halfway through.

The Hon. PETER BREEN: Does that include the Sydney prisons?

Ms WILSON-WILDE: The Sydney prisons?

The Hon. PETER BREEN: Do you know if people in the Sydney prisons have been tested or if those figures are more likely to be the country prisons?

Ms WILSON-WILDE: I think they are all over.

The Hon. PETER BREEN: All over?

Ms WILSON-WILDE: They are all over because the initial testing was done on release date. Those who were to be released soon were tested first, and that was all over the State.

CHAIR: Did you say a moment ago that an additional prison penalty of up to 12 months is attracted if the person does not submit to the testing procedure?

Ms WILSON-WILDE: If there is a court order in New South Wales. That is not the case in Victoria. Victoria can have a court order and they can still resist and not attract an extra penalty. It is my belief that it is a good thing to have because it makes the whole process smoother. Legislation has stated that you must take the sample and you want to make that procedure as smooth as possible, given that legislation. You also want to make it as painless as possible. I have done the training of some of the people who go into the prisons. We use self-sample buccal swaps so that the prisoners are doing it themselves. They are swabbing their own mouths. It is inobtrusive. We teach them a way to take hair samples in the least painful manner possible. I have had a bit of experience in taking hair from people, and I found that if you pluck the hair, yank it out or if you are very rough it is very painful. But we have a method termed the "lever arch method" where you lever the hair out, and it puts an even pressure on the hair you are pulling it is painless or not very painful. It is a reduced amount of pain by using that method. They all use that method.

CHAIR: Is it just one strand of hair that is removed?

Ms WILSON-WILDE: It is virtually impossible to remove one strand of hair at a time because they stick together. You remove a few each time, either 15 or 20 in total. Because the hair is in different growing phases, you need the plucked hair. Even if you use the lever arch method and pluck it out, some of that hair may be dying and about to fall out, so you need to take a few hairs.

CHAIR: When you say "a few", you say up to 15 to 20 times?

Ms WILSON-WILDE: Up to 15 to 20 hairs. You need to take a few hairs to ensure that you are going to get a profile because the last thing you want to do is go back and get more hair or do the whole thing again. We probably take more than we need, but enough to ensure a result. The police are not trained to identify the right growing phase. The way we get around that is to take a good 15 hairs and you are right. Victorian research looked into all its sexual offenders and found that all its serious sex offenders in the past 10 years started their criminal lives as offenders of volume crime, every single one of them. There is a progression from volume crime, break and enters.

Then there is an opportunistic event, for example a female is home at the time the offender is breaking into a house, and the offender commits a sexual offence then goes on to commit more. Very rarely does a sex offender commence by committing sex offences. There is a progression. There are a few points here. You can potentially break that link so that the offender does not progress to a serial sex offender or identify the offender early so that when the offender commits the first sex offence you can match up the offender, obtain a link and investigate the case, et cetera.

The Hon. PETER BREEN: Is that consistent with the existing way of producing a record of an offender? Is this just something that has come up as a result of new technology, or has it always been the fact that a person who commits volume crime is likely to become a sex offender?

Ms WILSON-WILDE: Just because you commit volume crime does not mean to say that you are going to be a sex offender. But a very large majority of serial sex offenders, if you look at the information, started off doing volume crime.

The Hon. PETER BREEN: But is this is something we have always known, or is it only as a result of technology?

Ms WILSON-WILDE: We have always known that criminals progress, and I am talking about criminals as opposed to the murder of a husband on a wife. We have always known that criminals have developed, that there has been progression. This technology of looking at the DNA has highlighted this and allowed us to be able to research it and see if it actually occurs. Research in New Zealand found that 90 per cent of its sex offenders already had convictions for break enter and steal. It is the same thing. That is a sex offender who was breaking into homes and sexually offending against women who were home at the time.

The Hon. PETER BREEN: But it is not a good argument as to why we should have the database, given that we already know that.

Ms WILSON-WILDE: We already know that, but the argument for the DNA database is more along the lines of given that we know that, if you are committing sexual offence you usually leave DNA at the crime scene. Something like semen. There are also offences where the victim does not know the offender. The victim can give a description, but does not know the offender. You are virtually relying on our DNA match to solve that crime. A database is useful because you can often get their DNA on the database from the volume crime they have committed previously. It will then be able to solve the crime if the offender starts committing sex offences. You do not have to wait for the offender to commit 14 more sexual offences before you get other evidence. It is about breaking the link.

I would like to mention a bit about Wee Waa where, as you know, a vicious sexual assault was committed on Rita Knight. The evidence from the crime scene is suggested that the offender was a local, someone from the town of Wee Waa. We had intelligence information. We went into the town and conducted DNA testing on the males that fitted into the population. We had masses of community support. I went up there and it was absolutely amazing to see the community support for the mass screening. The Country Women's Association made us scones and what have you. They were the best scones I have ever tasted. The support was huge. We had the rugby team come down. That was all on the TV, but what the TV did not show was the group of supporters who had a barbecue because of the DNA sampling.

They decided to hold a barbecue in support. After they had their food they all came down as a big group to do it all together. Fathers and sons came down together, mates came down. An old 75-year-old came down. Obviously, this guy could not have committed a crime to save his life. He was hobbling around on a walking stick. I said, "Look, you are not really in the age demographic. We do not need to test you." He said, "I've come down here to give my sample, and I want to give my sample." The poor guy had to use one hand to hold in his false teeth while he used the other hand to swab his mouth. That was the level of community support.

CHAIR: At the risk of injecting a discordant note, in a small community such as Wee Waa, there is a question as to the voluntary nature of the sampling if there is that degree of community

support, given that anyone who held out from the process would inevitably be subjected to a great deal of pressure to consent.

Ms WILSON-WILDE: I understand that, but testing was done whereby police officers went into their homes. The police officers went in. They were not local police; they were police who did not know them. The testing was done in the privacy of their own homes. If they said no, that was not advertised. No-one was told. They could then go down to the pub and say, "The police came into my home", because all the neighbours would have said, "and I gave a sample." No-one would be any the wiser. It would be only if they said, "No, I am not giving a sample." But if they did not want to give a sample and not let everyone know, then they had that opportunity. It was there for them. Indeed at least half a dozen people at Wee Waa did not volunteer and there were no repercussions.

The Hon. PETER BREEN: There are no people today walking around Wee Waa saying "You did not give a sample"?

Ms WILSON-WILDE: No, not that I know of. The only person is a lawyer, who did not live in Wee Waa anyway. I think he was from Narrabri. That is the unfortunate part. He was extremely vocal about it. Yes, sure, in a smaller community it did affect the community. There is no doubt about that. Because Rita Knight was elderly there was a lot of empathy and sympathy. I know that affected the community. When a lawyer did not want to, there was a lot of negative feeling towards him. That is the bad side, I guess.

The Hon. PETER BREEN: But what you are saying is that if someone did not want to be identified that person did not have to be identified?

Ms WILSON-WILDE: That is correct.

The Hon. PETER BREEN: I did not know that before.

CHAIR: I did not know it either. That is an added safeguard.

Ms WILSON-WILDE: Yes. We set up stations using the major incident response vehicle, which is a big truck-like vehicle, at the police station. We allowed for people to come to the police station to have their samples taken. But most of it was done in people's homes. The police went around. The reason for that is that we gave out a survey as well. It was not just the taking of DNA samples. It was all part of that intelligence web of policing. We gave a survey as well to ensure that we got everyone which is like, "Who are you? You live here, who lives next door? Who lives on the other side?" So that we could identify people. They needed two forms of identification. That was all in there.

We had questions asked such as, "Where were you at the time?" Then we had profiling-type questions, such as "Did you commit this offence on Rita Knight? Do you think the person who committed this offence would be feeling sorry for what he has done?" It was interesting to note that the only person who actually showed empathy for the offender said, "Yes, I think he would be feeling very sorry for what he has done and, yes, he does deserve the second chance", was the offender. Again, those surveys are part of the intelligence component that allow us to prioritise all samples and work it all out. It is a bigger thing than are just going in and DNA testing everyone.

That probably was not brought forward by the media at the time. But the outcome was that it exculpated all the innocent people and it inculpated the offender. We got the result we wanted. The benefits of the DNA database are to reduce crime rate, potentially. The deterrent factor is early detection of recidivists. Investigation costs, pointing an investigation in the right direction as opposed to other ways, and highlighting links between and offence and offender. The victim of crime committed by an unknown offender who is still out there can make it very difficult for the victim to get over that offence because they know that the person is still out there. Once we can identify who that was and put them in gaol for that offence the victim, who after all is the victim, can get over that and move on with their life. It identifies wrongly accused suspects, and this is where the whole innocence panel comes in. Also there are a court costs savings.

In relation to the wrongly accused suspects, America has the innocence project, which has been operating for quite a number of years, headed by a lawyer named Barry Shack. He receives letters from convicted offenders on death row who maintain their innocence in a crime. He goes back to the samples and uses DNA technology. These cases involve offenders convicted of an offence before DNA technology, so, ABO blood grouping or other things like that. He has the samples reanalysed using current technology and as a result has freed over 75 individuals from gaol; those long-term criminals most of whom were on death row. That is amazing success and highlights what can be done with this. Another case in America involved a boy who had been convicted of the rape and murder of his grandmother. He was convicted on what is called secretor status, which is a protein in semen. The evidence that convicted him was all circumstantial. He maintained his innocence. He served a long time in gaol on death row for that offence, I do not know the exact number of years but it was over 10 years.

Barry Shack had DNA analysis done on those samples and compare the DNA with the DNA from the semen, from the spermatozoa found at the crime scene, and showed that they were not the same. The emotion that would be involved in being convicted of your grandmother's rape and murder would be hard to live with and then to be shown that you were not guilty is quite enormous. I believe the Minister for Police here is setting up a similar innocence panel. I believe it is a worthwhile project because if you can use the information to help convict someone of an offence, equally you should use that information to show that someone is not guilty of an offence. It works both ways.

CHAIR: It should address also some civil liberties concerns.

Ms WILSON-WILDE: Yes. The important point to know is that we do not get any information out of a person. This system has been around for quite a number of years. It is a tried and true method. There are a lot of safeguards put into the system to ensure that results are accurate. Statistical analysis is done on it and it definitively excludes people. The whole point of DNA analysis is that you look for differences. You try to exclude someone. That is how you do the DNA analysis. The scientist is looking for differences. At the end of the analysis, if you cannot find any differences then you have not been able to exclude them. That is how you go about doing the analysis. That is the key issue. A DNA scientist is trying to find differences to exclude the person. If they can, they can, but if they cannot, you are left in a situation where you cannot exclude them. That is the evidence that has been brought before the court.

This slide is on where we are going in the future, because that is the question. We know where we are, but where can we go? A routine 24-turnaround time for DNA analysis—get faster and better at doing this. Cheap rapid mitochondrial DNA screening. As I said before, it is expensive and takes quite a while. In America it takes three months to do mitochondrial DNA analysis on a sample. The Forensic Science Service in England has been conducting research into targeting descriptor genes. These are predictive testings such as race, skin, hair colour, facial characteristics, eye colour, weight, age and behavioural characteristics—predisposition of things. That centre has been doing this since at least 1996. I do not think it has got very far.

The reality is that if we look at something simple, like hair colour, it is not just one gene or one site on the DNA that tells you whether you have brown hair; many sites are involved. So, how do you test for all of those sites? It is very difficult. Things like behavioural characteristics are not just determined by your genes; they are determined by your environmental conditions—the whole nature versus nurture argument. One or two people may have a predisposition for heart disease, one of them eats McDonald's, does not exercise and sits in front of the television every night and gets heart disease. The other person has healthy living, eats healthy, exercises regularly and has other interests and does not get heart disease. It is the factor not only of your genes but of your environment. They are looking at this, but I do not know where they are up to.

One part we are looking into and where we are having much success is real-time crime scene DNA profiling. That is where we go out to a crime scene, we find a blood stained, we pop it in the machine that does the DNA analysis at the scene. It produces a result, a DNA profile. We uplink it via a satellite connection to the database, match it on the database and 15 minutes later you get a result, yes, that DNA profile matches such and such a person. That is all done at the crime scene. The technology is there. America recently held a conference and highlighted quite a number of instruments that could do this type of thing, but they are not sensitive enough at this stage. Potentially this could

be where we are going. It has benefits in that it reduces contamination issues. Continuity issues are reduced because it is all done at the crime scene and does not go through multiple people. Fewer people have involvement in the sample, so it reduces contamination. There are huge benefits to it of course, particularly when you are trying to investigate, say, a murder. You want the results as soon as you can to use the information.

Essentially this is about putting the best science available to the court. The bottom line is that there is an expectation by the courts, the Coroner and the community that the best science available will be used by investigators and the courts to help resolve the matter. That means the effective and efficient use of DNA profiling and the DNA database. As scientists we have an obligation to use whatever we can to help solve the matter, and that is what we are doing.

CHAIR: You would be aware that there have been recent calls at least at a political level, for mandatory DNA testing of newborn babies. The National Party has been associated with those calls. I believe DNA samples sometimes are taken from newborn babies to test for genetic diseases.

Ms WILSON-WILDE: Yes.

CHAIR: Is that for the purpose of an anonymous comparison database or are the details of the baby recorded and linked to the DNA sample taken? Do you know the answer to that?

Ms WILSON-WILDE: Yes I do actually. It is called a Guthrie spot test. They prick the heel of a newborn and spot the blood onto a card. That has been done with just about every birth since the sixties. From that Guthrie spot the hospital records all the details of the child to be used for genetic testing. If they find that the child has a gene for a genetic disorder, then they tell the parents, provide the information and genetic counselling and a whole lot more goes on after that. They use those spots again if in five years time they find they have developed a new test for a new genetic disorder. If again they find that a child has tested positive, they will inform the parents. It is not DNA profiling. It is not DNA analysis the same as we do in forensics. I believe it serves a major role for the community and the Police Service has signed a memorandum of understanding with the health department, which holds these Guthrie spots, that it will not demand access to any of them unless it is in the interests of the person, such as identifying deceased remains.

It is vital that those are kept for the purpose for which they are intended. I believe in Western Australia the police went with a court order to the health department to demand these Guthrie spots. They destroyed all of the Guthrie spots except for the last two years. That is a massive loss to the community. I would never want to see anything like that happen in New South Wales. That is why the Police Service actually decided to create this memorandum of understanding so that it was clear exactly what we wanted. We simply do not want to put that in danger. I know I would not.

CHAIR: You would be aware that the legislation mandates that the Standing Committee on Law and Justice conducts the inquiry that we are now embarking on. In some ways it is regrettable that we are doing this so early. However, do you think there is sufficient experience, short as it may be, for us to reach reasonable or valid conclusions?

Ms WILSON-WILDE: I think we can get an idea of what is happening in the Police Service and in DNA testing. I do not think we will see the results of the benefits to society for another couple of years, the matches and possible reduction in crime rate and things like that. But you will be able to see how effective the legislation is in taking samples and getting matches on current cases. We may get an idea of some matches if we can do preliminary matching with the national database soon. You will certainly be able to see where improvements are required in the legislation.

CHAIR: In other words, we can validly examine the methodology?

Ms WILSON-WILDE: Yes, the methodology and the workings of the actual legislation.

The Hon. PETER BREEN: There is a question about whether the testing facilities available to the prosecution are always available to a defence. There is a case in Queensland of a fellow named Burton who was convicted of an offence, but had the testing been done during the course of his trial it

would have been conclusive that he was not the offender. Do you have any view about that? Is there any system in place that can make the testing facilities more accessible to defence teams?

Ms WILSON-WILDE: I believe that a defendant has the right to get the DNA analysis done independently. I have concerns about the same laboratory doing it, as in the laboratory at Lidcombe—DAL. I would have concerns about a laboratory that conducted the initial analysis doing the reanalysis. I would like to see an independent laboratory do that. So, either another laboratory interstate like AFP Canberra or other laboratories that are now operating that will do DNA analysis. They may not do it in the same system, but it all works the same way. I think you can use a different system and if the two samples are from the same source they will match.

If there is a difference that should be borne out straight away even if you are using a different system—without doubt. There are laboratories that will do that. University laboratories will do it. It means that the defendant needs to have access to the crime scene sample. I believe they should have access to that and to have it independently analysed. It is costly. It will cost them because it is not free. It certainly is not free to the prosecution; someone has to pay. They should be able to do that and I believe it should be done by an independent laboratory. That is my opinion.

CHAIR: Does each Australian jurisdiction have its own official laboratory, so to speak?

Ms WILSON-WILDE: Yes, every jurisdiction has its own laboratory that does the majority of its casework. Sometimes samples are sent interstate or overseas for whatever reason, but there are quite a number of laboratories that will do independent analysis. One was advertised on the television only a short time ago. It advertised parentage testing for individuals who suspected a child was not their own, but it is the same technique.

The Hon. PETER BREEN: Is it the case, though, that if a sample is contaminated the most you can expect is that the person will be excluded. Would the person be excluded if a sample was contaminated?

Ms WILSON-WILDE: That is a difficult question because it depends of the case. If, in respect of a sample from the crime scene, I were to say it was not contaminated and that it matched the suspect—in other words, they were from the same source—but it was contaminated after that by another person, you still would not be able to exclude the suspect. It would still be there. You essentially get additional DNA fragments, but it would cover is a mixture. You would be able to identify that a mixture has occurred or that contamination has occurred.

The Hon. PETER BREEN: That argument could be used to say that there is no point in having a second test because, even if a sample has been contaminated, the profile is still identifiable.

Ms WILSON-WILDE: If two profiles are from the same source, it does not matter how many analyses you get it will still show the same thing.

The Hon. PETER BREEN: That is right. The question is: What is the point?

Ms WILSON-WILDE: That is a good question. There is no answer to that. If the laboratory conducts an analysis of a crime scene sample and finds that is from a single source and that it matches a suspect, the only thing the suspect can do is to have it analysed using a different system. But, I would say that would probably show that it also matches. It is like I said, you can only get the result that you get. It will either excluded or include them; that is all you can get.

The Hon. PETER BREEN: The only form of contamination it might protect you against is if it is somehow the wrong sample.

Ms WILSON-WILDE: That is right. Swapping samples.

The Hon. PETER BREEN: Independent testing could protect you against that.

Ms WILSON-WILDE: That is right

CHAIR: How often—albeit rare, I would hope—do false matches occur?

Ms WILSON-WILDE: When the old system was used, using three or four sites, there was a potential for false matches. The more sites you look at, the less chance of that occurring. I am not going to tell you that that is impossible. I cannot because we have not tested everyone. There is a chance because you do not look at the whole DNA molecule; you only look at those 10 sites. So, yes. There is a chance that it could match somebody else and that two people have the same DNA profile, but that is so rare. That is why you do the statistical analysis, to give the court an indication of the chance of someone else in the population having that same profile. I cannot say is impossible. It is possible, yes. That is why we do a statistical analysis, but I would say it would be very, very, very unlikely.

(Ms Wilson-Wilde withdrew)

The Committee concluded at 1.50 p.m.