www.ifpi.org.nz

The Independent Forensic Practitioner's Institute

Response to the NZ Law Commission's DNA Issues Paper; Paper 43

DNA Review
Law Commission
Wellington

24 April 2019

By email: dna@lawcom.govt.nz

Re: **The use of DNA in Criminal Investigations, Issues Paper 43**

Introduction

The Independent Forensic Practitioner Institute Inc. ('IFPI') is grateful for the opportunity to comment on the Law Commission's review of the Criminal Investigations (Bodily Samples) Act 1995 (CIBS Act) in its Issues Paper, The Use of DNA in Criminal Investigations/Te Whakamahi i te ra Tangata i ngā Mātai Taihara – Issues Paper 43, December 2018 (herein, 'Issues Paper').

IFPI agrees that the CIBS Act is in need of replacement.

Although DNA evidence has great potential to improve crime fighting, and has been useful in exonerating people who have been wrongfully convicted worldwide, IFPI has not expressed its opinions in this submission from that perspective. Rather, we have taken a critical approach on the basis that if inappropriately executed DNA evidence could lead to even *one* inappropriate prosecutorial accusation or wrongful conviction, this is not acceptable. This is consistent with the perspective which our society requires when evaluating the implementation of new machinery and technology. New machinery is not acceptable if, even though it greatly benefits the vast majority it can still result in personal loss to only a single individual.

If the Law Commission wishes to discuss any aspects of this submission with our members further, we would be pleased to assist.

Chapter 1: Introduction

IFPI has no comments to Chapter 1 of the Law Commission's paper

Chapter 2: Framework for Analysis

Paragraph 2.13

The value of DNA profiling stems from its reliability. It has long been described as the "gold standard" of forensic science – a status largely reinforced in a 2016 report by the United States President's Council of Advisors on Science and Technology (PCAST).

The PCAST report was highly critical of many fields of forensic science but found that the vast majority of DNA profiling used "an objective method in which the laboratory protocols are precisely defined and the interpretation involves little or no human judgment"

IFPI's response

This is not entirely correct. While Forensic DNA testing may well have been described in popular press as the "gold standard of forensics" there have also been numerous reports in the legal[1] and the scientific literature[2] that would suggest otherwise.

Far from reinforcing Forensic DNA as the "gold standard" standard in the case of the analysis of single-source and simple mixtures the PCAST *inter alia* concluded that[3]:

i. Provided the appropriate amount of DNA was analysed, the probability of a match arising by chance in the population is extremely low.
ii. But like all forensic analysis, DNA is not infallible; and
iii. Errors can and do occur (sample mix-ups, contamination, incorrect interpretation and reporting errors);
iv. Although the probability of two samples from different sources having the same profile is small, the chance of human error is much higher but this can be minimized by adherence to well validated Standard Operating Procedures (SOP's) with all the appropriate controls and Quality Assurance Standards;

In the case of complex mixtures the PCAST report concluded that:

i. The difference between complex mixture samples and in single source or simple mixture samples lies not so much in the laboratory processes but in the interpretation of the resulting profile;
ii. These analysis are inherently much more subjective and difficult and therefore susceptible to error and confirmation bias;
iii. The probability that a suspect matches by chance may be greatly increased (by many orders of magnitude) than in the case of a single-source profile;

These PCAST recommendations are fundamental components of all scientific method, not just forensic DNA.

[1] For example: William C. Thompson *"Tarnish on the 'Gold Standard: 'Understanding recent problems in Forensic DNA Testing"* [2006] The Champion Magazine 10-16 www.NACDL.org pages 10-16
[2] A decade later: Cynthia M. Cale *"Forensic DNA is not infallible"* [2015] Nature 526: 611
[3] President's Council of Advisors on Science and Technology *Forensic Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods* (2016) at page 7

Failure to adopt/adhere to these principles invalidates the results and increases the risk of a false conclusion being drawn by the fact finder in criminal trials, be it by judges or juries.
The PCAST report also noted that advances in computer programs (including the STRMix software[4] developed by ESR) were imminent and these represented a major improvement by removing subjectivity from the interpretation but at the time the report was submitted their scientific validity had not been established.

IFPI agrees that these advances represent a significant step forward.

However, we were also aware that around that time the commercialisation of the STRMix software (and that of its competitors) had run into difficulty in a number of jurisdictions because of their lack of validation to the standard these jurisdictions required. For example, in USA the software packages did not comply with the Daubert Standard and its need to publish and/or full disclosure of the algorithms that these software programs relied on. This conflicted with commercial constraints.

We understand that these concerns with respect to STRmix have been resolved in some overseas jurisdictions[5]. But what is not clear is when and by what process STRmix was formally validated and approved for use in the New Zealand Courts.

This raises another problem which has not been identified. In IFPI's experience it is not uncommon for ESR to refuse to provide the defence with their protocols, standard operating procedures (SOP's) and/or the empirical validation data, citing commercial reasons.

Be that as it may, this information is pivotal information to the expert(s) undertaking peer review for the defence. Peer review is a fundamental principle of science just as full disclosure is a fundamental principle of criminal jurisprudence. These two foundations of science and the criminal justice system must in our opinion take precedence over commercial considerations.

Indeed, some of our members operate their own laboratory and/or have been involved with engaging commercial companies or institutions that offer forensic services for the defence. We are not aware that any of these providers refusing to disclose their methods, SOP's or their validation data. Usually they form part of their report to the Defence Counsel.

It is IFPI's submission that the new legislation should prevent the Police from employing scientific methods that are considered to be commercially sensitive and therefore are not fully and freely available for independent review.

Paragraph 2.23

Regarding Parliament's second aim of eliminating suspects and exonerating the innocent, there are high-profile cases in New Zealand that demonstrate how DNA profiling can exonerate the wrongfully convicted. The cases of Teina Pora, David Dougherty and Aaron Farmer are the most prominent.

[4] At [3.23]
[5] At [7.34]

Footnote to paragraph 2.2.3

Teina Pora was arrested in 1993 and convicted of the rape and murder of Susan Burdett in 1994. DNA evidence obtained from Ms Burdett's body was linked to another man. This DNA evidence was later relevant when the Privy Council quashed Mr Pora's conviction in 2015. David Dougherty was convicted of kidnapping and raping an 11-year-old girl in 1993. However, new DNA evidence led to a retrial in 1997 where Mr Dougherty was acquitted. Aaron Farmer was convicted of raping a 22-year-old woman in 2003. After a successful appeal, the retrial ordered did not proceed as new DNA evidence excluded Mr Farmer as the rapist.

IFPI's response

We do not believe that the cases of Teina Pora and David Dougherty are good examples of how DNA profiling can exonerate the wrongfully convicted. Instead, they demonstrate imperfect court processes and risks to the innocent who may be subject to court scrutiny. They may therefore discourage the public from volunteering their DNA to a database that can be scrutinized by prosecutorial and court processes. These two cases are therefore worth discussing in greater detail.

Teina Pora was arrested and convicted based on a false confession by him. The fact that a DNA profile obtained from Ms Burdett's body did not match that obtained from Teina Pora was never in doubt and was known from the outset. The DNA profile was subsequently matched to Malcolm Rewa when he was apprehended a year or so later and that in part led to a re-trial for Pora. At this re-trial Pora was again convicted and his subsequent appeal was again dismissed. Therefore DNA played no part in his exoneration, yet it possibly should have.

David Dougherty was arrested in 1992 solely on the determined identification evidence of the 11 year old complainant. There was no forensic evidence linking him to the alleged scene or the complainant and her clothing, nor was there any forensic evidence linking the complainant to Dougherty and the clothes he was wearing. He voluntarily provided a DNA reference sample when there was no legal requirement for him to do so. No DNA profile was obtained from any of the scene samples using the methods available at that time. David was convicted in 1993. Within three months of his conviction the ESR re-tested these samples at the request of David's father using a new and much more sensitive (PCR based) technology. Although they found another man's DNA, the ESR scientist concerned advised the Court of Appeal that in her opinion, there were traces of DNA from which Dougherty could not be excluded and his appeal was dismissed in 1994.

That led to a long and torturous process to obtain justice for David Dougherty, including: (i) a petition to the Governor General to have his case reopened in 1996; (ii) a rare second appeal which ordered a re-trial on the basis that the opinion of three independent scientists engaged by the defence was materially different to the ESR's; (iii) a High Court order requiring the scene samples and what remained of the DNA extracted from them to be transferred to the defence so they could repeat the original work done by ESR and undertake new work using three STR DNA loci. That resulted in a clear DNA profile which could not have originated from David Dougherty. Nor was there any evidence of the traces that the ESR scientist and Crown were still relying on to implicate him.

Prior to the retrial in 1997, the admissibility of the ESR scientist's evidence given to the 2nd Court of Appeal was challenged on the basis of the new exculpatory DNA profile provided by the defence. Although the Crown's evidence was ruled admissible by the trial Judge, the Jury acquitted David Dougherty.

That was not the end of the matter. As part of the investigation into the application for compensation an untested semen stain was found on a leg of the pyjamas that the complainant had been wearing and which had previously been missed by ESR. This stain was sent to yet another laboratory (the 3rd) and from this a pristine, single source, full-length (10/10 loci) DNA profile was obtained using the SGM+ chemistry[6]. In 2001 David Dougherty received an apology from the Government and was granted compensation.

That SGM+ DNA profile was eventually submitted to the DNA Profiles Databank in 2003, where it was found to possibly relate to another man[7].

Finally David Dougherty's name was unequivocally cleared but the long drawn out legal process required to clear his name once convicted, left him deeply affected and stigmatized for the rest of his life[8].

Although there have been several cases overseas where DNA has been used to rectify wrongful convictions, David Dougherty's case has demonstrated that in New Zealand this is far from straightforward. It also demonstrates the risk associated with DNA profiling evidence being admitted with inadequate court scrutiny together with the personal loss that an innocent party may suffer if that risk materializes, even if the end result is acquittal. This is because the process of complete exoneration may take several years to finally conclude. IFPI believes that this risk must be assessed and promulgated openly, honestly and truthfully when inviting the general public to volunteer or be compelled for their DNA profiles to be placed in the state's databanks, which can expose them to the risk of false implication.

IFPI submits that there are many lessons to be learned from the case of David Dougherty. This occurred before DNA databases were set up and the CIBS Act was enacted. The role of DNA was pivotal from beginning to end throughout the criminal investigation, prosecution and exoneration phases of the end to end judicial process. Although DNA technology has progressed significantly since that used at David Dougherty's first appeal, IFPI believes that there are lessons from this case which are very relevant to the current review[9] and that a more comprehensive analysis of each of these phases would help to improve new court processes required to assess DNA evidence.

Another case which has different lessons to contribute to the current review is the case of George Gwaze who was accused of raping and murdering his 10 year old adopted daughter. The only evidence linking Mr Gwaze to the allegations of sexual assault was DNA likely to have originated from sperm, on the underpants the girl was wearing. He was tried twice and acquitted both times[10].

Again this is an example where a full DNA profile appeared pivotal to many aspects of the Crown's case yet there was disagreement between defense and prosecution scientists during both High court trials regarding the interpretation and significance of that profile in the context of other non-DNA evidence. George Gwaze was finally acquitted but unlike Dougherty, he received no compensation

[6] Arie Geursen [2003] *There is no solving crime without science but is the court room the appropriate place to do science?* Proceedings of the Royal Society of New Zealand Series 63 (ISBN 1-877264-10-5) pages 56-61.
[7] Reekie vs R [2004] CA339/03
[8] David Dougherty Obituary NZ Herald (28 April 2017): https://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=11847308
[9] Arie Geursen [2003] *There is no solving crime without science but is the court room the appropriate place to do science?* Proceedings of the Royal Society of New Zealand Series 63 (ISBN 1-877264-10-5) pages 56-61.
[10] Felicity Goodyear-Smith [2015] In "Murder that wasn't: The case of George Gwaze"' Pub Otago University Press. ISBN 978-1-877578-99-1

for the enormous personal stress to him and his family and interruption to his veterinary career. George Gwaze's case is discussed in more detail in our response to Chapter 5 of the DNA issues paper to demonstrate the value of a meticulous and detailed scene examination to capture all the evidence from the outset of every investigation and before there is a risk of confirmation bias.

Gwaze's case is a good example of how the prejudicial effect of DNA evidence can incorrectly overtake its probative value.

Finally on this point, it is important to note that the government's move to introduce a Criminal Cases Review Commission is formal acknowledgement that the risk of a wrongful conviction is meaningfully significant. One overseas article estimates this risk as high as 11.6% [11] for cases with a sexual assault component. Sangero estimates it as between 5 to 10 %.[12] Although appropriate use of DNA may be able to reduce the risk of a wrongful prosecutorial accusation and/or conviction of someone linked to a DNA profile obtained from a crime sample even further, it may still be higher than the risk of other types of personal losses from events such as air crashes and industrial OSH type accidents.[13] Regrettably the risk of a wrongful convictions is poorly understood. IFPI believes that this risk must be comprehensively assessed and then be explained to anyone who is asked to consent to providing DNA reference samples in criminal investigations. In our view this is as important as issues of privacy and bodily intrusion which rightfully attract a lot of attention in the DNA issues paper but regrettably has not been considered to the same extent.

Paragraph 2.25

The CIBS Act alludes to this potential:

(a) *The suspect sampling provisions specifically state that a sample may be taken "to confirm or disprove" the suspect's involvement in the offending. Once a suspect sample is taken, the provisions require the officer to offer to take a second sample to allow the suspect to have it independently analysed. Police advises that, at most, it receives three or four requests a year for a second sample.*

(b) *Similarly, the CIBS Act provides that, if the suspect requests it and it is practicable, part of the crime scene sample should be made available for independent analysis. ESR advises that it receives very few such requests, although it does not collect exact numbers.*

IFPI's response

While we acknowledge that frequently crime scene samples will be fully used up or destroyed in the initial stages of the investigation, it is our experience that Police and/or Crown Prosecutors, assisted by ESR, will vigorously resist any request for access to or handing over of scene samples to the defense or only agree to do so only if ESR do the work. This creates significant difficulties not least of which is the conflict of interest. In our experience, Judges are at best reluctant to enter into argument about these issues or flatly refuse to require it.

[11] Walsh, K et al *'Estimating the prevalence of wrongful convictions'* US National Criminal Justice Service, office of Justice programs Doc No 251115 Sept 2017 page 11

[12] Sangero,B 'Safety from wrongful convictions' self-published, Jerusalem Israel 2016; sangero@clb.ac.il page 14

[13] Sangero, B ibid page xiii

While it is only rarely necessary for the defense to do additional testing, it is important to note that had the scene samples in the David Dougherty case not been transferred to the defense as the Judge ordered (overruling the crown's objection), David would probably have never been fully exonerated or compensated.

We believe that it is the suspect's right to have access to part of the crime sample. In our view, the CIBS Act is too nebulous in this regard and should be strengthened.

If this not already a right under NZBOR, then it should be.

Chapter 3: The Science

Paragraph 3.14

The overall likelihood ratio compares two propositions: the likelihood of the DNA profiling results from the crime scene sample if they came from the suspect/person of interest compared to the likelihood of the same DNA profiling results from the crime scene sample if they came from a member of the New Zealand public selected at random. This ratio is then explained using an equivalent verbal scale. For example: the likelihood of obtaining these [DNA profiling] results is at least one million times greater if the DNA in this sample originated from Person X rather than from someone selected at random from the general New Zealand public. On the verbal equivalent scale this would provide extremely strong support for the proposition that the DNA evidence came from the person of interest.

Footnote to paragraph 3.14

The verbal equivalent scale used in New Zealand:

Likelihood ratio	**Verbal equivalent**
1	Is neutral
1-10	Provides slight support
10-100	Provides moderate support
100 - 1,000	Provides strong support
1,000 - 1,000,000	Provides very strong support
Over 1,000,000	Provides extremely strong support

IFPI's response

The likelihood ratio is 1 divided by the random match probability. The random match probability is how frequently a profile of alleles (genetic characteristics) has been observed in combination in a sample of random individuals in the population.

The random match probability with STR loci on 20 chromosomes is a very, very small number and is typically in the order of (10^{-10}).

When we divide that small number into 1, we get a very large likelihood ratio which suggests that the sample is 10 billion times more likely to have originated from the accused than a man randomly selected from the NZ population.

While all this may appear to be a reliable and robust statistical approach for the strength of a match, frequently it does not consider the factual (non-DNA) circumstances of the case. This can lead to confusion of many people including the scientist[14].

Take for example the likelihood of someone committing a crime on an item from their own house. Finding their own DNA at the scene of a crime is unlikely to be useful. In cases such as these, the denominator for that proposition is not known or quantifiable. The verbal scale routinely used does nothing to address situations like this. Nor does it say anything about underlying reproducibility, repeatability and reliability of the profile in question. All these are important considerations when it comes to assessing the relevance of the DNA profile to the crime which the likelihood ratio based on a random match probability, does not properly represent.

Gill writes that it is the responsibility of the forensic scientist to put forward the limitations of the statistical evidence, so that it is not misinterpreted. [15] The statistical strength of a match to a random man on its own, is of limited use to the prosecution because it is unlikely to determine the probability of guilt without consideration of other evidence. Therefore it is essential to explain all the possible transfer methods that could have resulted in the DNA being found in its location and how it could have related to the crime. Many of these are imponderable and therefore it is not possible to estimate the statistical bases underpinning these propositions. We therefore believe that the likelihood ratios based on a random match and the enormous numbers generated are highly prejudicial and are largely responsible for perpetrating the myths around forensic DNA's infallibility and also for the CSI effect which research shows is very real.

From a scientific perspective it is more important that the expert ensures that a robust DNA profile is obtained from the crime scene sample before it is compared to a reference sample. If appropriate the likelihood ratio and its corresponding verbal scale may be used as a measure to quantify the extent to which a crime scene DNA sample matches the reference sample. However it must be remembered that this may not correctly indicate the probability that the person from whom the DNA sample was obtained committed the crime, because other factors which the likelihood ratio does not assess, may have contributed to this probability.

Therefore IFPI recommends that likelihood ratios should only be given in evidence in court provided the mechanisms of DNA transfer have already been proven and the limitations of the statistical data have been comprehensively explained.

Chapter 4: Time for a New Act

IFPI makes no comment to Chapter 4

Chapter 5: Crime Scene Examinations

While we accept that not all crime scenes are attended by ESR scientists and that decisions need to be made as to which items might be tested, it is important that Scene of Crime Officers (SOCO) are trained in contamination issues and are trained in the importance of not being too selective in which items they take and document at the early stage of the investigation. What may seem

[14] See Manoharan v R at [3.20]

[15] Gill P [2014]. *misleading DNA evidence; reasons for miscarriage of justice* pages 144-146

irrelevant to the prosecution may be pivotal to the defence and unless a thorough scene examination is done from the outset, exculpatory evidence will be lost.

The best example of this can be found in the case of George Gwaze which we have mentioned previously. As discussed earlier, the only evidence linking Mr Gwaze to the allegations of sexual assault was DNA likely to have originated from sperm that was found on the underpants the deceased was wearing. At the first trial, the Crown asserted that a seminal stain had been deposited in the crotch of the deceased's underpants as a result of sexual assault by Mr Gwaze. The defence disagreed, quoting scientific literature which showed that sperm cells could survive laundering in a washing machine and be transferred in sufficient numbers to produce DNA profiles from co-laundered items. Which Crown and its witnesses considered was highly improbable if not impossible scenario.

Immediately after Police were alerted to the concerns of medical staff at Christchurch Hospital, the family home was secured and a thorough scene examination was conducted by ESR scientists and police SOCO. A very large number of items of clothing were seized and documented as part of this initial scene examination, including an unwashed pair of size 2-4 boy's cotton underpants found under the deceased's bed. These were demonstrably too small for any of the inhabitants of the Gwaze household and these could easily have been ignored as being irrelevant to the investigation.

Thankfully they were seized and documented. As part of the preparation for the second trial some years later, DNA was painstakingly extracted from both skin and sperm cells attached to the fabric of these underpants and which must have been deposited before the underpants were last laundered[16]. The DNA profile obtained from the skin cells matched that of the Gwaze's 3 year old grandson, the likely wearer of the underpants, who lived elsewhere with his mother and father (the Gwaze's eldest daughter and son-in-law), but frequently visited his grandparents. The DNA from the sperm cells however, matched that of the boy's father. There was no evidence that the boy's father had sexually abused his son leaving the important question as to how his sperm cells came to be on the son's underpants. The evidence of the boy's mother was that she always machine washed his clothes at their own home with all the other family clothing.

These results from an exhibit found at the scene, while not directly related to the alleged crime nevertheless provided key supporting evidence that sperm from an adult male can indeed survive laundering and be detected on items of cotton clothing belonging to other members of a household as reported in the literature.

This pivotal evidence demonstrate the importance of routinely conducting a thorough and objective crime scene examination that captures all the evidence at an early stage of any criminal investigation and should be included in the Police manual.

Chapter 6: Forensic DNA Phenotyping

In IFPI's view, the reliability of phenotyping has yet to be established and until that is confirmed, we prefer that it is not admissible in court.

[16] Felicity Goodyear-Smith [2015] In "*Murder that wasn't: The case of George Gwaze*"' Pub Otago University Press. ISBN 978-1-877578-99-1 Pages 89-91.

Regardless of any process adopted for phenotyping, IFPI believes that it should be the subject of close independent oversight.

Chapter 7: Forensic comparisons

Relating to paragraphs 7.11 to 7.49

IFPI's response

Our greatest concerns are not with the scientific validity of the new DNA analytical techniques that are being brought into routine forensic case work[17], but with the subsequent flawed application by forensic scientists of these DNA analytical techniques which in the past have resulted in misleading and prejudicial DNA evidence being admitted into criminal proceedings without the appropriate judicial scrutiny.

Although the Law Commission has been aware of concerns with this issue for more than a decade since the enactment of Evidence Act 2006[18] and has also widely highlighted them throughout this Issues paper[19], sadly they have been ignored in the final review of the Evidence Act that was published recently[20] . Regrettably they remain outside of the current overhaul of the CIBS Act as well.

Be that as it may, IFPI is deeply concerned that we are left with a job half done and urges the Law Commission that as part of the outcome of the current overhaul of CIBS Act, which we strongly support, that at the very least a firm recommendation is made to Parliament to formulate new rules for the admissibility of expert evidence that relies on scientific methodology for its truth[21]. This should be undertaken as a matter of urgency.

Paragraphs 7.28 and 7.29

It has been widely recognised internationally that judges and lawyers generally lack the scientific expertise necessary to conduct the critical assessment of forensic evidence and associated literature that is required by the Daubert factors. This is supported by an abundance of academic literature and government reports. In making this point, a 2009 report from the National Research Council in the United States warned:

We must limit the risk of having the reliability of certain forensic science methodologies judicially certified before the techniques have been properly studied and their accuracy verified by the forensic science community.

Although the report was primarily concerned with non-DNA-based forensic analysis techniques, assessing the reliability of new DNA analysis techniques raises the same problem – it requires a considerable amount of scientific expertise.

[17] At [7.16] to [7.20] and at [7.28]
[18] See footnote 352 at page 119 and summary at [7.51]
[19] For example at [7.21] to [7.26], and particularly in respect of the use of trace DNA analysis at [7.71] to [7.81]
[20] Second Review of the Evidence Act 2006 (NZLC R142,2019)
[21] See Jack Oliver Hood *"Challenging the admissibility of scientifically invalid evidence"* (2018) New Zealand Law Review 3 pages 399-427

IFPI's response

A good example of prematurely certifying a new technique before it has been properly studied and validated by the scientific community, is the sign off and acceptance of Low Copy Number (LCN) DNA. LCN never was a new technique. Instead it is a good example of forensic scientists pushing a well-developed and validated commercially available STR DNA profiling kit (SGM+) beyond the limit of detection set by its manufacturer, by increasing the number of cycles of PCR from 28 from to 33.

At that time the dangers of over amplifying DNA were well understood and reported in the scientific literature by the molecular biologists working in academia. Namely that artifacts or spurious signals inherent in all PCR tests at the detection limit are greatly amplified by increasing the number of cycles and these random effects impact on the repeatability/reproducibility of the results. In other words, one has no idea what signals are from real DNA or signal noise, nor does the operator have any idea of the number of contributors to the profile, or if trace contamination is occurring. The latter may not be reliably picked up by the negative controls. The net effect of all this drastically reduces the reliability of the test.

To cater for this lack of repeatability and reproducibility, a protocol for interpreting low level, non-reproducible DNA profiles was developed by forensic scientists from the now disestablished UK Government Forensic Science Service (FSS) to generate what they euphemistically called a "consensus DNA profile". Initially the protocol involved scoring only those peaks that were observed more than once in the low level, partial profiles obtained from two replicate, 33 cycle PCR reactions. However, the whole consensus profile concept was of dubious origin and there was little or no empirical validation data to support the validity of the protocol before it was rushed into case work.

The protocol very quickly became even more dubious when the scientists changed the procedure to "peaks observed more than once in two 30 cycle PCR reactions" and this meant that the PCR reactions did not contain the same amount of crime scene DNA and were therefore not replicates.

The first time LCN was used by Police in New Zealand in 2006 the work was performed by the FSS.[22.] The scientist who performed the LCN work in that case did not just generate a consensus profile based on peaks observed twice in two PCR reactions as per the protocol but on ten PCR reactions at unknown DNA template concentrations. It was as if he continued to repeat the PCR reactions until a desired result was achieved. This is arguably an example of scientific over reach and/or confirmation bias.

During an appeal in 2009 this unscientific approach was heavily criticized by experts and although the court expressed reservations[23] it held that the LCN evidence presented at trial was reliable. Some would say that this effectively slammed the door shut on the many serious concerns with LCN that were emerging in the scientific literature at that time.[24]

[22] [3.23 - footnote 176]

[23] Wallace vs R [2010] NZCA 46 at 114. "*There is certainly a 'lis' between Dr Whittaker and Dr Harbison on the one hand and Professor Jamieson and Dr Geursen on the other. This Court is not in a position to say who, at the end of the day, is correct in a scientific sense. Then too the science is moving on apace. This Court does not have the expertise, and in any event it is not ultimately the role of this Court, to come to any such determination*".

[24] Budowle, Eisenberg, van Daal [2009] *Low copy number typing has yet to achieve "general acceptance"'* Forensic Sci Int. Gen Supple.

Very few jurisdictions ever adopted LCN for routine case work and IFPI are not aware of any commercial companies that now provide forensic services to the Police Forces in the UK which offer LCN. Notwithstanding its admissibility by legal precedent the continued use of LCN the technique in criminal casework is questionable.

LCN went on to become widely associated with "Touch DNA" and more recently "Trace DNA". However we stress that these LCN type of techniques are not novel techniques in their own right. They are simply the application of well characterized and commercially available STR profiling methods used at DNA template concentrations that are well below the limit of detectability required to generate a robust DNA profile.

Nevertheless, opinion evidence based on loosely defined and poorly validated consensus profiles continues to be admitted without challenge in criminal trials and perhaps also with significant prejudicial baggage.

We suggest that formal approval process for deviations or changes to Standard Operating Procedures (SOP's) , perhaps from the proposed Independent Oversight Body, may be a more scientific and flexible approach than by legal precedent.

Paragraphs 7.71 to 7.79

IFPI's response

Trace DNA – The risks

There are significant risks in relying on traces of DNA at crimes scenes. The reason for this is as follows: Humans continually shed cells into their environment and onto items they come into contact with and in sufficient quantities to generate DNA profiles using the methods routinely used in casework. It is now well understood that once deposited, these cells and the DNA within them are able to persist for long periods of time - in some circumstances months or even years, and are able be transferred many times after they have first been deposited.

There are many factors that influence the persistence of cells and their ability to be transferred. For example wet materials or surfaces will more readily transfer DNA bearing cells than dry material but cells deteriorate more rapidly under wet conditions compared to dry ones. Some individuals shed skin cells more readily than others and this is further influenced by activities such as hand washing or bathing.

Published scientific studies have shown that in some cases, detectable quantities of DNA can be transferred through at least 6 contacts and yet in other cases none or very little was transferred beyond the initial contact. Also, the last person to touch someone or an object was not necessarily the major contributor to the mixture of DNA recovered.

In another study volunteers were asked to shake hands for a defined length of time and then each individual handled a separate knife of their own that had been scrupulously cleaned to remove any trace of background DNA. The results showed that the other person's DNA was transferred and identified on the knife 85% of the time, even though that person had not touched the knife. Moreover, in one-fifth of those samples the person who hadn't touched the knife was the sole or only contributor of the DNA recovered from the knife.

In addition to these scientific studies there is now a slew of casework examples (including R vs Gwaze discussed previously) that have demonstrated that it is possible for a trace DNA profile at the scene of

the crime to have got there through innocent secondary or tertiary transfer or other means unrelated to the crime. This is no longer a theoretical risk that can be ignored.

In order to mitigate that risk, the prosecution must establish **where** the trace DNA come from (i.e. the cellular source), **how** it got there (i.e. the possible mechanism - active or passive transfer) and **when** it had been deposited (i.e. before, during or after the alleged crime).

If they are unable to do that then in our opinion the risk of a false inclusion associated with DNA trace evidence is greater than the risk associated with conventional fingerprint evidence, which normally has no risk associated with its transfer. Accordingly we are of the opinion that trace DNA evidence should either not be admissible in a criminal trial at all or strictly regulated.

Paragraphs 7.80 and 7.81

As discussed at [7.46] to [7.50] there is extensive academic literature on the risk of overestimating the probative value of DNA evidence and underestimating its unfairly prejudicial effect.

It has been suggested that, in practice, the presentation of DNA evidence reverses the presumption of innocence, as juries expect defendants to provide an explanation for their DNA being present. This can be an impossible task, and there have been calls for a prohibition on convicting a person based solely on DNA evidence. Commentators have also suggested that trial processes should be amended to improve the understanding of jurors. As noted above, these suggestions fall outside our terms of reference. However, the literature calls for steps to be taken outside of the courtroom as well, including:

- *greater emphasis on improving the quality of crime scene examinations;*
- *more scrutiny around laboratory procedures;*
- *more constraints around the extent and timing of communications between forensic scientists and investigating police officers;*
- *a shift in laboratory culture to promote recording and reporting of quality issues (as medical laboratories do);*
- *additional research into DNA transfer, persistence and "shedder status" and*
- *increased public education.*

IFPI's response

The risk of over-estimating the probative effect of DNA evidence and under-estimating its prejudicial effect as correctly stated in paragraph 7.80, should prevent convictions based solely on DNA evidence. To properly research this risk and recommend procedures to address it would need a review of DNA evidence cases in which the court or other parties have not agreed with the prosecution's opinions and derive procedures to address the type of uncertainties that have contributed to disagreements and tensions between the prosecution and defense scientists. This study would help to reduce the risk of wrongful prosecutorial accusations or inappropriate inclusions of DNA evidence in court processes and also ultimately reduce the risk of wrongful convictions. Although para 7.81 lists some suggested areas of further work which IFPI supports, these are of a general nature only.

IFPI recommends the use of the STAMP process that has been developed by the Massachusetts Institute of Technology (MIT).[25] This process would be able to comprehensively identify, address and answer difficult questions in relation to the way court processes should treat DNA evidence. More information about how the STAMP process could be applied to reduce the risk of DNA evidence being incorrectly assessed by prosecutorial and court processes may be found in Sanjero's publication.[26]

Paragraph 7.83

In relation to specific cases, the existing criminal appeal system in New Zealand may provide sufficient opportunities to challenge trace DNA evidence. However, if it was considered that an additional safeguard should be put in place, one option would be to empower an independent body to review any conviction that is based solely on trace DNA evidence. For instance, this could be a function given to a Criminal Cases Review Commission, if such a Commission were established in New Zealand.

IFPI's response

We do not consider that the existing appeal system in NZ provides sufficient opportunities to challenge trace DNA evidence in routine case work before it is addressed at trial as the enquiry into the Jama miscarriage of Justice in Australia found[27]. We agree with the suggestion that an independent body review any conviction that is based solely on trace DNA evidence. In our opinion, profiles obtained from trace DNA should not be admissible evidence in criminal trials and this should be clearly stated in regulation or statute.

Paragraphs 7.93 to 7.94

One possible model for this approach could be Ireland's new Criminal Justice (Forensic Evidence and DNA Database System Act 2014.) The definitions of "crime scene sample", "DNA profile" and "match" in that Act are:

"Crime scene sample" means a sample of biological material found at, or recovered from, a crime scene from which a DNA profile in respect of a person may be generated;

"DNA profile", in relation to a person, means information comprising a set of identification characteristics of the non-coding part of DNA derived from an examination and analysis of a sample of biological material that is clearly identifiable as relating to the person and that is capable of comparison with similar information derived from an examination and analysis of another sample of biological material for the purpose of determining whether or not that other sample could relate to that person;

"Match", in relation to two DNA profiles, means that there is such a degree of correspondence between them that they are indistinguishable and it is probable that they relate to the same person, and the degree of that probability can be indicated statistically.

These definitions imply that – ordinarily – crime scene samples and reference samples will be analysed to generate DNA profiles and the profiles will come from non-coding regions of the

[25] Leveson, G *'Engineering a Safer world'* The MIT press, Cambridge Massachusetts 2011
[26] Sangero,B '*Safety from wrongful convictions'* self published, Jerusalem Israel 2016; sangero@clb.ac.il pages 46-52; 94-96
[27] [7.76]

genome. This is a simple and transparent way of providing at least some statutory guidance on how these samples should be analysed.

IFPI's response

IFPI is impressed with many aspects of the approach adopted by Ireland in their new Forensic Evidence and Database Act 2014.

IFPI agrees with the Law Commission that there is no need to significantly increase the amount of data that is included in a DNA profile obtained from a scene sample.[28] After much consideration IFPI has concluded that many of the issues/and concerns that are set out in the Issues Paper would actually resolve themselves if there was a clear definition that a DNA profile from a crime scene sample needs to comply with before a meaningful comparison can be made between it and a reference sample. The definition should either be included in the new Act as Ireland have done or by regulations developed by a new Statutory Oversight Body that is independent from the Police and the ESR. The latter is preferable as it would give greater flexibility to make subsequent changes should advances in technology or other unforeseen circumstances require it to do so.

The definition should specify the following: (i) The loci that are to be included in the profile; (ii) the minimum amount of DNA required to generate a profile; (iii) the minimum number of alleles required to minimize the risk of a false inclusion; (iv) the complexity of the profiles i.e. the number of contributors and; (v) minimum quality parameters. We have been careful not to be too prescriptive at this stage as we suggest that this definition should be developed by a multi-disciplinary group that includes those with expertise in scientific method and risk assessment processes such as the MIT STAMP process discussed previously.

Such a definition once developed and implemented would be very transparent and by itself would provide many safeguards that could be further enhanced with some additional organizational changes which we will discuss when responding to Chapter 15.

Chapter 8: Reference samples – direct collection

General

IFPI acknowledges the need for reference samples to be acquired to assist criminal investigations. We also highlight the potential risk of cognitive bias unduly influencing an investigation. Accordingly we suggest the following guidelines:

Reference samples should only be sought from persons of interest if a meaningful profile has been obtained from a scene sample. Therefore, there should be no need for a temporary databank.

No one should be compelled to give a sample in relation to a crime unless a **meaningful profile** has already obtained from a **relevant** sample from the scene.

The reason behind these suggestions is to mitigate cognitive bias being generated in the inceptive stages of an investigation and influencing the subsequent course of that investigation.

[28] [7.88]

Paragraphs 8.56 and 8.57

Another alternative would be allowing the court to draw an adverse inference from a suspect's refusal to comply. Section 70(1) of the CIBS Act already allows for an adverseinference to be drawn from a suspect's refusal to provide a compelled sample. This provision can be used instead of obtaining the sample using reasonable force. For evidence of the suspect's refusal to be admissible at trial, however, the judge must find that the probative value of that evidence outweighs its "prejudicial effect". Further, the judge may tell the jury that there may be good reasons for the suspect to have refused. There are no reported cases of this provision being used.

Our concern with these alternatives is that, if there was no option of being able to use reasonable force as a "back-up" or alternative option, depending on the offence under investigation, the legislation could incentivise refusal to comply with compulsion orders. For example, a suspect who knows that their sample will implicate them may well choose to be charged with failing to comply with the order and to risk an adverse inference being drawn at trial. However, this would undermine the presumption of innocence. There may be a multitude of reasons why a person may refuse to provide a suspect sample.

IFPI's response

These paragraphs note that an adverse inference from a suspect's refusal to provide consent to handing over DNA may be taken to indicate the suspect's guilt. However in IFPI's opinion that is unreasonable, given the risk of a wrongful conviction in other countries is in the order of 5% or higher. This risk is high, compared to what is acceptable in aviation and other industries, and what is regulated the Occupational Health and Safety legislation. Indeed it may well be sufficiently high to cause someone to withhold their informed consent for their DNA to be handed over to a databank. Although overseas DNA has been used to exonerate or reverse wrongful convictions, and therefore may contain less risk than conventional evidentiary court processes, the cases of David Dougherty, George Gwaze and others suggest that concerns of false accusation and/or wrongful conviction from poorly executed DNA evidence may be reasonably founded in New Zealand.

Paragraph 8.62

As explained at [8.6] to [8.18], informed consent is a central concept in Part 2 of the CIBS Act. A police officer must attempt to obtain a suspect sample by consent prior to applying for a compulsion order. Further, there are very detailed rules around the information that must be given to a suspect, both verbally and in writing. There are additional protections in the Act if the suspect is a young person or child.

IFPI's response

IFPI believes that for all samples that are currently obtained by the Police, whether they are voluntary suspect samples, elimination samples or relationship to suspect samples, or samples for mass screening, that they should be obtained only after **informed** consent has been given in a manner approved by a Human Ethics Committee.

We believe that it is necessary that as part of that informed consent, the subject is fully informed of the consequences of providing a sample including the fact that they are providing genetic information not only of themselves, but also of their relatives and any relatives yet to be born. They should also be made aware of the risks of false accusations and wrongful convictions that could

unwittingly arise from the use of that sample. As stated previously, literature suggests that in the United States the risk of a wrongful conviction of any crime could be in the order of 5 to 10 %.

Chapter 9: Reference samples – indirect collection

Paragraphs 9.77 to 9.97

IFPI's response

A number of IPFI's members work or have worked in academic research in various forms. These members have asked IFPI to convey their grave concern at the whole concept of heel prick samples taken from babies being stored and possibly made available for forensic purposes or research beyond the purpose for which they were given. In their opinion this is contrary to all ethical principles. For those reasons IFPI believes that the National Screening Unit should follow the course taken by Western Australia in 1997 which required that all the samples be destroyed[29].

Paragraphs 9.109 to 9.120

IFPI's response

Regarding DNA from genealogy websites. IFPI believes that because genetic information obtained from this source has probably not been subject to the same rigour of controlled forensic laboratories, that this information should not be admissible in court. However it may be used as an investigative tool that could provide useful leads in an investigation.

Chapter 10: Crime Sample Databank

IFPI has no response to this chapter.

Chapter 11: Known person databank - collection

IFPI has no response to this chapter.

Chapter 12: Known person databank - use

IFPI is of the view that the known person databank should be operated and administered independently of Police and ESR and that access to it should be controlled by a body with independent oversight.

Chapter 13: Familial searching

Regardless of what process adopted for familial searching of the State's IFPI believes it should be the subject of close independent oversight.

[29] [9.90]

Chapter 14: Retention of samples and profiles

In relation to the following samples, IFPI believes that they should all be treated the same and destroyed as soon as practicable after a clearly defined DNA profile has been obtained.

- Suspect sample by consent or compulsion;
- Suspect sample by indirect collection;
- Elimination sample;
- Non prosecutorial child suspect samples
- Temporary DNA databank sample (if one is retained in the future under new legislation)

In relation to the retention of crime scene samples, IFPI agrees with the approach adopted by the Innocence project of the United States; see footnote 1017 of the Issues paper.

Chapter 15: Oversight

IFPI agrees generally with the suggestions that the Commission makes in Chapter 15, with the exception of a few aspects that are discussed below.

IFPI's preference is that the structure is configured as illustrated in Figure 1 below. An Independent Oversight Body would be responsible for setting up and controlling procedures related to DNA sample collection, management and release. Its activities would include review and approval of new technologies, policy formulation, new regulations, compliance audits, deriving operating methodologies, undertaking thematic systemic enquiries, commissioning necessary research and reporting to the Ministry of Justice which would preside over it.

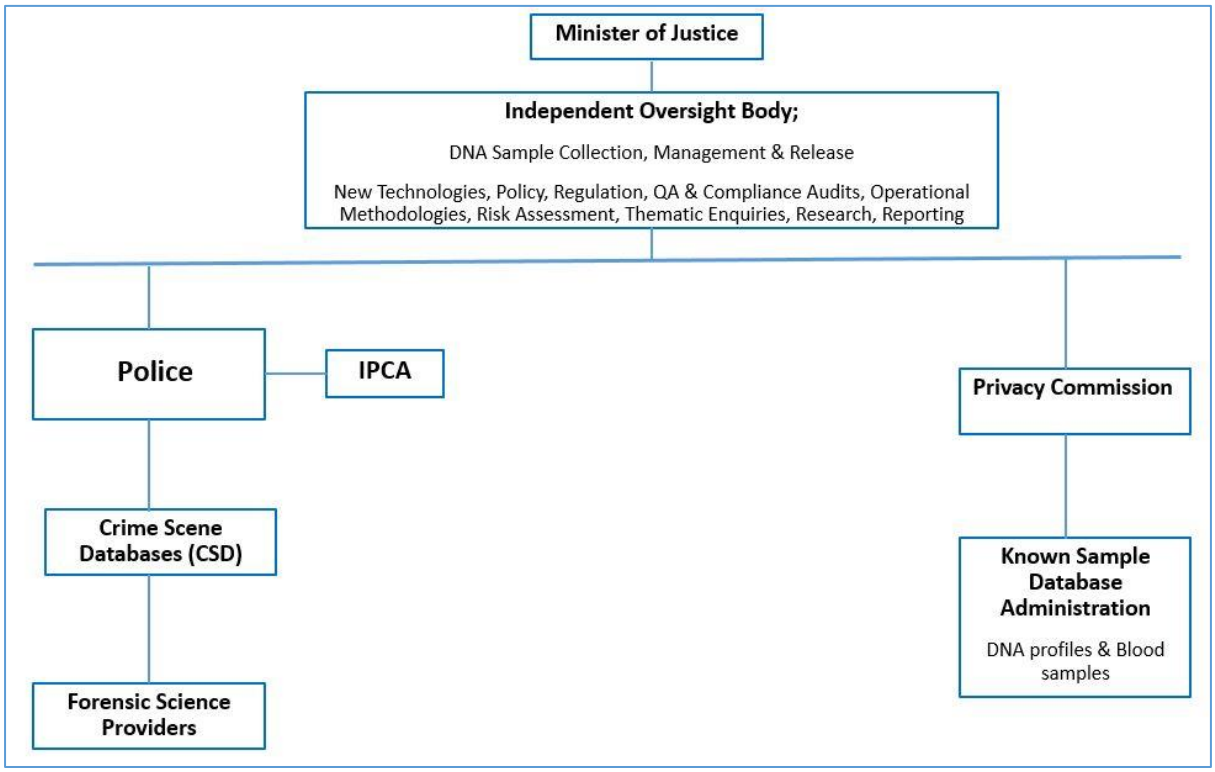

Figure 1: Independent Oversight Body and Operational Hierarchy

The left side of the hierarchical diagram shows the Police in control of the Crime Scene Databases and forensic science providers such as ESR who would come under the oversight of the IPCA. We believe that the Police should continue to have overall statutory responsibility for criminal investigations and for the procurement of forensic science services. We don't see the need for ESR to be recognized specifically in statute because this is already covered by its contract with the Police which is recognized in statute. The right side of the diagram shows the Privacy Commission exercising responsibility over the security, privacy and administration of the Known Sample Database containing DNA profiles and blood samples. This would provide transparency and independence in the management of the Known Sample Database and would ensure objectivity needed in forensic comparison. There should be no need for a temporary DNA database.

It may be possible for the proposed Criminal Cases Review Commission (CCRC) to contribute to the activities of the Independent Oversight Body if it was possible for the CCRC to intervene before the legal process of a conviction had run its course. However as that is not how the present CCRC bill before parliament has been drafted, we have refrained from representing this suggestion in Figure 1 above.

We don't believe that there is a need for a forensic science regulator, as we believe that the activities of the Independent Oversight Body should be sufficient to satisfactorily regulate the activities of the forensic science provider(s).

This concludes our submission.

Kind regards

Andrew McGregor CPEng

Secretary

027 281 3398

amcgreg@prosolve.co.nz