

**DNA Dilemma:
Reconciling the Presumption of Innocence with New
Zealand's DNA Databanks**

Bridget Newman

A dissertation submitted in partial fulfilment of the degree of Bachelor of Laws (with Honours) at the University of Otago – Te Whare Wānanga o Otāgo

October 2020

Acknowledgements

To my supervisor Danica McGovern, for your encouragement, patience and input;

To the girls, especially those who have lived at 129, for your friendship, humour, and motivation;

To my parents, for the endless support and opportunities. To Dad, for always being proud of me. To Mum, for inspiring me and showing me how to be a strong and successful woman;

And finally, to Ben, for the visits, encouraging messages and love. Thank you for helping me get through this year.

Contents

Introduction	5
I. Overview of New Zealand’s DNA Databanks.....	7
A. Overview of DNA Profiling	7
B. New Zealand’s DNA Databanks.....	9
1. Suspect samples.....	10
2. Temporary Databank	10
3. DNA Profile Databank.....	11
4. Crime Sample Databank	11
C. General Operation of the DNA Databanks in a Criminal Investigation	12
II. Re-framing the Presumption of Innocence.....	14
A. Current Application of the Presumption of Innocence.....	15
B. The Values Underpinning the Presumption of Innocence.....	16
C. A Proposal for an Investigative Presumption of Innocence	18
D. Comments.....	20
III. DNA Databanks and the Investigative Presumption of Innocence.....	22
A. General Operation of DNA Databanks.....	23
B. Limitations of a DNA Databank Match	26
C. Prior Conviction: DNA Profile Databank.....	30
D. Non-Conviction DNA Databanks: Temporary Databank and Crime Sample Databank	31
1. Temporary Databank	32
2. Crime Sample Databank	33
IV. Can these Intrusions on the Investigative Presumption of Innocence be Justified? 34	
A. The Balancing Exercise.....	35
B. Seriousness of the Offence Committed.....	37
C. Conviction Status.....	40
D. Comments.....	42
V. Recommendations	42
A. DNA Databank Index Model.....	43
1. The offence threshold	43
2. The constitution of each DNA databank index.....	45
3. Rules for comparison.....	47
B. Comments.....	47
Conclusion.....	48
Bibliography.....	50

“The presumption of innocence is not just a legal concept. In commonplace terms, it rests on that generosity of spirit which assumes the best, not the worst, of the stranger.”

– Kingman Brewster Jr.

Introduction

The presumption of innocence is the ‘golden thread’ of our criminal law:¹ all those who are charged with an offence have the right to be presumed innocent, until the contrary is proven.² This offers important protection against errors in the criminal process and as a “counterweight” to the power and resources of the State.³ However, the right only attaches once a charge has been laid.⁴ Accordingly, pre-charge investigative techniques that appear to compromise the presumption of innocence are not squarely captured by its scope.

DNA databanks are an important example of this. DNA databanks store DNA profiles of certain individuals, and act as a database against which DNA profiles recovered from crime scenes can be compared. This process may lead to the identification of potential suspects on the basis of DNA evidence. Accordingly, DNA databanks are a useful crime-solving tool, particularly in cases where there are no investigative leads. However, individuals on a DNA databank are formally entrenched as a category of suspects who are then subject to increased state intervention.⁵ Every time a crime is committed, and a comparison takes place between crime scene profiles and profiles on a DNA databank, suspicion is imported to the corresponding persons.⁶ This suggests that the individuals represented on a DNA databank are not being treated as wholly innocent and therefore their right to be presumed innocent seems to be impacted.

However, because the use of DNA databanks occurs before the right to be presumed innocent formally attaches, discussion surrounding DNA databanks and the presumption of innocence is limited. Those who have engaged in the topic mainly focus on non-conviction DNA databanks and frequently conclude that they do not have any effect on the presumption of innocence.⁷ This does not satisfactorily address why the use of DNA databanks seems to be at

¹ *Woolmington v DPP* [1935] AC 462 (HL) at 481.

² New Zealand Bill of Rights Act 1990, s 25(c).

³ Andrew Ashworth *Principles of Criminal Law* (5th ed, Oxford University Press, New York, 2006) at 83.

⁴ This is because s 25 of the New Zealand Bill of Rights Act 1990, which contains the right to be presumed innocent, applies to everyone “charged” with an offence.

⁵ Liz Campbell “A Rights-based Analysis of DNA Retention: Non-conviction Databases and the Liberal State” (2010) 12 *Criminal Law Review* 889 at 897.

⁶ Jason Tarricone “An Ordinary Citizen Just Like Everyone Else: The Indefinite Retention of Former Offenders’ DNA” (2005) 2 *Stanford Journal of Civil Rights and Civil Liberties* 209 at 243.

⁷ For example, see Campbell, above n 5, at 7; and Liz Campbell “Non-conviction DNA databases and criminal justice: a comparative analysis” (2011) 1 *Journal of Commonwealth Criminal Law* 55 at 71.

odds with the principles underlying the presumption of innocence. Fundamentally, this is because of a gap in our criminal justice system. The presumption of innocence, as currently framed, does not go far enough to ensure that individuals, in the first instance, are presumed by the State to be innocent of a crime. However, this could be solved by an investigative presumption of innocence.

Therefore, the overall objective of this dissertation is to provide a theoretical extension of the presumption of innocence and show how this could operate by reference to New Zealand's DNA databanks. Accordingly, this will enable unique discussion regarding the permissibility of DNA databanks and demonstrate the issues associated with their use.

To provide context, Chapter I will give an overview of DNA profiling and DNA databanks. This will lead into discussion of the current presumption of innocence and why DNA databanks are not engaged but seem relevant to this right. Chapter II will then formulate an investigative presumption of innocence to solve this. This will be premised on two main arguments. The first is that extending the presumption of innocence will further advance the values underpinning the presumption. The second is that as science continues to evolve, increasingly invasive techniques will emerge, and these may circumvent existing legal doctrines. An investigative presumption of innocence can be framed so that it cannot be evaded and accordingly can always function to assess whether a particular technique is an acceptable use of State power. Specifically, the investigative presumption of innocence will incorporate a reducible presumption of factual innocence and a broader requirement to always scrutinise incriminating evidence. However, the factual aspect will not be framed as an absolute, non-derogable right. A balancing exercise may be performed and in some cases State interests in using a particular technique may be significant enough to outweigh an individual's factual presumption of innocence.

DNA databanks will then be examined according to this investigative presumption of innocence in Chapter III. Broadly, it will be argued that both the general operation and specific aspects of DNA databanks compromise the investigative presumption of innocence. Chapter IV will then assess whether this can ever be justified by engaging in a balancing exercise. It will be concluded that in *some* circumstances the State interest in solving serious crime should take precedence over an individual's right to be presumed factually innocent. Chapter V will

then recommend how the current regime governing New Zealand’s DNA databanks should be amended to reflect the issues identified with DNA databank use. Doing so will ensure that the use of DNA databanks is more consistent with the investigative presumption of innocence and that any reduction of the investigative presumption of innocence is justified.

I. Overview of New Zealand’s DNA Databanks

This chapter will provide an overview of DNA profiling and introduce New Zealand’s DNA databanks. The operation of these databanks in respect of criminal investigations will be explained. Understanding these aspects is key when examining whether any characteristics of DNA databanks undermine the presumption of innocence.

A. Overview of DNA Profiling

DNA databanks utilise the discriminatory power of DNA profiling, the gold-standard forensic identification method.⁸ The power of DNA profiling is three-fold: it can identify potential suspects; provide strong evidence of a suspect’s guilt; and exonerate those who are innocent.⁹ A DNA profile can be obtained from a bodily sample containing genetic material.¹⁰ Thus, it contains information that is intrinsic to identity.¹¹ In New Zealand, the primary DNA profiling technique used is “STR profiling.”¹² This targets positions of the DNA sequence (**loci**) called short tandem repeats (**STRs**).¹³ These loci exhibit genetic variation, meaning that there may be differences between individuals at these points.¹⁴ Consequently, this sort of DNA profiling can assist in distinguishing individuals.

⁸ Jo-Anne Bright and Michael Coble *Forensic DNA Profiling: A Practical Guide to Assigning Likelihood Ratios* (CRC Press, Boca Raton, 2019) at 1.

⁹ Erin Murphy “Forensic DNA Typing” (2018) 1 Annual Review of Criminology 497 at 498.

¹⁰ Nessa Lynch and Liz Campbell *The Collection and Retention of DNA from Suspects in New Zealand* (Victoria University Press, Wellington, 2015) at 15.

¹¹ At 158.

¹² Law Commission *The Use of DNA in Criminal Investigations* (NZLC IP43, 2018) at 64.

¹³ Murphy, above n 9, at 500.

¹⁴ Victor Weedn and David Foran “Forensic DNA Typing” in Debra Leonard (ed) *Molecular Pathology in Clinical Practice* (2nd ed, Springer International Publishing, Switzerland, 2016) 793 at 796.

STRs consist of a core unit of DNA sequence that is repeated a varying number of times.¹⁵ For example, the STR marker D8S1179 has a repeating unit of ‘TCTA’ or ‘TCTG’ which may be repeated 9-21 times.¹⁶ At this locus, an individual may have the motif TCTA repeated 9 times on one chromosome and 12 times on the other.¹⁷ Another individual could have the motif repeated 6 times on both chromosomes. To obtain a DNA profile, multiple STR markers are examined, using a number of scientific techniques. The basic technique used is the Polymerase Chain Reaction (**PCR**). This allows for the specific (and simultaneous) amplification of STR loci.¹⁸ Essentially, the reaction involves copying targeted regions of DNA to a level where the DNA can then be analysed.¹⁹ The products obtained from PCR can be separated and characterised according to STR region and the size of the fragment.²⁰ The number of repeats at each locus are recorded to generate a DNA profile which can be compared to other DNA profiles.

In New Zealand, forensic analysis of DNA samples is performed by the Institute of Environmental Science and Research (**ESR**). Currently, ESR targets either 15 loci (using a kit called Identifiler) or 21 loci (using a kit called Globalfiler).²¹ When analysing DNA samples obtained from known individuals, ESR uses the Globalfiler kit.²² When analysing crime scene DNA samples, ESR predominantly investigates 15 STR loci, using the Identifiler kit.²³ Standard DNA profiling also includes a sex test.²⁴ This determines the sex of the contributor by profiling a specific region of DNA that differs between the X and Y chromosome.²⁵

DNA can be found at crime scenes in many forms. For example, it can be recovered from blood stains, semen samples, or skin cells left on touched surfaces.²⁶ Even though in many cases DNA is recovered in minute amounts, modern STR profiling has enabled profiling of very small

¹⁵ Bright and Coble, above n 8, at 1.

¹⁶ John Butler *Fundamentals of Forensic DNA Typing* (Elsevier Science, San Diego, 2009) at 156.

¹⁷ Bright and Coble, above n 8, at 2.

¹⁸ Butler, above n 16, at 125.

¹⁹ Lynch and Campbell, above n 10, at 16.

²⁰ Bright and Coble, above n 8, at 3.

²¹ Law Commission, above n 12, at 118.

²² At 196.

²³ At 196.

²⁴ Institute of Environmental Science and Research “DNA Techniques Available for Use in Forensic Case Work” (2016) <www.esr.cri.nz> at 3.

²⁵ Butler, above n 16, at 166.

²⁶ Murphy, above n 9, at 498.

traces of DNA (less than 1 nanogram).²⁷ This may result in complete (or near complete) DNA profiles being derived from crime scenes. However, in some cases, crime scene DNA may be degraded or in such low quantities that additional techniques are required.²⁸ These are based on the same premise of STR profiling but are more sensitive,²⁹ and less discriminating.³⁰

Low Copy Number analysis is the most sensitive technique currently used by ESR,³¹ and is employed where less than 100pg of DNA is recovered from a crime scene sample.³² Only 10 STR loci are tested but the DNA is copied to a greater extent.³³ By contrast, Mini-STR profiling targets 8 STR loci and copies the DNA in smaller lengths.³⁴ This is used when the DNA is very degraded.³⁵ Finally, it is also common for mixed DNA samples to be recovered from crime scenes. These are samples which contain DNA from more than one source. To resolve these samples and derive individual DNA profiles, ESR uses software called STRmix.³⁶ STRmix employs mathematical algorithms to find the most likely combination of DNA profiles contained in a mixed sample.³⁷

Further techniques can also be used when profiling crime scene samples such as Y-STR profiling and mitochondrial DNA analysis. However, these are not currently included in any profiles held on the DNA databanks, so have been excluded from this discussion.

B. New Zealand's DNA Databanks

New Zealand currently has three DNA databanks: the DNA Profile Databank, the Temporary Databank and the Crime Sample Databank. Each is constituted by certain categories of DNA profiles, retained for different reasons. The Criminal Investigations (Bodily Samples) Act 1995 (**CIBSA**) is the primary legislation governing DNA collection and retention in New Zealand.

²⁷ Butler, above n 16, at 317.

²⁸ Law Commission, above n 12, at 117.

²⁹ ESR, above n 24, at 2.

³⁰ Lynch and Campbell, above n 10, at 16.

³¹ At 16.

³² Butler, above n 16, at 330.

³³ Law Commission, above n 12, at 7.

³⁴ ESR, above n 24, at 5.

³⁵ Lynch and Campbell, above n 10, at 16.

³⁶ ESR, above n 24, at 10.

³⁷ Law Commission, above n 12, at 8.

It explicitly regulates both the DNA Profile Databank and the Temporary Databank. The most relevant parts of CIBSA are Parts 2, 2B and 3. In respect of each, there are certain procedural requirements that must be followed, with different provisions that apply, depending on the age of an individual subject to CIBSA. However, this discussion will generally refer to the provisions that apply to those aged 18 or older.

1 Suspect samples

Part 2 of CIBSA establishes when bodily samples may be obtained from a suspect, either by consent or compulsion. In a criminal investigation, a bodily sample may be requested from a suspect if the relevant offence is an imprisonable offence or is listed in Part 3 of Schedule 1 (a **qualifying offence**), and there are reasonable grounds to believe that the sample would tend to confirm or disprove the suspect's involvement in the commission of the offence.³⁸ If a suspect refuses to consent, then an application for an order requiring the suspect to give a bodily sample (**a suspect compulsion order**) may be made to a District or High Court Judge.³⁹ Ultimately, a judge may authorise a suspect compulsion order, if the criteria set out in section 16 is satisfied. If a suspect compulsion order is granted, then a DNA profile can be generated from the bodily sample that is obtained and it can be compared to the crime scene DNA profile.⁴⁰

2 Temporary Databank

Part 2B of CIBSA empowers the taking of a bodily sample from adults arrested or intended to be charged with a qualifying offence.⁴¹ Section 24O of CIBSA then permits the maintenance of the Temporary Databank, which contains DNA profiles derived from the bodily samples of individuals who have been charged with an offence but not yet convicted.⁴² Profiles on the databank must be removed if the charge is withdrawn or if the individual is acquitted.⁴³ However, if they are convicted of the offence, then the profile may be transferred to the DNA Profile Databank.⁴⁴

³⁸ Criminal Investigations (Bodily Samples) Act 1995, s 6(1).

³⁹ Section 13(1).

⁴⁰ This can be inferred from the definition of DNA profile in section 2 and section 16.

⁴¹ Section 24J.

⁴² Law Commission, above n 12, at 11.

⁴³ Section 60(3)(b).

⁴⁴ Sections 24P(1)(b)(ii) and 26(ab).

3 DNA Profile Databank

Part 3 of CIBSA permits the maintenance of a DNA profile databank.⁴⁵ The DNA Profile Databank contains DNA profiles of *known* individuals. It currently holds around 200,000 profiles.⁴⁶ These relate to individuals who have been convicted of a qualifying offence or have consented to their profile being uploaded to the DNA Profile Databank.⁴⁷

Section 26 of CIBSA establishes the avenues according to which a DNA profile may be uploaded to the DNA Profile Databank:

- A bodily sample was taken pursuant to Part 2 of the Act and the individual has been convicted of the qualifying offence (or a related qualifying offence);⁴⁸ or
- A bodily sample was taken pursuant to Part 2B of the Act and the individual has been convicted of the triggering offence (or a related qualifying offence);⁴⁹ or
- A bodily sample has been taken under Part 3 either by consent or according to a databank compulsion order where the individual has been convicted of a qualifying offence.⁵⁰

Once the profile of an adult is uploaded to the DNA Profile Databank, the default position is for the profile to be retained indefinitely, unless it was uploaded by consent and consent is withdrawn.⁵¹

4 Crime Sample Databank

The Crime Sample Databank contains DNA profiles recovered from crime scenes. It currently holds around 40,000 profiles.⁵² 98% of these are single contributor DNA profiles while the remainder are mixed DNA profiles.⁵³ Importantly, the Crime Sample Databank is not explicitly regulated by CIBSA; it is mainly governed by police guidelines. The current policy regarding

⁴⁵ Section 25.

⁴⁶ Institute of Environmental Science and Research “About the DNA Databank” <www.esr.cri.nz>.

⁴⁷ Note that this dissertation will primarily focus on the compulsory retention of DNA profiles.

⁴⁸ Section 26(a).

⁴⁹ Section 26(ab).

⁵⁰ Sections 29, 30 and 39.

⁵¹ Law Commission, above n 12, at 309.

⁵² ESR, above n 46.

⁵³ Law Commission, above n 12, at 195.

retention of profiles on the databank is that all profiles are retained indefinitely unless it is determined that a profile relates to an individual who had “legitimate access to the crime scene.”⁵⁴ This means that while many of the DNA profiles on the Crime Sample Databank relate to unsolved crimes,⁵⁵ there are profiles relating to resolved crimes.⁵⁶

C. General Operation of the DNA Databanks in a Criminal Investigation

When a DNA profile is obtained from a DNA sample found at a crime scene, this may be uploaded to the Crime Sample Databank and searched against the DNA Profile Databank, The Temporary Databank, and the Crime Sample Databank. This is authorised by the provisions of CIBSA. Pursuant to s 27(1)(a), information retained on the DNA Profile Databank can be accessed and disclosed for the purpose of a forensic comparison in a criminal investigation.⁵⁷ Then, pursuant to s 24R(1)(a), profiles on the Temporary Databank may be compared to unidentified information from crime scenes of offences under investigation or not yet solved.⁵⁸ The key point of this inquiry is to discover whether any databank DNA profiles match the profile obtained from the crime scene. In the first instance, the STR loci between profiles will be compared and if there is a match, ESR will generate a link report to send to the police.⁵⁹ This indicates that the individual may be of interest to police. The most useful match will be between a crime scene profile and the profile of a known individual.

However, no DNA profile stored on the DNA Profile Databank or the Temporary Databank is admissible against a person in a criminal proceeding.⁶⁰ Once there is a DNA databank match, a suspect sample needs to be obtained for the purposes of prosecution.⁶¹ This is where Part 2 of CIBSA becomes relevant. Evidence of a databank match may be given in support of an application for a suspect compulsion order.⁶² The DNA profile derived from this can be compared to the crime scene profile. This is the DNA evidence that may be presented in court.⁶³

⁵⁴ At 199.

⁵⁵ ESR, above n 46.

⁵⁶ Law Commission, above n 12, at 199.

⁵⁷ “Forensic comparison” is defined in s 2.

⁵⁸ “Unidentified information” is defined in s 24R(2).

⁵⁹ Law Commission, above n 12, at 16.

⁶⁰ Section 71.

⁶¹ Simon France (ed) *Adams on Criminal Law – Rights and Powers* (online ed, Thomson Reuters) at [CI71.01].

⁶² Sections (5)(a) and 71(3).

⁶³ France, above n 61, at [CI71.02].

In terms of the comparison that takes place, the main inquiry is the likelihood that the DNA profiles originated from the same source. A matching of profiles cannot simply be considered as proof of identity. Factors such as the rarity of the matching characters must also be accounted for.⁶⁴ In New Zealand the statistical method used to quantify the evidentiary value of matching profiles is a likelihood ratio. A likelihood ratio represents the probabilities of observing DNA profiling results given two different propositions about the origin of the DNA.⁶⁵ Importantly, likelihood ratios are *not* evidence of the probability that the accused was the source of the DNA at the crime scene.⁶⁶ They can only *support* that conclusion in light of other evidence.⁶⁷

A likelihood ratio is the hypothesis of the prosecution (that the suspect was the source of the DNA), divided by the hypothesis of the defence (that a random match has occurred and someone else was the source of the DNA).⁶⁸ The hypothesis of the prosecution is given the value of 1.⁶⁹ The hypothesis of the defence depends on how common the combination of repeats (**genotype**) are at each STR position within a given population.⁷⁰ This is calculated using components of a population genetics equation and the likelihood ratio becomes 1 divided by the value obtained. If the ultimate value is >1 then this provides support for the prosecution's hypothesis; if the value is <1 then this provides support for the defence's hypothesis.⁷¹ In terms of support for the prosecution, the greater the value is above 1, then the more probative the evidence.⁷²

A likelihood ratio is calculated for each matching locus, then these are multiplied to get an overall ratio.⁷³ The general rule is that the more loci that are examined and the rarer the

⁶⁴ Butler, above n 16, at 229.

⁶⁵ John Buckelton and others "A review of likelihood ratios in forensic science based on a critique of Stiffelman 'No longer the Gold standard: Probabilistic genotyping is changing the nature of DNA evidence in criminal trials'" (2020) 310 Forensic Science International 1 at 2.

⁶⁶ Angela van Daal and Andrew Haesler "DNA evidence: current issues and challenges" (2011) 23(7) Judicial Officers Bulletin 55 at 58.

⁶⁷ At 58.

⁶⁸ Butler, above n 16, at 252.

⁶⁹ At 252.

⁷⁰ At 252.

⁷¹ Weedn and Foran, above n 14, at 805.

⁷² Law Commission, above n 12, at 65.

⁷³ At 65.

genotypes are in a population, the higher the likelihood ratio will be.⁷⁴ For example, if the likelihood ratio is 1,000,000, then the likelihood of obtaining the DNA profiling result is 1,000,000 times greater if the DNA sample originated from the suspect, than if it originated from some unknown person within the relevant population.⁷⁵ When DNA evidence is presented in court, likelihood ratios are used, with a verbal scale employed to aid understanding.⁷⁶ For example, a likelihood ratio between 1,000 and 1,000,000 provides very strong support for the prosecution's hypothesis.⁷⁷

This process offers great utility in the investigation of crime because the use of DNA databanks may enable police to progress from an investigation where there are no suspects to a prosecution where DNA evidence may be presented. Furthermore, at the point when an individual's profile is uploaded to the DNA Profile Databank or the Temporary Databank, it may also be searched against the Crime Scene Databank.⁷⁸ In a case where DNA evidence is not relevant but following arrest or conviction the individual's DNA profile is uploaded to the relevant databank, this may implicate the individual in additional offending. However, as the use of the databanks has the potential to link individuals to criminal activity, individual rights are necessarily engaged. Whether there are any impacts on the presumption of innocence is particularly concerning.

II Re-framing the Presumption of Innocence

DNA databanks are often critiqued in the context of rights such as privacy. The conversation less frequently touches on the relationship between DNA databanks and the all-important presumption of innocence. However, the presumption of innocence seems relevant because individuals represented on a DNA databank are rendered as suspects for any and all future crimes.⁷⁹ DNA retention suggests that a person is likely to commit another offence and therefore it will be useful to have their DNA profile available, to identify them as a suspect when they do. Intuitively, it seems that this affects a person's right to be presumed innocent,

⁷⁴ Butler, above n 16, at 252.

⁷⁵ Example adapted from Butler, above n 16, at 252 and Law Commission, above n 12, at 65.

⁷⁶ Law Commission, above n 12, at 65.

⁷⁷ At 65.

⁷⁸ At 77.

⁷⁹ Tania Simoncelli "Dangerous Excursions: The Case Against Expanding Forensic DNA Databases to Innocent Persons" (2006) 34(2) *The Journal of Law, Medicine and Ethics* 390 at 392.

indicating that greater attention to the effects of DNA databanks on the presumption of innocence is required. The imperative is then furthered when the power of DNA evidence is considered. DNA evidence is often understood as a strong indicator of guilt and thus has the ability to convict.⁸⁰ However, it is not infallible, and the impact of this on the presumption of innocence is important.

This chapter will first consider the current application of the presumption of innocence and identify why the use of DNA databanks fall outside its scope. However, it will be argued that the values underpinning the presumption of innocence support extending the presumption beyond its current application. Specifically, an argument will be made for a presumption of innocence that operates during the investigative phase of the criminal process. This will incorporate a factual presumption of innocence as well as a requirement to always scrutinise incriminating evidence. Finally, it will be argued that due to a need for greater protection in the technological age, this wider presumption of innocence ought to exist in our legal system.

A. Current Application of the Presumption of Innocence

The presumption of innocence is reflected in s 25(c) of the New Zealand Bill of Rights Act 1990 (**NZBORA**): everyone who is charged with an offence has, in relation to the determination of the charge, the right to be presumed innocent until proved guilty according to law. Hence, the presumption of innocence applies once charged, and in relation to that charge. This means that the presumption of innocence predominantly operates at trial. In effect, it is equated with the burden of proof: that the prosecution must prove guilt beyond all reasonable doubt.⁸¹ This reflects the common law understanding of the presumption of innocence, which is most often explained by reference to Viscount Sankey's influential dictum:⁸²

Throughout the web of the English criminal law one golden thread is always to be seen - that is the duty of the prosecution to prove the prisoner's guilt... If, at the end of and on the whole of the case, there is a reasonable doubt...the prosecution has not made out the case and the prisoner is entitled to an acquittal.

⁸⁰ Sense about Science and EUROFORGEN *Making Sense of Forensic Genetics: What can DNA tell you about a crime?* (25 January 2017) <senseaboutscience.org> at 6.

⁸¹ Andrew Ashworth "Four Threats to the Presumption of Innocence" (2006) 10(4) *The International Journal of Evidence & Proof* 241 at 243.

⁸² *Woolmington*, above n 1, at 481.

The position remains the same in respect of the right reflected in NZBORA.⁸³ Effectively, the fact finder must treat the accused as legally innocent unless sufficient evidence is presented by the prosecution that, if not rebutted, persuades the fact-finder of the defendant's guilt.⁸⁴ Accordingly, the presumption of innocence operates as a legal presumption because it identifies who must prove the case.⁸⁵ If guilt beyond reasonable doubt is not established, then no consequences associated with legal guilt can be imposed on the individual; they are entitled to be treated as legally innocent.

However, this notion of the presumption of innocence offers no protection during the investigative phase of the criminal process. Accordingly, claims that DNA databanks challenge the presumption of innocence are often dismissed; DNA databank use occurs before a charge is laid, and a databank match is not presented as evidence in Court. Therefore, for the fundamental use of DNA databanks to be critiqued in the context of the presumption of innocence, an argument needs to be made for a presumption that actually operates in the investigative phase of the criminal process. Reference to the values that underpin the current presumption of innocence provide support for this.

B. The Values Underpinning the Presumption of Innocence

The presumption of innocence is one of the central tenets of our criminal justice system. It forms part of the right to a fair trial and seeks to mitigate any errors or defects that arise during the criminal process.⁸⁶ Most importantly, the presumption of innocence “tilts the scales of justice in favour of a defendant by requiring the prosecution to establish guilt to a high standard of certainty.”⁸⁷ By placing the burden of proof on the prosecution, the prosecution assumes the risk of non-persuasion.⁸⁸ In the marginal cases, an acquittal rather than a conviction will result. This indicates a preference for the acquittal of guilty persons over the conviction of innocent

⁸³ Mathew Downs (ed) *Cross on Evidence (NZ)* (online ed, LexisNexis) at [2.3.1.1].

⁸⁴ Antony Duff “Offences, Defences and the Presumption of Innocence” in *Answering for Crime: Responsibility and Liability in the Criminal Law* (Hart Publishing, Oxford, 2007) 195 at 195.

⁸⁵ *Hansen v R* [2007] NZSC 7, [2007] 3 NZLR 1 at [27] per Elias CJ.

⁸⁶ At [26].

⁸⁷ Andrew Stumer, *The Presumption of Innocence: Evidential and Human Rights Perspectives* (Hart Publishing, Oxford, 2010) at xxxvii.

⁸⁸ At 33.

persons.⁸⁹ The criminal justice system is trying to prevent wrongful convictions and ensure that the negative consequences of a criminal conviction are not imposed on an innocent person.⁹⁰ The presumption of innocence also recognises that there is a fundamental imbalance in power and resources of the State and the defendant.⁹¹ It follows that the prosecution is required to introduce all necessary evidence to persuade the fact-finder of the defendant's guilt.⁹² The defendant need not suggest a defence or disprove guilt unless the prosecution produces sufficient evidence to establish a *prima facie* case.⁹³

As evidenced by these values, the presumption of innocence plays an important role in our criminal justice system. However, these values could be further advanced by extending the scope of the presumption. Everything that the presumption of innocence seeks to protect is equally important throughout the entire criminal process. If we are concerned with protecting against injustices, then the presumption of innocence should not necessarily be confined to post-charge. Injustices can still arise during the investigative phase and it should be just as important to avoid these errors as it is at trial.⁹⁴ An investigative presumption of innocence would function to further protect individuals against wrongful conviction and the power and resources of the State. Moreover, it would provide additional protection against the burdens of becoming a defendant unless there is sufficient evidence amounting to a case to answer.⁹⁵

Extension of the presumption of innocence is also supported by liberal philosophies that tacitly underpin the presumption. A liberal legal order is concerned with the freedom of each individual and encourages minimal interference by the State.⁹⁶ The presumption of innocence at trial operates to enhance these values by placing the burden of proof on the State and ensuring that the consequences of a criminal conviction are not imposed without meeting the requisite standard. However, Stumer argues that to give effect to the liberal ideal, the *entire* criminal

⁸⁹ Andrew Sanders, Richard Young and Mandy Burton *Criminal Justice* (4th ed, Oxford University Press, New York, 2010) at 11.

⁹⁰ Stumer, above n 87, at 32.

⁹¹ *Hansen*, above n 85, at [198] per McGrath J.

⁹² Duff, above n 84, at 198.

⁹³ Ashworth, above n 81, at 249.

⁹⁴ Hamish Stewart "The Right to be Presumed Innocent" (2014) 8 *Criminal Law and Philosophy* 407 at 411.

⁹⁵ Antony Duff "Who Must Presume Whom to Be Innocent of What?" (2013) 42(3) *Netherlands Journal of Legal Philosophy* 170 at 174.

⁹⁶ Stewart, above n 94, at 408.

process ought to protect the rights of defendants and control the powers of the State.⁹⁷ This could be achieved by a presumption of innocence that operates in the investigative phase to restrain the forms of investigative techniques used by the State.

Essentially, we ought to treat the presumption of innocence “as an expression of deeper values”,⁹⁸ that directs the State in its dealings of citizens who have not yet been convicted of an offence.⁹⁹ For example, Ferguson argues that the presumption of innocence should be treated as “permeating the entire criminal process”,¹⁰⁰ and “promoted as a practical attitude to be adopted by the key protagonists in the justice system.”¹⁰¹ As recognised by the Supreme Court of Canada, “the presumption of innocence confirms our faith in humankind; it reflects our belief that individuals are decent and law-abiding members of the community until proven otherwise.”¹⁰² Accordingly, an investigative presumption of innocence should represent a commitment by the State to treat its citizens as innocent unless there is evidence to suggest otherwise. Doing so will further enhance the values currently enshrined by the presumption of innocence.

C. A Proposal for an Investigative Presumption of Innocence

The presumption of innocence as it currently applies is a *legal* presumption. During the investigative phase, the presumption of innocence could instead operate as a *factual* presumption. Heerema proposes a theoretical model whereby all citizens are entitled to be presumed *factually* innocent of a crime until information to the contrary exists.¹⁰³ This is different to the legal presumption of innocence which denotes that a person has not yet been found guilty according to law.¹⁰⁴ Instead, according to a factual presumption, all individuals should be treated as though they did not *in fact* commit the crime, *unless* there is evidence to suggest otherwise. In effect, this would be a reducible presumption, lowered through

⁹⁷ Stumer, above n 87, at xi.

⁹⁸ Duff, above n 95, at 171.

⁹⁹ Rinat Kitai “Presuming Innocence” (2002) 55(2) Oklahoma Law Review 257 at 272.

¹⁰⁰ Pamela Ferguson “The Presumption of Innocence and its Role in the Criminal Process” (2016) 27 Criminal Law Forum 131 at 135.

¹⁰¹ At 132.

¹⁰² *R v Oakes* [1986] 1 SCR 103 at [29].

¹⁰³ Mark Heerema “Uncovering the Presumption of Factual Innocence in Canadian Law” (2005) 28(5) Dal LJ 443 at 446.

¹⁰⁴ At 447.

incriminating evidence linking an individual to a crime.¹⁰⁵ Essentially, the more evidence there is to this effect, the less of a factual presumption of innocence an individual is entitled to. In turn, the level of factual innocence afforded to a person should inform the investigative techniques used by the State, with more techniques becoming permissible as a person's factual presumption is lowered.¹⁰⁶ For example, if there is no information suggesting a person's involvement in an offence, then that individual should not be detained or interrogated by police. Doing so would be inconsistent with viewing them as factually innocent and accordingly, their factual presumption of innocence would be undermined.

However, a person's factual presumption of innocence can be fully rebutted by incriminating evidence.¹⁰⁷ Realistically, an individual cannot be treated as factually innocent throughout the *entire* criminal process. In order for a charge to be laid, the police must reasonably suspect an individual's involvement in crime.¹⁰⁸ However, it is the existence of incriminating evidence that justifies the restrictive consequences that follow a charge. At this point, while a person's factual presumption of innocence may be fully rebutted, the individual would still retain their right to be presumed *legally* innocent. A legal presumption ensures that a person is not treated as guilty purely because of incriminating evidence against them.¹⁰⁹ This can only be rebutted at trial.

An extra layer can also be added to this investigative presumption of innocence. If operating on the premise that the presumption of innocence ought to reflect the way the State treats its citizens during the criminal process, then the presumption should necessarily also offer some protection once an individual is reasonably suspected of a crime. Even if there is incriminating evidence implicating an individual, those involved in the criminal process should remain open to the possibility of their factual innocence. At this point, the investigative presumption of innocence could function to ensure that guilt is not assumed, and instead encourage inspection and scrutiny of the incriminating evidence.¹¹⁰ Alternative explanations should be considered, and exonerating evidence should be sought.¹¹¹ The presumption of innocence requires "one

¹⁰⁵ At 451.

¹⁰⁶ At 447.

¹⁰⁷ At 454.

¹⁰⁸ Ferguson, above n 100, at 141.

¹⁰⁹ Kitai, above n 99, at 279.

¹¹⁰ At 279.

¹¹¹ Ferguson, above n 100, at 143.

side of the scales to be tipped in favour of the accused”,¹¹² and this should be done throughout the entire criminal process. While the criminal process must to a certain extent be coercive, especially once suspicion has attached, it should still be conditioned by the presumption of innocence.

The key purpose of this investigative presumption of innocence is to regulate the use of State power during the investigative phase. It should be employed as a principle according to which State action is assessed and a lens through which it can be decided what is permissible in a given case. Essentially, the State must be justified in the action they take during an investigation, based on the level of factual innocence an individual is entitled to. Then, once an individual’s factual presumption of innocence is lowered, the investigative presumption of innocence should further operate as a guiding principle to protect individuals “in the uncertain state prior to the [legal] determination of an individual’s guilt or innocence.”¹¹³

However, there may also be circumstances in which intrusions on the investigative presumption of innocence are justified. Heerema suggests that if there are interests of “sufficient magnitude” then investigative powers may be allowed that are contrary to an individual’s factual presumption of innocence.¹¹⁴ This is because we cannot be exclusively concerned with the protection of individual interests; the public interest in solving crime must also be considered. Essentially, a balancing exercise may take place.¹¹⁵ While the factual presumption of innocence does not permit the unlimited use of State powers in solving crime, it may be that in some situations, it is appropriate for the police to use more invasive techniques, even where there is no factual justification to do so.¹¹⁶

D. Comments

One of the main objections to this framing of the presumption of innocence may be that other rights serve the same function, making the investigative presumption of innocence redundant. However, while other rights may function to protect individuals during the investigative phase,

¹¹² At 146.

¹¹³ Kitai, above n 99, at 273.

¹¹⁴ Heerema, above n 103, at 460.

¹¹⁵ An example of this will be presented in Chapter IV.

¹¹⁶ Heerema, above n 103, at 471.

the investigative presumption of innocence still has important protection to offer. In this respect, Heerema argues that a presumption of factual innocence ought to exist because it is not as easily circumvented by technological change as some other pre-charge legal doctrines.¹¹⁷ As technology is becoming increasingly sophisticated, particularly in the pursuit of crime control, the protection afforded by these other doctrines may be diminished.¹¹⁸ However, the same cannot happen to an investigative presumption of innocence. This is because it represents a baseline commitment to presuming individuals as factually innocent and treating them accordingly; technological change has no bearing on this commitment.¹¹⁹

For example, DNA science might develop to a point where an individual's physical appearance can be predicted by their DNA sequence. It might become possible to more precisely predict eye and hair colour, height, nose size, handedness, and jaw angles.¹²⁰ Essentially, if DNA is found at a crime scene, then investigators might be able to construct a likely image of the contributor. This image could then be connected to an individual, for example, by searching publicly available images, utilising facial recognition technology. Accordingly, DNA samples may not be required to match DNA left at a crime scene to an individual; this could be done on the basis that an individual matches the image constructed.

The possibility of this investigative technique is unnerving – individuals can be implicated in a crime on the basis of their image, determined by their DNA. However, it is not an intrusive technique, it involves no detention and it is unlikely that there is a reasonable expectation of privacy in abandoned DNA or an individual's physical image. Thus, protection against the use of this sort of technique may not come from other legal principles. Yet, permitting analysis of genetic material in this way, gives a concerning amount of investigative power to the State. Reference to the investigative presumption of innocence can help determine the permissibility of this, because it expressly links a person's factual innocence to the powers that ought to be afforded to the State during a criminal investigation. Ultimately, it may be decided that the

¹¹⁷ At 459.

¹¹⁸ At 459.

¹¹⁹ At 460.

¹²⁰ Currently some of these predictions can be made using a DNA sequence. The technique is called forensic phenotyping. Characteristics such as eye and hair colour, and ethnicity are most commonly predicted. What is being proposed here is essentially an extension or advancement of this technique. While there are some scientific challenges to overcome for this to occur, it is an example of what could potentially develop.

investigative power afforded by this technique does not correlate to the level of factual innocence that ought to be afforded to a person whose DNA is simply found at a crime scene.

Consequently, while the investigative presumption of innocence may offer duplicate protection it may also provide a distinct “form...not expressly covered by other legal doctrines.”¹²¹ As more techniques develop, the investigative presumption of innocence can necessarily fill any legal gaps that emerge. As noted by Stevenson, Lord Sankey could not have predicted the complex challenges posed by biotechnology to the ‘golden thread’.¹²² Incorporating an investigative presumption of innocence can be used as a principle to resolve some of these challenges or help frame other rights where a technology challenges their application. In a society marked with rapid technological change, the balance between respect for individual liberties and State power, must continually be renegotiated.¹²³ This can be done by reference to an investigative presumption of innocence which allows for a balancing exercise to take place. In the era of technological advancement, this principle can always act as a way to assess what is permissible.

Most importantly, the investigative presumption of innocence proposed attempts to further the values underpinning the presumption while ensuring that the police can investigate and solve crime. It addresses the superior power and resources of the State by regulating the investigative techniques that can be used in a given case. By placing an investigative burden on the State, it furthers the protection against undue State interference and wrongful conviction.

III DNA Databanks and the Investigative Presumption of Innocence

How this investigative presumption of innocence should apply will be demonstrated by reference to New Zealand’s DNA databanks. First the general operation of the DNA databanks will be examined, and it will be argued that their use is contrary to the investigative presumption of innocence. This argument will then be developed by identifying further aspects of DNA databanks that pose threats to the investigative presumption of innocence. Specifically,

¹²¹ Heerema, above n 103, at 460.

¹²² Michelle-Therese Stevenson “DNA Evidence Under the Microscope: Why the Presumption of Innocence is Under Threat in Ireland” in Alice Diver and Jacinta Miller (eds) *Justiciability of Human Rights Law in Domestic Jurisdictions* (Springer, Cham, 2015) 263 at 276.

¹²³ Heerema, above n 103, at 445.

discussion will include the scientific limitations of a DNA databank match and factors that are relevant to each of the databanks.

A. General Operation of DNA Databanks

In effect, the factual aspect of the investigative presumption of innocence informs the starting point from which every individual is viewed by the State in relation to a crime. In the same way that the post-charge presumption of innocence tells the fact-finder where they should begin in consideration of the case,¹²⁴ the investigative presumption of innocence tells State actors where they should begin in consideration of all people. If a crime has been committed and there is no reason to suspect an individual of that crime, then that individual should theoretically retain their factual innocence.

On this basis, known individuals on the DNA databanks should be afforded an unreduced factual presumption of innocence. In cases where there are no suspects, DNA databanks are utilised in attempt to identify one. Thus, there is no evidence directly linking any of the individuals on the DNA databanks to the relevant offence. Even though there is DNA evidence at the crime scene, it is unknown to whom that relates. Consequently, each individual on the databank is entitled to be presumed *factually* innocent of the offence being investigated. An individual should be entitled to the same presumption of innocence as the “policeman that is investigating her, the prosecutor that is putting her on trial, and the judge that is delivering the judgement in her case.”¹²⁵ By the same notion, an individual who is represented on a DNA databank ought to be afforded the same level of factual innocence as those who are not. Previous engagement with the criminal justice system should not automatically lower a person’s factual presumption of innocence.

However, comparing a crime scene DNA profile to the profiles on the DNA databanks, undermines the factual presumption of innocence for all known individuals represented on the databanks. This is because the investigative technique suggests that the individuals may not, *in fact*, be entirely innocent despite no evidential justification for this. Campbell acknowledges

¹²⁴ Richard Friedman “A Presumption of Innocence, Not of Even Odds” (2000) 54(4) Stanford Law Review 873 at 883.

¹²⁵ Kitai, above n 99, at 282.

that non-conviction DNA retention may “denote suspicion on the part of the State as to the future criminality of the person and [their] likelihood of re-offending.”¹²⁶ In this way, those on the DNA databanks are “distinguish[ed] from “truly” innocent people who have not come to the attention of the police.”¹²⁷ These statements stand true for all known individuals represented on the DNA databanks. In effect, they are treated as suspects for any and all crime. They are the first to be suspected when a new crime sample is entered onto the Crime Sample Databank, due to a perceived likelihood of reoffending. Their DNA profile is compared to the profile of the perpetrator,¹²⁸ and this is driven by the idea that “those who come to the attention of the police do so with good reason and [are likely to] do so again.”¹²⁹ In terms of the factual presumption of innocence, the implication is that they are not being treated as wholly innocent despite no incriminating evidence warranting such a position to be taken. Consequently, for all these individuals, their factual presumption of innocence is reduced, and it is reduced in comparison to all those not on the DNA databanks.

An important comparison can be made to the use of suspect compulsion orders (excluding where DNA databank matches are used to obtain one). For a judge to authorise the taking of a bodily sample from an individual there must be good cause to suspect that the individual has committed the offence.¹³⁰ This is generally consistent with the factual presumption of innocence proposed; when applying for a suspect compulsion order, the facts relied upon to show there is good cause to suspect an individual must be set out.¹³¹ It can be inferred that for a suspect compulsion order to be granted, there must be some form of evidence existing against the individual, thereby reducing their factual presumption of innocence, and legitimising the invasive technique that follows. However, databanks allow for this comparison to take place without such procedure. The only difference is that because a DNA profile has previously been retained, the invasive aspect of taking a bodily sample is absent. However, this is irrelevant because the effect is the same; a DNA databank comparison has the equivalent potential to implicate a person in a crime. Yet, prior to the comparison taking place, there is no evidence linking them to the offence, so their factual innocence is different to a person who is already a

¹²⁶ Campbell, above n 5, at 896.

¹²⁷ At 894.

¹²⁸ Tarricone, above n 6, at 243.

¹²⁹ Robin Williams and Paul Johnson “Circuits of Surveillance” (2004) 2(1) *Surveill Soc.* 1 at 9.

¹³⁰ Criminal Investigations (Bodily Samples) Act 1995, s 16(1).

¹³¹ Section 13(2)(a).

suspect. The comparison that takes place is therefore inconsistent with their factual presumption of innocence.

It is likely that this sort of argument will come up against opposition. For example, DNA evidence left at a crime scene is evidence that can potentially link a person to an offence. This is evidence that may legitimately reduce an individual's factual presumption of innocence. Searching the crime scene DNA profile against the databanks is just a technique used to try link the DNA evidence to a person. If a match results, then the act of searching simply reflects the level of factual innocence that the individual was entitled to, on the basis that their DNA was found at the crime scene. Then, in terms of the remaining individuals on the databank, their DNA profile has not been matched to the crime scene, so they are unlikely to be implicated in the crime. This could be said to actually strengthen their presumption of innocence. In *Van der Velden v The Netherlands*, the court held that inclusion in a DNA databank may actually benefit an individual by excluding them as a suspect for a crime, rather than casting doubt on their innocence.¹³²

The issue however, is that prior to searching the DNA databank, it is not known to whom the DNA profile relates. Therefore, the justification for searching the databank is retrospective. On this basis, any technology, including more invasive techniques like DNA sweeps, could become permissible if it yields a match or exonerates others. For example, a DNA sweep is where individuals are requested to volunteer a DNA sample simply because they had the physical opportunity to commit the crime.¹³³ Heerema argues that these individuals are entitled to an unreduced presumption of factual innocence and DNA sweeps are therefore inconsistent with this.¹³⁴ However, if it is accepted that DNA databanks do not undermine the factual presumption of innocence, then neither would DNA sweeps. Accordingly, individuals could be required to give a DNA sample with no factual justification other than they had the physical opportunity to commit the crime. If an individual, subject to this technique, matches the crime scene DNA, then the invasive technique would be retrospectively justified. If no match results, then the technique would also be retrospectively justified, through a strengthening of the presumption of innocence. Allowing such a technique however, runs counter to the liberal

¹³² Campbell, above n 5, at 894.

¹³³ Heerema, above n 103, at 447.

¹³⁴ At 467-468.

principles embedded in the presumption of innocence. The presumption of innocence should operate to determine the limits of interference by the State in the autonomy and freedom of an individual.¹³⁵ Subjecting factually innocent people to such techniques is inconsistent with this and the proposition that all citizens should “be free from state powers which are inconsistent with their level of innocence based on the facts.”¹³⁶ Thus, accepting that DNA databanks do not undermine the presumption of innocence sets a dangerous precedent; anything could become permissible if it connects a person to a crime. Furthermore, accepting this argument fails to acknowledge the limitations of a DNA databank match.

B. Limitations of a DNA Databank Match

The limitations of a DNA databank match are also important when analysing the operation of DNA databanks according to the investigative presumption of innocence. This is because, if a person’s DNA profile is on a DNA databank, being innocent of a crime does not necessarily mean they have nothing to fear; there is still a risk of false incrimination by DNA evidence. The “scientific aura” surrounding DNA evidence “can obscure the reality that DNA evidence is not foolproof.”¹³⁷ While DNA evidence is strongly incriminating, DNA profiling is not completely infallible nor conclusive.

Firstly, there is the possibility of a coincidental match, where two DNA profiles are identical, purely by chance.¹³⁸ Even in cases where the frequency of a DNA profile is incredibly low, because DNA profiling does not examine the entire genome, it is still possible that two unrelated DNA profiles could match at the loci examined. In particular, the likelihood of a coincidental match increases when incomplete or partial DNA profiles are obtained from crime scenes.¹³⁹ For example, if a profile containing only 8 STR loci is compared to a profile containing 21 loci, then the probability of the 8 loci matching is far greater than if more loci had been compared.¹⁴⁰ Essentially, if there are fewer points of comparison, then there are fewer

¹³⁵ Kitai, above n 99, at 280.

¹³⁶ Heerema, above n 103, at 466.

¹³⁷ David Turner "Towards a DNA Dystopia? Human Rights Concerns under the Criminal Investigations (Bodily Samples) Amendment Act 2009" [2011] New Zealand Law Students Journal 502 at [38].

¹³⁸ William Thompson “The Potential for Error in Forensic DNA Testing (and How that Complicates the Use of DNA Databases for Criminal Identification)” (paper presented to Council for Responsible Genetics National Conference, New York, June 2008) at 4.

¹³⁹ At 5.

¹⁴⁰ At 5.

points where a difference between profiles may arise, making it more difficult to distinguish between individuals.¹⁴¹

Importantly, the risk of a coincidental match is actually higher when a DNA databank is used.¹⁴² For example, if a DNA profile obtained from a crime scene has a frequency of 1 in 1 million, then if it is compared to the profile of a single suspect, the probability of a coincidental match is 1 in 1 million.¹⁴³ If a match occurs then it is highly unlikely that it is coincidental,¹⁴⁴ particularly where there is other evidence implicating the individual. However, if the same profile is compared to a DNA databank, then given the large number of profiles on the databank, the probability of a coincidental match increases.¹⁴⁵ This is the case even with a databank containing approximately 200,000 profiles like the DNA Profile Databank; there are 199,999 more opportunities for a coincidental match to occur.

Therefore, if a match does occur with the DNA databank, it does not necessarily mean that the individual is the true source of the DNA left at the crime scene. Whether a match is likely to be coincidental will turn on the strength of the other evidence against the individual.¹⁴⁶ However, there are feasibly some situations where the fact of a coincidental match will not be immediately apparent. For example, the individual may happen to fit the description of the perpetrator, and there may not be any clear exculpatory evidence.

There is also the risk of an erroneous match between two DNA profiles.¹⁴⁷ Where samples have not been properly handled, processed or interpreted, there is the potential for false positives.¹⁴⁸ It is particularly problematic when crime scene DNA becomes contaminated with an innocent individual's DNA because this can falsely incriminate a person. In 2011, Adam Scott was arrested in the United Kingdom for rape, because the crime scene DNA profile matched his.¹⁴⁹ Scott maintained that he was innocent and that at the time of the offence he was

¹⁴¹ Sense about Science and EUROFORGEN, above n 80, at 15.

¹⁴² Thompson, above n 138, at 8.

¹⁴³ This example is adapted from Thompson, at 10.

¹⁴⁴ At 10.

¹⁴⁵ At 10.

¹⁴⁶ At 11.

¹⁴⁷ At 23.

¹⁴⁸ Lynch and Campbell, above n 10, at 55.

¹⁴⁹ Sense about Science and EUROFORGEN, above n 80, at 7.

200 miles away.¹⁵⁰ This was only corroborated once his phone records became available and he was released after spending 5 months in custody.¹⁵¹ It was later discovered that the DNA sample from the rape investigation had become contaminated with a DNA sample relating to Scott that was being handled by the same laboratory.¹⁵² In error, the same plastic plate used to analyse Scott's sample was reused to analyse the DNA sample from the rape case.¹⁵³ This case indicates that contamination *does* occur, and mistakes *are* made. While great care is taken to avoid these events from occurring (anti-contamination policies exist), it would be naïve to think that they do not or could not happen in New Zealand. Wherever humans are involved in a process, there is always the chance of error.¹⁵⁴ Even though Adam Scott was not convicted in this case, it is conceivable that in some situations an individual might be.

For example, in *R v Jama* (Australia, 2009), Jama was convicted and spent 15 months in prison after his DNA profile was linked to an alleged rape.¹⁵⁵ The prosecution was based entirely on this DNA evidence, despite no other inculpatory evidence.¹⁵⁶ It was later discovered that his DNA had contaminated the crime scene sample.¹⁵⁷ The forensic doctor who had taken the DNA swab from the complainant had earlier taken swabs from a woman whom Jama had engaged in sexual activity with.¹⁵⁸ It is believed that the contamination occurred either because the examination room or the equipment was not cleaned correctly.¹⁵⁹ A subsequent report found that in this case the DNA evidence was perceived to be “so powerful” that it led to “an almost mystical infallibility that enabled its surroundings to be disregarded” and a “patently absurd” outcome.¹⁶⁰ Accordingly, DNA evidence needs to be scrutinised and should not be afforded greater weight than other evidence to avoid miscarriages of justice.

¹⁵⁰ At 7.

¹⁵¹ At 7.

¹⁵² At 7.

¹⁵³ At 7.

¹⁵⁴ Michael Kirby “Forensic Evidence: Instrument of Truth or Potential for Miscarriage” (2009) 20(1) *Journal of Law, Information and Science* 1 at 17.

¹⁵⁵ *Sense About Science and EUROFORGEN*, above n 80, at 22.

¹⁵⁶ Frank Vincent *Report: Inquiry into the Circumstances that Led to the Conviction of Mr Farah Abdulkadir Jama* (Victorian Government Printer, 2010) at 55.

¹⁵⁷ *Law Commission*, above n 12, at 131.

¹⁵⁸ At 131.

¹⁵⁹ *Sense About Science and EUROFORGEN*, above n 80, at 22.

¹⁶⁰ Vincent, above n 156, at 11.

Finally, even if a person's DNA is truly found at a crime scene, this does not necessarily establish guilt.¹⁶¹ A person's DNA may be found at a crime scene without them ever being at the crime scene, or at the time of the offence.¹⁶² Firstly, DNA can go places the source has never actually been.¹⁶³ For example, DNA can be transferred from one place to another through intermediaries such as laundry,¹⁶⁴ physical objects, or people.¹⁶⁵ Accordingly, a person's DNA may be found at the crime scene, even if they have never come into direct contact with it.¹⁶⁶ Furthermore, if a person has been at a crime scene prior to the offence being committed, it still may be detected because DNA can persist for long periods of time.¹⁶⁷ However, DNA evidence alone does not provide any information as to how or when the DNA arrived at the crime scene.¹⁶⁸ Consequently, DNA may be detected that is actually irrelevant to an investigation.¹⁶⁹ Yet, as this is not necessarily known, it is possible that the innocent individual to whom the DNA relates will become a suspect. This is more likely if a comparison is made to a DNA databank and a match occurs. Then, as articulated by Jamieson, this "compelling" evidence may be combined with other circumstantial evidence, thereby strongly implicating the individual in the offence.¹⁷⁰ However, if a person's profile is not on the DNA databank, then they may never be identified, eliminating this risk.

Due to the combination of these factors, if a person's DNA profile is on one of the databanks, they are at higher risk of being falsely implicated in a crime than if their DNA were not on the databank.¹⁷¹ In terms of the investigative presumption of innocence, two main conclusions follow. Firstly, given these risks, an argument that DNA databank use does not undermine the factual presumption of innocence should not be accepted. Retrospectively justifying the use of a DNA databank because a match occurs fails to recognise that DNA evidence at a crime scene does not correspond to guilt. Then, if the dangers of a DNA databank match are not considered and there is not adequate scrutiny of the evidence, the investigative presumption of innocence

¹⁶¹ Sense about Science and EUROFORGEN, above n 80, at 6.

¹⁶² At 16.

¹⁶³ Allan Jamieson "LCN DNA – Devil in the Detail" (2007) J Law Soc Sc 22 at 23.

¹⁶⁴ Murphy, above n 9, at 500.

¹⁶⁵ Jamieson, above n 163, at 23.

¹⁶⁶ Murphy, above n 9, at 500.

¹⁶⁷ At 500.

¹⁶⁸ Sense about Science and EUROFORGEN, above n 80, at 18.

¹⁶⁹ At 16.

¹⁷⁰ Jamieson, above n 163, at 23.

¹⁷¹ Thompson, above n 138, at 38.

is undermined even further. Even when the numbers are large, DNA evidence is only ever a mathematical probability,¹⁷² and can never be regarded as a certain indication of a person's involvement in a crime.¹⁷³ While DNA profiling is highly reliable in excluding individuals as the source of forensic evidence, it is much harder to conclusively identify to whom the DNA sample actually relates.¹⁷⁴

C. Prior Conviction: DNA Profile Databank

DNA databanks containing profiles of convicted individuals are considered less controversial than DNA databanks containing profiles of unconvicted individuals because retention follows a finding of guilt.¹⁷⁵ However, when analysing the use of DNA databanks according to the investigative presumption of innocence, this position should not be adopted. Even though individuals may have been convicted of a crime, the legal determination of guilt is specific to that crime. An individual retains the right to be presumed innocent for all other crimes.¹⁷⁶ Accordingly, individuals on the DNA Profile Databank should be presumed factually innocent of such crimes, and when the DNA databanks are searched, this undermines the factual presumption of innocence for reasons already postulated.

There is also the risk that a DNA databank match with an individual who has previously been convicted of an offence will be perceived as more significant evidence than it actually is. Primarily, following a DNA databank match, there is the risk of confirmation bias. Confirmation bias is the tendency of human beings to seek information that confirms their intuitive hypothesis, rather than to look for evidence that disproves it.¹⁷⁷ Stevenson proposes that during the investigative stage, suspect vulnerability is the greatest, with a threat of confirmation bias.¹⁷⁸ Arguably, a DNA databank match that links an individual who has

¹⁷² Jessica Ritchie "Probabilistic DNA evidence: the layperson's interpretation" (2015) 47 AJFS 440 at 448.

¹⁷³ Jamieson, above n 163, at 22.

¹⁷⁴ Erin Murphy "The Art in the Science of DNA: A Layperson's Guide to the Subjectivity Inherent in Forensic DNA Typing" (2008) 58(2) Emory Law Journal 489 at 493.

¹⁷⁵ Campbell, above n 7, at 56.

¹⁷⁶ Michael Lwin "Privacy issues with DNA databases and retention of individuals' DNA information by law enforcement agencies: the holding of the European Court of Human Rights case *S and Marper v. United Kingdom* should be adapted to American Fourth Amendment jurisprudence" (2010) 19(2) Information & Communications Technology Law 189 at 202.

¹⁷⁷ Stevenson, above n 122, at 270.

¹⁷⁸ At 277-278.

previously been convicted of an offence to crime scene DNA is more likely to be understood as evidence of guilt, with alternative explanations (such as laboratory error or innocent transfer of DNA) neglected. Driving this is the view that the individual is likely to reoffend, the very reason the individual's DNA was retained in the first place.

Databanks allow for “cold hits” prompted only by genetic identity, rather than “conventional investigative leads.”¹⁷⁹ Consequently, DNA databanks lower the scrutiny burden on the State; following a DNA databank match, the police know whom to focus their investigation on and who to scrutinise.¹⁸⁰ This means that DNA evidence comes first, rather than DNA evidence being used to support or disprove a suspicion arising from other evidence. It is true that DNA evidence can provide objectivity and protect innocent suspects from becoming defendants or convicted individuals.¹⁸¹ However, DNA databank matches also pose the risk of the opposite; that DNA evidence will be used in the first instance to build a case with other evidence fitted around it. This is supported by the fact that a DNA databank match may be given as the only evidence in support of an application for a suspect compulsion order.¹⁸² Yet, due to the scientific limitations of a DNA databank match, the ability to do this is questionable.

Ultimately, a DNA databank match may be afforded too much weight and encourage the discovery of other evidence that fits the narrative of the individual being the offender. If such occurs, then necessary scrutiny of the DNA databank will not have occurred, undermining the broader notion of the investigative presumption of innocence. This is dangerous because a DNA databank match does not necessarily correspond to guilt for the reasons explained. Accordingly, the scientific limitations of a DNA databank match must be considered to promote consistency with the investigative presumption of innocence and prevent innocent individuals being implicated in crimes.

D. Non-Conviction DNA Databanks: Temporary Databank and Crime Sample Databank

¹⁷⁹ Erin Murphy “The Dark Side of DNA Databases” *The Atlantic* (online ed, Washington, D.C., 8 October 2015).

¹⁸⁰ Lwin, above n 176, at 203.

¹⁸¹ Katerina Hadjimatheou “Surveillance Technologies, Wrongful Criminalisation, and the Presumption of Innocence” (2017) 30 *Philosophy & Technology* 39 at 48.

¹⁸² France, above n 61, at [CI16.05].

As mentioned, non-conviction DNA databanks typically receive the most attention. For example, Simoncelli argues that “subjecting those who have never been convicted of a crime [to inclusion on a DNA databank] subverts our notion of a free and autonomous society and is characteristic of an authoritarian regime.”¹⁸³ In *S and Marper v United Kingdom* the European Court of Human Rights acknowledged that while it did not undermine the presumption of innocence, the retention of unconvicted persons’ DNA goes to an individual’s “perception that they are not being treated as innocent” because “their data [is] retained indefinitely in the same way as the data of convicted persons”.¹⁸⁴ However, for unconvicted individuals whose profiles are on a DNA databank, their investigative presumption of innocence is undermined in the same way as convicted individuals. The difference in conviction status is most relevant to whether the intrusion on the presumption of innocence is justified. In saying that, some further issues in terms of the presumption of innocence arise specifically in relation to the operation of New Zealand’s non-conviction DNA databanks.

1 Temporary Databank

The Police Manual states that the purpose of the Temporary Databank is to “increase the chances of identifying suspects” by linking Temporary Databank profiles to profiles on the Crime Sample Databank taken from unsolved crime scenes.¹⁸⁵ However, the operation of this databank has some serious implications for the presumption of innocence, both in its investigative and legal sense.

Firstly, according to the reasoning proposed, this lowers the individual’s factual innocence in respect of all the offences recorded on the Crime Sample Databank. The Police Manual also sets out that when exercising discretion to take a bodily sample for the Temporary Databank, there must be reasonable grounds to suspect that the individual has committed other offending, due to the particular circumstances, the nature of the triggering offence, or the particular suspect.¹⁸⁶ For example, whether the suspect has previous convictions is relevant.¹⁸⁷ In terms of the factual presumption of innocence, this discretion comes with the suggestion that the

¹⁸³ Simoncelli, above n 79, at 391.

¹⁸⁴ *S and Marper v United Kingdom* (2008) 48 EHRR 50 (Grand Chamber, ECHR).

¹⁸⁵ Police Manual *DNA Sampling* at 14.

¹⁸⁶ At 16.

¹⁸⁷ At 17.

person has engaged in other offending. However, there is no specific incriminating evidence in relation to a specific offence justifying this. Rather, suspicion is imported either due to the characteristics of the individual or the nature of the triggering offence. Furthermore, as the individual has not actually been convicted of the triggering offence, this assumption is problematic.

The main issue with the Temporary Databank has been recognised by Turner. Essentially, Police are able to enter a suspect's DNA profile onto the Temporary Databank *before* they are convicted of the offence, "allowing the police to treat a suspect as a criminal offender before a court has had a chance to make that determination and thus placing them on a kind of "genetic probation"."¹⁸⁸ This occurs without oversight of the courts and proceeds on the basis of suspicion alone. By allowing the State to take this action, it suggests that the individual is likely guilty of the triggering offence, thereby also impacting on their legal presumption of innocence.

2 *Crime Sample Databank*

The Crime Sample Databank is uniquely challenging. For example, it has become apparent that profiles relating to persons who are discovered to have legitimate access to a crime scene, are not being removed from the Crime Sample Databank.¹⁸⁹ As a result, DNA profiles of individuals who have not been involved in the commission of an offence are being routinely compared to new crime scene samples uploaded to the Crime Sample Databank. Where a profile on the Crime Sample Databank can be connected to a specific individual, then that individual may then be implicated in offending.

This occurred in *Police v Shull*. Shull was connected to an offence because a DNA profile that had been previously linked to him, was on the Crime Sample Databank.¹⁹⁰ However, the profile on the Crime Sample Databank was related to an investigation that had been discontinued.¹⁹¹ The investigation was in relation to an alleged rape and the DNA profile on the Crime Sample

¹⁸⁸ Turner, above n 137, at [30].

¹⁸⁹ Law Commission, above n 12, at 210.

¹⁹⁰ *Police v Shull* [2017] NZDC 17314, [2018] DCR 587 at [1].

¹⁹¹ At [14].

Databank was derived from a semen stain.¹⁹² It was connected to Shull, but Shull denied the allegations, claiming that the sex was consensual.¹⁹³ The investigation was discontinued because it was decided that the complainant was not a credible witness.¹⁹⁴ Accordingly, the evidence suggested that Shull had legitimate access to the crime scene, but moreover, that there was no “unsolved” crime to which the DNA profile related.¹⁹⁵ On this basis, the DNA profile should have been removed from the Crime Sample Databank and this would have prevented implication. Ultimately, the application for the suspect compulsion order was denied.¹⁹⁶

Despite this, this case is still relevant to the investigative presumption of innocence. It demonstrates that individuals who have never been charged with an offence may be implicated in offending, through an investigative technique that is contrary to their factual presumption of innocence. This is especially problematic because profiles are being retained where there is no imperative to do so. Of course, there is some protection afforded by judicial oversight in respect of suspect compulsion orders. As in this case, they might be declined, and this might mitigate any intrusion on the factual presumption of innocence. However, this does not alleviate all concerns. In *Shull*, the individual had refused to volunteer a bodily sample for comparison, and then opposed the application for the suspect compulsion order. This may not happen in every case; some individuals may first consent to a bodily sample being taken. Furthermore, even if an application for a suspect compulsion order is denied, once it is known that there has been a match, police may focus on the suspect and discover further evidence that implicates them in a crime. Importantly, the justification for retaining these profiles and undermining a person’s factual presumption of innocence may be less, compared to convicted offenders on the DNA Profile Databank.

IV Can these Intrusions on the Presumption of Innocence be Justified?

This chapter will discuss whether any intrusion on the investigative presumption of innocence by the use of New Zealand’s DNA databanks can be justified, by engaging in a balancing exercise that contemplates broader interests and considerations. It will be argued that in some

¹⁹² At [11].

¹⁹³ At [13].

¹⁹⁴ At [14].

¹⁹⁵ At [34].

¹⁹⁶ At [38].

cases, retention of DNA profiles and use of the DNA databanks is justified due to an overriding interest in solving serious crime. However, reform is needed to better regulate the DNA databanks to ensure this is reflected in legislation and to provide greater protection for the presumption of innocence.

A. The Balancing Exercise

Criminal justice is a system where balance must necessarily be struck between State powers and individual liberties. Heerema suggests that “the most celebrated legal doctrine in maintaining this balance is the presumption of innocence.”¹⁹⁷ The investigative presumption of innocence is simply another principle according to which this can be achieved. State powers inconsistent with a person’s factual presumption of innocence may be justified but only where exceptional state interests exist.¹⁹⁸ This necessitates a balancing exercise: what interests are engaged when enhanced investigative methods are employed, and when do they override an individual’s right to be presumed factually innocent?

To help guide this assessment, reference can be had to the NZBORA s 5 test for assessing whether limitations on the rights and freedoms contained within the Act are justified. The test recognises that no rights are absolute; individual rights are sometimes limited by conflicting rights of others or the wider community.¹⁹⁹ However, the limiting measure must serve a purpose sufficiently important to justify curtailment of the right, and the limit must be proportionate to the importance of the objective.²⁰⁰ The same requirements can be imported into the test of exceptional state interests; there must be some important objective but the investigative presumption of innocence should not be undermined more than reasonably necessary to achieve this. Furthermore, pursuant to the Legislation Guidelines, the policy objective, the powers necessary to achieve this, and when the powers may be exercised should be clearly reflected in CIBSA.²⁰¹

¹⁹⁷ Heerema, above n 103, at 445.

¹⁹⁸ At 461.

¹⁹⁹ Sylvia Bell (ed) *Brookers Human Rights Law – New Zealand Bill of Rights Act 1990* (online ed, Thomson Reuters) at [BOR5.01].

²⁰⁰ *Hansen*, above n 85, at [104].

²⁰¹ Legislation Design and Advisory Committee *Legislation Guidelines* (March 2018) at [18.5].

In order to determine whether any aspects of DNA databanks are justified according to this balancing exercise, the general interests engaged must be identified. The primary purpose of DNA databanks is crime resolution. By storing DNA profiles of individuals, DNA databanks have the ability to identify otherwise unsuspected offenders while quickly exonerating others. The claim can be made that, “but for” DNA databanks, some crimes may never be solved. DNA databanks may also have a role in crime prevention because by detecting and prosecuting offenders, this may disable them before they reoffend. This helps with protecting the public from criminal behaviour, which is one of the State’s primary obligations.²⁰² Thus, ensuring the efficient and accurate resolution of crime is arguably a state interest of sufficient magnitude. It is the State’s job to detect and prevent crime, ensure that the rights of victims are vindicated and to hold perpetrators to account. By connecting offenders to crimes that would otherwise go unsolved and possibly also deterring those who might otherwise commit an offence,²⁰³ DNA databanks serve an important role in pursuit of these objectives.

However, this comes into direct conflict with the right to be presumed factually innocent and the individual liberties which this seeks to protect. The investigative presumption of innocence proposed is a further protection against over-reaching State powers, wrongful conviction and individual freedom. The key tension that arises is whether crime solution through the use of DNA databanks is strong enough to justify an intrusion on the factual presumption of innocence. In resolving this tension, a proportionate balance needs to be struck.

Essentially, the balance that is to be struck is one between an enthusiastic model and a hostile model of DNA databases proposed by Beyleveld.²⁰⁴ The enthusiastic model is centred on a crime control model of criminal justice where the primary purpose of the criminal justice system is the identification, punishment and deterrence of offenders.²⁰⁵ Under this model it is accepted that occasionally the conviction of innocent persons may result if the chances of convicting the guilty are maximised.²⁰⁶ Conversely, the hostile model is centred on the due process model of criminal justice.²⁰⁷ Under this model the overriding purpose of the criminal

²⁰² Turner, above n 137, at [13].

²⁰³ Tarricone, above n 6, at 238.

²⁰⁴ Deryck Beyleveld "Ethical issues in the forensic applications of DNA analysis" (1997) 88 *Forensic Science International* 3.

²⁰⁵ At 8.

²⁰⁶ At 8.

²⁰⁷ At 8.

justice system is the protection of the innocent,²⁰⁸ and the need for limits on state power.²⁰⁹ The hostile model is therefore more aware of the risks associated with DNA databanks and the possibility of convicting an innocent person.²¹⁰

However, both the repression of criminal conduct and protection of the innocence are important values. Thus, a compromise between these two models must be achieved. In order to do so, two factors ought to be considered: the seriousness of the offence committed and the conviction status of the individual.

B. Seriousness of the Offence Committed

A DNA profile can be compulsorily retained on the DNA Profile Databank or the Temporary Databank when a person has been charged or convicted of an imprisonable offence (or the offence of peeping and peering).²¹¹ This is a relatively low threshold and captures a number of somewhat “trivial” offences, such as unlawfully opening a postal article.²¹² When CIBSA was first enacted, one of its primary purposes was to improve the identification and prosecution of sexual and serious violent offenders.²¹³ The Minister of Justice said that the aim of the DNA Profile Databank was to store DNA profiles of those convicted of these types of offences, who may reoffend.²¹⁴ However, the widening of the offence threshold appears to be a move away from this. The Regulatory Impact Statement of the Criminal Investigations (Bodily Samples) Amendment Bill 2009 (which expanded the offence threshold and introduced Part 2B) indicated that the amendments were to “assist Police to solve more crime by having more identified DNA profiles to match against the increasing number of DNA samples obtained from scenes of unsolved crime.”²¹⁵ By increasing the size of the databank, the aim was to solve more crimes and prosecute more offenders, increasing public safety and confidence in the justice

²⁰⁸ At 9.

²⁰⁹ Sanders, Young and Burton, above n 89, at 23.

²¹⁰ Helen Machado and Rafaela Granja *Forensic Genetics in the Governance of Crime* (Palgrave Macmillan, Singapore, 2020) at 61.

²¹¹ Criminal Investigations (Bodily Samples) Act 1995, pts 2B and 3.

²¹² Postal Services Act 1998, s 23.

²¹³ Law Commission, above n 12, at 34.

²¹⁴ At 34.

²¹⁵ Ministry of Justice and Treasury *Criminal Investigations (Bodily Samples) Amendment Bill 2009: Regulatory Impact Statement* (February 2009) at 1.

system.²¹⁶ Although this is a very worthwhile objective, it enables an individual's profile to be retained even if they are charged or convicted of a low-level offence.

As retention is the gateway to a person's investigative presumption of innocence being undermined, the legitimacy of this must be questioned. In these circumstances, the harm caused by the offending and the risk of reoffending, is significantly less in comparison to when a person has been charged or convicted of a more serious offence.²¹⁷ Lwin argues that "it is dubious to assume a person who has committed a non-violent, [minor offence] is therefore more likely to commit a crime where DNA evidence would be important and highly valued by society" such as a violent or sexual crime.²¹⁸ Thus, the state's imperative to retain DNA profiles from these individuals is far less, and arguably is not enough to warrant a permanent and significant reduction in a person's investigative presumption of innocence. A person's treatment should not be disproportionate to the nature of the offence, or risk they are thought to pose.²¹⁹

In fact, the police guidelines (in respect of Part 2B) indicate that where a person has been charged with a *serious* qualifying offence, it is more likely that their DNA profile will be linked to an unsolved crime.²²⁰ The guidelines acknowledge that these offences will also be those that "society has a greater interest in solving", such as serious violent crimes and sexual crime.²²¹ This itself suggests that there is little justification for acquiring DNA from suspects in respect of minor and non-violent offences.²²² The same rationale could logically be extended to retaining profiles for the DNA Profile Databank.

Then, theoretically, a crime scene profile can be uploaded to the Crime Sample Databank in respect of any offence where DNA is relevant. This means that DNA databanks can be employed to solve crimes from littering, to theft, to homicide. However, the state interest in solving these crimes cannot be the same. Heerema proposes that whether it is justified to intrude on a person's factual presumption of innocence should turn on the nature of the crime

²¹⁶ At 2.

²¹⁷ Lynch and Campbell, above n 10, at 111.

²¹⁸ Lwin, above n 176, at 207.

²¹⁹ Sanders, Young and Burton, above n 89, at 50.

²²⁰ Police Manual, above n 185, at 16.

²²¹ At 16.

²²² Lynch and Campbell, above n 10, at 112.

that is being investigated.²²³ In respect of DNA databanks, the seriousness of the crime should be considered because the state interest in resolving serious offences is inherently greater. In these cases (such as rape or homicide), resolving the offence should take precedence over an individual's right to be presumed factually innocent. This is because of the gravity of the offence and the continuing threat to society if the offender is at large.

The claim of crime solution also needs to be scrutinised. Despite having the potential to identify possible suspects, the effectiveness of the current regime is not actually known. Firstly, DNA profiles are not uploaded to the Crime Sample Databank in every case where DNA evidence is relevant. Secondly, when they are, and a match occurs, the value of these links in resolving criminal investigations is not understood.²²⁴ So while use of the DNA databanks can generate investigative leads, it is unclear how effective these are in actually resolving criminal investigations. ESR has reported that the current crime to crime link rate is 32 percent and the crime to person link rate is 70 percent.²²⁵ However, this does not indicate whether links are followed up or useful in identifying the suspect and leading to prosecution.

Thus, if the effectiveness of the regime is undetermined, then this diminishes the State's claim to the efficient resolution of crime. Reaching a balance is difficult where there is a lack of evidence to demonstrate how DNA databanks contribute to factors such as public security.²²⁶ If a measure is going to interfere with the investigative presumption of innocence, there should be evidence that this is likely to be effective in achieving the measure's objective. Accordingly, the use of DNA databanks should not be warranted in every case because the appeal to crime solution is not always enough to overcome individual interests. In this respect, the touchstone should also be the seriousness of the crime. This acknowledges that in *some* cases, DNA databanks have the important potential to identify offenders, but as the true extent of this is unknown, intrusions on the investigative presumption of innocence should only be justified where the need to solve the crime is the greatest.

²²³ Heerema, above n 103, at 479.

²²⁴ Law Commission, above n 12, at 200.

²²⁵ ESR, above n 46.

²²⁶ Aaron Opoku Amankwaa and Carole McCartney "The Effectiveness of the UK National DNA Database" (2019) 1 Forensic Science International 45 at 46.

Essentially, in terms of DNA profile retention, the focus ought to be returned to more serious offending. A seriousness threshold should also frame when DNA databanks can be used to investigate an offence where there are no suspects. In respect of both these aspects, the current regime confers a significant amount of discretion, but without any factors to guide this in the legislation itself. While DNA profiles may not be retained, or the DNA databanks used in every qualifying case, the wide threshold and lack of legislative guidance means that the potential for this to happen in respect of minor offending remains. For example, the Law Commission analysed the category of triggering offence used to obtain DNA profiles for the known person databank (DNA Profile Databank and Temporary Databank) over a three-month period in 2016.²²⁷ They found that in some cases, DNA samples were obtained for “minor triggering offending” such as trespass, wilful damage, common assault and resisting police.²²⁸

Accordingly, in order to better protect the presumption of innocence, a seriousness threshold should be clearly communicated in CIBSA. This will mean that the objective of crime resolution can be achieved, but only where it is most required. Doing so will also achieve greater consistency in the operation of the databanks. Groups such as Māori are more likely to be impacted by wide and inconsistent discretion,²²⁹ so clearly restricting when DNA databanks can be used, will provide greater protection to these groups. Furthermore, providing better, more comprehensive guidelines in legislation is more consistent with the notion that any limitation on a right should be clearly prescribed in law.²³⁰

C. Conviction Status

Another particularly important issue is the retention of DNA profiles relating to individuals who have not been convicted of an offence. Campbell argues that the expansion of DNA databanks to those who have not been convicted of an offence reflects a move “away from a rights-orientated paradigm towards a more populist and punitive model” and a desire “to “rebalance” the criminal justice system in favour of the victim and the wider community.”²³¹ However, the justification for retaining profiles in respect of individuals who have not been

²²⁷ Law Commission, above n 12, at 230.

²²⁸ At 231.

²²⁹ At 258.

²³⁰ New Zealand Bill of Rights Act 1990, s 5.

²³¹ Campbell, above n 7, at 56.

convicted of an offence is less convincing. Retention is not predicated on a finding of legal guilt, and if a person has not been convicted of an offence then there is no risk of “reoffending” warranting retention. In New Zealand, both the Crime Sample Databank and the Temporary Databank operate as non-conviction DNA databanks of sorts.

The Crime Sample Databank is not currently regulated by CIBSA and hence its operation is somewhat unclear. However, the Law Commission have identified that DNA profiles of innocent persons are being inadvertently uploaded to the Crime Sample Databank.²³² In terms of the investigative presumption of innocence this is unjustified; if they have not been involved in the commission of a crime, there is no reason to suspect them of any other offending. However, it must be acknowledged that storing DNA profiles of victims and third parties may still be important for the investigation of an offence. For example, it may be necessary to compare their DNA profiles to crime scene DNA profiles in order to eliminate their profiles. Uploading these DNA profiles in a manner that allows for this to happen but excludes routine comparisons to other crime scene profiles would be more consistent with the investigative presumption of innocence.

In terms of the Temporary Databank, the argument is different because the individual has been charged with an offence. Being able to upload these DNA profiles onto the Temporary Databank is particularly useful because it provides the opportunity to uncover additional offending and prosecute these at the same time as the triggering offence.²³³ The appeal is again to crime control and efficiency. However, not only does this have the potential to reduce an individual’s investigative presumption of innocence generally, it also impacts on the individual’s legal presumption for the triggering offence. Consequently, a strong argument can be made against this form of pre-conviction DNA retention, as the impact on individual interests is considerably greater. Furthermore, the State’s interest in solving crime can still be achieved if the individual is then convicted; a search can take place between their profile and crime scene profiles. This may be at cost to efficiency, but this is necessary to ensure the greatest consistency with all aspects of an individual’s presumption of innocence. Essentially, if an individual has not been convicted of an offence, their DNA profile should not be uploaded to the Temporary Databank to allow for a comparison to take place with the Crime Sample

²³² Law Commission, above n 12, at 208.

²³³ At 252.

Databank. This should only take place upon conviction of an offence that warrants DNA retention.

D. Comments

It is worthwhile noting that this argument is in respect of the factual aspect of the investigative presumption of innocence. The broader notion that requires evidence to be scrutinised and for alternative explanations to be considered, can never be justifiably limited. However, the possibility for this to be impacted when DNA databanks are used, furthers the imperative to restrict the use of DNA databanks to serious situations (as this reduces the occasions where a further reduction in the investigative presumption of innocence may result). Then, the encouragement of good practice following DNA databank matches is the best protection to ensure that no wrongful convictions result. Furthermore, it must continuously be recognised throughout both an investigation and trial, that DNA evidence can only ever be circumstantial evidence and is not evidence of guilt.

V Recommendations

The legislation governing DNA databanks requires amendment to reflect the suggestions in the previous chapter to ensure that the investigative presumption of innocence is promoted and that any justified limitations are clearly defined. This chapter will propose how this should be done. In particular, it will be proposed that a databank index model should be adopted. This enables rules to be promulgated, determining when profiles can be uploaded to various indices and when it is permissible to make comparisons within and between the indices. Most importantly, a seriousness threshold (through defining what is a triggering offence) will ensure that any usage of the DNA databank is a justified intrusion on the investigative presumption of innocence. Collectively, the recommendations will promote greater transparency and consistency in the operation of the DNA databanks. Note that the recommendations made are targeted at the issues that have already been identified. Wider aspects, outside the scope of this discussion, will also need to be considered, if change is adopted.

A. DNA Databank Index Model

Jurisdictions such as Ireland, Canada and Australia use a model whereby they have one DNA databank that contains multiple indices, each containing DNA profiles belonging to a particular category of people.²³⁴ These are far more comprehensive models than the regime currently operating in New Zealand. A DNA databank index model should be adopted, in order to reduce the impact on the presumption of innocence. In particular it is recommended that the following categories be established: a convicted persons index, a crime scene index, a victims index, and a voluntary donors index. Various rules can then be set out in terms of retaining DNA profiles for these indices and comparing profiles for the purpose of a criminal investigation.

1 The offence threshold

Important to these indices are the types of offences that warrant retention or comparison of DNA profiles. In the previous chapter it was suggested that the seriousness of the offence should dictate both of these aspects. In Canada, the legislation requires the offence to be a “designated offence”, which is set out in length in the Criminal Code and the National Defence Act.²³⁵ Essentially, these are prescribed serious offences, including sexual offences, homicide, and terrorism related offences. An alternative approach is to set a term of imprisonment as the offence threshold. For example, in New South Wales, the threshold is a serious indictable offence or a indictable offence.²³⁶ A serious indictable offence is an offence that is punishable by a maximum penalty of 5 or more years imprisonment.²³⁷ This 5 year threshold is also the threshold for known person databank collection in Ireland and federal Australia.²³⁸

The schedules to CIBSA also contain useful guidance in this respect. As noted by the Law Commission, the offences listed in the schedules are mainly sexual and violent offences, or offences that are considered precursors to that kind of offending.²³⁹ In 2003, the offence threshold was a “relevant offence” which was listed in the Act’s schedule. Part 1 contained serious sexual and violent offences such as sexual violation, murder, wounding with intent to

²³⁴ At 21.

²³⁵ DNA Identification Act 1998 (Canada), s 2.

²³⁶ Crimes (Forensic Procedures) Act 2000 (New South Wales), s 90.

²³⁷ Section 3.

²³⁸ Law Commission, above n 12, at 80-81.

²³⁹ At 37.

cause grievous bodily harm and aggravated robbery.²⁴⁰ Part 2 then contained further offences such as acid throwing, arson, firearms offences, and some preparatory offences to burglary.²⁴¹ This approach attempted to “strike a balance between extending the use of DNA as a valuable crime-fighting tool, and the recognition and protection of fundamental personal rights.”²⁴² Accordingly, the majority of offences were serious offences with a high degree of potential harm to society.²⁴³ The offence threshold also included any other offence punishable by 7 years or more imprisonment, and any attempt or conspiracy to commit a relevant offence.²⁴⁴ The current enactment of CIBSA contains both Part 1 and Part 2 of the schedule. However, there is now also Part 3 which was introduced by the Criminal Investigations (Bodily Samples) Amendment Act 2009. This contains further offences from various Acts such as the Animal Welfare Act 1999, the Arms Act 1983 and the Land Transport Act 1998.

It could be suggested that what constitutes a triggering offence should be those that are listed in CIBSA’s schedule, as these are mainly serious violent or sexual offences. However, there are still some less justified offences contained in the schedule. For example, theft of property valued at less than \$500, which carries a maximum term of 3 months imprisonment, is included.²⁴⁵ Instead, a term of imprisonment could be set as the threshold, such as in NSW. However, if this was set at 5 years of imprisonment or more, then retaining DNA profiles and using the DNA databank would be excluded for some important offences such as aggravated assault.²⁴⁶ This is a violent offence, where the offender may not be known, and plausibly DNA evidence may be of use.

Instead guided by the types of offences that are included in the schedule of CIBSA and are “designated” under the Canadian regime, it is recommended that a triggering offence be one where a term of imprisonment of three years or more can be imposed. This would capture serious offences that the State has a sufficient interest in solving such as rape, murder and robbery. However, it would also exclude more minor imprisonable offences (such as theft of

²⁴⁰ Criminal Investigations (Bodily Samples) Amendment Act 2003, sch 2.

²⁴¹ Schedule 2.

²⁴² Criminal Investigations (Bodily Samples) Amendment Bill 2003 (221-2) (select committee report) at 3.

²⁴³ Lynch and Campbell, above n 10, at 117.

²⁴⁴ Criminal Investigations (Bodily Samples) Amendment Act 2003, s 5(10).

²⁴⁵ Crimes Act 1961, s 223(d).

²⁴⁶ Pursuant to s 192 of the Crimes Act 1961, aggravated assault has a maximum term of 3 years imprisonment.

less than \$1,000),²⁴⁷ and offences with short terms of imprisonment where DNA evidence is unlikely to be relevant (such as driving while disqualified).²⁴⁸ In essence, such offences do not justify a reduction in the investigative presumption of innocence. There is a risk that setting the offence threshold at this level will lead to over-charging where offence definitions overlap.²⁴⁹ However, this should be mitigated by the proper use of prosecutorial discretion and the fact that in any event, the individual must be convicted of the offence.

2 The constitution of each DNA databank index

Under this proposed model of a DNA databank, DNA profiles of individuals convicted of a triggering offence could be uploaded to the convicted person's index. This could be done compulsorily following conviction, according to a compulsion order. Profiles on this index could then be retained indefinitely, provided that an individual's conviction is not overturned.

DNA profiles derived from bodily samples found at or recovered from crime scenes of triggering offences could then be uploaded to the crime scene index. For example, under the Canadian regime, these are DNA profiles derived from bodily samples found:²⁵⁰

- (a) at any place where a designated offence was committed;
- (b) on or within the body of the victim of a designated offence
- (c) on anything worn or carried by the victim at the time when a designated offence was committed;
- or
- (d) on or within the body of any person or thing or at any place associated with the commission of a designated offence.

The purpose of this is to enable crime scene DNA profiles from triggering offences, that potentially relate to the perpetrator, to be uploaded to the crime scene index. However, if the identity of the suspect is known, then the current Part 2 suspects regime should be used. This allows for the same comparison to take place but contains greater safeguards for a suspect.

²⁴⁷ Crimes Act 1961, s 223.

²⁴⁸ Land Transport Act 1998, s 32.

²⁴⁹ For example, common assault carries a maximum term of 1-year imprisonment, while assault with intent to injure carries a maximum term of 3 years imprisonment.

²⁵⁰ DNA Identification Act 1998 (Canada), s 5(3).

Where the identity of the offender is known, the imperative to use the DNA databank is absent, so the requirements in the suspect regime should not be circumvented.

In respect of profiles that are uploaded to the crime scene index, these may be retained indefinitely until the offence is resolved. If the offence is resolved (such as the individual is convicted, or it is decided that no offence has taken place) then the corresponding DNA profiles must be removed from the crime scene index. In such instances, the rationale for retaining these profiles is diminished; the police are no longer investigating an individual's involvement in a specific crime.²⁵¹ However, they may be transferred to another index, if the DNA profile meets the criteria for that index.

Further indices are also required to enable DNA profiles of innocent persons to be uploaded to the DNA databank for the purpose of investigating a triggering offence. Firstly, DNA profiles of victims could be uploaded to a victim's index, either voluntarily or from crime scene samples.²⁵² Then, there could also be a voluntary donors index. In Canada, individuals consent to their DNA profile being uploaded to the index, "where their profile may be relevant to an investigation of a designated offence".²⁵³ Having this index allows for comparisons to take place between DNA profiles of individuals not suspected of committing the offence and crime scene DNA profiles. The primary purpose of both these indices is to aid in the investigation of the triggering offence, for example, by eliminating profiles as relating to the offender. Accordingly, if the triggering offence is resolved, profiles should be removed from the relevant index.²⁵⁴ Furthermore, if DNA profiles that are initially uploaded to the crime scene index are subsequently discovered to belong to a victim or an individual who has been eliminated as a suspect, then they should be removed from the crime scene index.²⁵⁵ If appropriate, they may be transferred to the victims index or voluntary donors index.

Importantly, suspects or those arrested for a triggering offence are not included in this model. This ensures that DNA profiles of known individuals are not routinely compared to profiles from crime scenes, unless that individual has been convicted of a triggering offence. This

²⁵¹ Lwin, above n 176, at 206.

²⁵² For an example provision, see s 4.1 of the DNA Identification Act 1998 (Canada).

²⁵³ Section 4.5.

²⁵⁴ For an example provision, see s 8.1(2).

²⁵⁵ For an example provision, see s 8.1(1).

means that there is no equivalent of the Temporary Databank, preventing any reduction in a suspect's presumption of innocence. Again, this is not warranted because they have not yet been convicted of a serious offence.

3 Rules for comparison

Firstly, profiles uploaded to each index may be compared to other profiles in that index. Here, the most important comparison that will take place is between the profiles on the crime scene index. This will allow for links between offending to be discovered. Profiles uploaded to the crime scene index may then be compared to the convicted offenders index. This will facilitate possible identification of a suspect. However, as the threshold is that of a triggering offence, this will only take place in respect of serious crimes (where the need for resolution is greater).

Finally, profiles uploaded to the crime scene index may be compared to the victims and voluntary donors index, but matches may only be reported in respect of the triggering offences they were originally retained for. This is important because it prevents individuals who have not been convicted of an offence from being implicated in unrelated offending (which is beyond the purpose for which their profiles were retained). This is not only more protective of these individual's investigative presumption of innocence but may also help to encourage the willingness of victims to report crime and provide important DNA samples.²⁵⁶

B. Comments

Clearly defining each of these indices, and the rules surrounding their use is critical to ensuring that the proposed DNA databank is used only in relation to serious offending, where there is a justification for reducing the investigative presumption of innocence. As DNA evidence will not be relevant or useful in every case, it is likely that there will still be some discretion involved under this model. However, what ought to inform this, should be clearly outlined in legislation, in order to achieve transparency and consistency in the use of the DNA databank.

It is also important that a purpose provision is inserted into CIBSA, so that the purpose of the DNA databank can be clearly identified. The Canadian legislation provides a useful example.

²⁵⁶ Law Commission, above n 12, at 211.

It outlines that the purpose of the Act “...is to establish a national DNA databank to help law enforcement agencies identify persons alleged to have committed designated offences...”.²⁵⁷ The Act also recognises that “the protection of society and the administration of justice are well served by the early detection, arrest and conviction of offenders, which can be facilitated by the use of DNA profiles...”.²⁵⁸ Incorporating a provision that takes into account these aspects will help communicate the purpose of the DNA databank. Overall the balance to be achieved is the protection of the presumption of innocence while still supporting crime solution. Amendments to the current system are required and without them, the present use of DNA databanks will continue to impact on the investigative presumption of innocence.

Conclusion

The presumption of innocence is arguably the most important principle in our criminal justice system. It represents the commitment that individuals should be presumed innocent until proven guilty and seeks to protect against injustices like wrongful conviction. Yet, because it only applies once an individual is charged with an offence, the benefits of the presumption are not conferred during the investigative phase of the criminal process. However, if the presumption of innocence is of utmost importance, then it should be promoted throughout the entire course of the criminal process. Extending the presumption of innocence to the investigative phase, will operate to further enhance the presumption’s underlying objectives. In particular, an investigative presumption of innocence will function as a principle according to which investigative techniques employed by the State can be assessed. Accordingly, the effects of investigative techniques on the presumption of innocence can be more appropriately addressed. Moreover, an investigative presumption of innocence will ensure that as science progresses, individuals will still receive the benefit of being presumed factually innocent until information to the contrary exists, especially where other legal doctrines that provide protection during the investigative phase, may be circumvented.

The example of DNA databanks has been used to demonstrate how the investigative presumption of innocence should operate in practice. This analysis is important because DNA databanks do not appear to fully comport with the values underpinning the presumption of

²⁵⁷ DNA Identification Act 1998 (Canada), s 3.

²⁵⁸ Section 4(a).

innocence. Reference to the investigative presumption of innocence has enabled more in-depth discussion of DNA databanks and identification of why this is so. Implicitly, individuals on a DNA databank are not treated as factually innocent because suspicion is imported every time a comparison takes place between databank profiles and crime scene profiles. Doing so shifts the relationship between the individual and the State insofar as individuals on a databank are treated as potential offenders rather than factually innocent when they ought to be. The argument is then strengthened when aspects such as the scientific limitations of a DNA databank match and the potential consequences of DNA databank use are considered. For example, there is the possibility that a DNA databank match will be incorrect, wrongfully implicating a person. Given these implications, the legitimacy of using DNA databanks must be questioned. Here, this was done by reference to a balancing exercise.

Three main conclusions follow from this dissertation. The first is that there ought to be an investigative presumption of innocence. The second is that DNA databanks undermine this investigative presumption of innocence and only in certain circumstances (where there are sufficient state interests in solving crime) is this justified. The third is that the structure and use of the DNA databanks ought to be amended to promote greater consistency with the investigative presumption of innocence and ensure that use of DNA databanks is justified.

Bibliography

A. Cases

1 New Zealand

Hansen v R [2007] NZSC 7, [2007] 3 NZLR 1.

Manoharan v R [2015] NZCA 237.

McLaughlin v R [2015] NZCA 339.

Police v Shull [2017] NZDC 17314, [2018] DCR 587.

Wallace v R [2010] NZCA 46.

2 Canada

R v Oakes [1986] 1 SCR 103.

3 England and Wales

Woolmington v DPP [1935] AC 462 (HL).

4 European Court of Human Rights

S and Marper v United Kingdom (2008) 48 EHRR 50 (Grand Chamber, ECHR).

B. Legislation

1 New Zealand

Crimes Act 1961.

Criminal Investigations (Bodily Samples) Act 1995.

Criminal Investigations (Bodily Samples) Amendment Act 2003.

Criminal Investigations (Bodily Samples) Amendment Act 2009.

Land Transport Act 1998.

New Zealand Bill of Rights Act 1990.

Postal Services Act 1998.

2 Australia

Crimes (Forensic Procedures) Act 2000 (NSW).

3 Canada

DNA Identification Act 1998.

4 Ireland

Criminal Justice (Forensic Evidence and DNA Database System) Act 2014.

C. Books and Chapters in Books

Andrew Ashworth *Principles of Criminal Law* (5th ed, Oxford University Press, New York, 2006).

Jo-Anne Bright and Michael Coble *Forensic DNA Profiling: A Practical Guide to Assigning Likelihood Ratios* (CRC Press, Boca Raton, 2019).

John Butler *Fundamentals of Forensic DNA Typing* (Elsevier Science, San Diego, 2009).

Antony Duff “Offences, Defences and the Presumption of Innocence” in *Answering for Crime: Responsibility and Liability in the Criminal Law* (Hart Publishing, Oxford, 2007) 195.

Antony Duff “Presuming Innocence” in Lucia Zedner and Julia Roberts (eds) *Principles and Values in Criminal Law and Criminal Justice: Essays in Honour of Andrew Ashworth* (Oxford University Press, Oxford, 2012) 51.

Hock Lai Ho “The Presumption of Innocence as a Human Right” in Jill Hunter and Paul Roberts (eds) *Criminal Evidence and Human Rights: Reimagining Common Law Procedural Traditions* (Hart Publishing, Oxford, 2012) 259.

Nessa Lynch and Liz Campbell *The Collection and Retention of DNA from Suspects in New Zealand* (Victoria University Press, Wellington, 2015).

Helen Machado and Rafaela Granja *Forensic Genetics in the Governance of Crime* (Palgrave Macmillan, Singapore, 2020).

Kent Roach *Due Process and Victims’ Rights: The New Law and Politics of Criminal Justice* (University of Toronto Press, Canada, 1999).

Andrew Sanders, Richard Young and Mandy Burton *Criminal Justice* (4th ed, Oxford University Press, New York, 2010).

Michelle-Therese Stevenson “DNA Evidence Under the Microscope: Why the Presumption of Innocence is Under Threat in Ireland” in Alice Diver and Jacinta Miller (eds) *Justiciability of Human Rights Law in Domestic Jurisdictions* (Springer, Cham, 2015) 263.

Andrew Stumer, *The Presumption of Innocence: Evidential and Human Rights Perspectives* (Hart Publishing, Oxford, 2010).

Johanna Veth and Gerald Midgley “Finding the balance: forensic DNA profiling in New Zealand” in Richard Hindmarsh and Barbara Prainsack (eds) *Genetic Suspects: Global Governance of Forensic DNA Profiling and Databasing* (Cambridge University Press, New York, 2010) 289.

Victor Weedn and David Foran “Forensic DNA Typing” in Debra Leonard (ed) *Molecular Pathology in Clinical Practice* (2nd ed, Springer International Publishing, Switzerland, 2016) 793.

Lucia Zedner *Criminal Justice* (Oxford University Press, Oxford, 2004).

D. Journal Articles

Andrew Ashworth “Four Threats to the Presumption of Innocence” (2016) 10(4) *The International Journal of Evidence & Proof* 241.

Aaron Opoku Amankwaa and Carole McCartney “The Effectiveness of the UK National DNA Database” (2019) 1 *Forensic Science International* 45.

Deryck Beyleveld "Ethical issues in the forensic applications of DNA analysis" (1997) 88 *Forensic Science International* 3.

Brian Blakemore and Christopher Blake “Can the National DNA Database be Effective and Comply with Human Rights Legislation?” (2012) 85 *The Police Journal* 191.

John Buckelton and others “A review of likelihood ratios in forensic science based on a critique of Stiffelman ‘No longer the Gold standard: Probabilistic genotyping is changing the nature of DNA evidence in criminal trials’” (2020) 310 *Forensic Science International* 1.

Liz Campbell "A Rights-based Analysis of DNA Retention: Non-conviction Databases and the Liberal State" (2010) 12 *Criminal Law Review* 889.

Liz Campbell “Criminal Labels, the European Convention on Human Rights and the Presumption of Innocence” (2013) 76 *The Modern Law Review* 681.

Liz Campbell “Non-conviction DNA databases and criminal justice: a comparative analysis” (2011) 1 *Journal of Commonwealth Criminal Law* 55.

James Carrant “Expert Witnesses in DNA cases” [2000] *NZLJ* 101.

Antony Duff “Who Must Presume Whom to Be Innocent of What?” (2013) 42(3) *Netherlands Journal of Legal Philosophy* 170.

Pamela Ferguson “The Presumption of Innocence and its Role in the Criminal Process” (2016) 27 *Crim Law Forum* 131.

Richard Friedman “A Presumption of Innocence, Not of Even Odds” (2000) 54(4) Stanford Law Review 873.

Katerina Hadjimatheou “Surveillance Technologies, Wrongful Criminalisation, and the Presumption of Innocence” (2017) 30 Philosophy & Technology 39.

SA Harbison and JF Hamilton and SJ Walsh "The New Zealand DNA databank: its development and significance as a crime solving tool" (2001) 41(1) Science and Justice 33.

Mark Heerema “Uncovering the Presumption of Factual Innocence in Canadian Law” (2005) 28(5) Dal LJ 443.

Allan Jamieson “LCN DNA – Devil in the Detail” (2007) J Law Soc Sc 22.

Michael Kirby “Forensic Evidence: Instrument of Truth or Potential for Miscarriage” (2009) 20(1) Journal of Law, Information and Science 1.

Rinat Kitai “Presuming Innocence” (2002) 55(2) Oklahoma Law Review 257.

Christopher Lawless “The low template DNA profiling controversy: Biolegality and boundary work among forensic scientists” (2013) 43(2) Social Studies of Science 191.

Michael Lwin “Privacy issues with DNA databases and retention of individuals' DNA information by law enforcement agencies: the holding of the European Court of Human Rights case *S and Marper v. United Kingdom* should be adapted to American Fourth Amendment jurisprudence” (2010) 19(2) Information & Communications Technology Law 189.

Erin Murphy “Forensic DNA Typing” (2018) 1 Annual Review of Criminology 497.

Erin Murphy “The Art in the Science of DNA: A Layperson’s Guide to the Subjectivity Inherent in Forensic DNA Typing” (2008) 58(2) Emory Law Journal 489.

Una Ni Raifeartaigh “Reconciling Bail Law with the Presumption of Innocence” (1997) 17(1) Oxford J. Legal Stud. 1.

Mike Redmayne “Presenting Probabilities in Court: a DNA experience” (1997) 1 The International Journal of Evidence & Proof 187.

Jessica Ritchie “Probabilistic DNA evidence: the layperson’s interpretation” (2015) 47 AJFS 440.

Bernard Robertson “Fundamental Concepts” [2018] NZLJ 123.

Bernard Robertson “Likelihood Ratios in Evidence” [2016] NZLJ 22.

John Rowan “Reviewing DNA Evidence” [2011] NZLJ 400.

Tania Simoncelli “Dangerous Excursions: The Case Against Expanding Forensic DNA Databases to Innocent Persons” (2006) 34(2) *The Journal of Law, Medicine and Ethics* 390.

Hamish Stewart “The Right to be Presumed Innocent” (2014) 8 *Criminal Law and Philosophy* 407.

Carl-Friedrich Stuckenberg “Who is Presumed Innocent of What by Whom?” (2014) 8 *Crim Law and Philos* 301.

Jason Tarricone “An Ordinary Citizen Just Like Everyone Else: The Indefinite Retention of Former Offenders’ DNA” (2005) 2 *Stanford Journal of Civil Rights and Civil Liberties* 209.

Yvette Tinsley “Science in the Criminal Courts: tools in service, challenge to legal authority or indispensable ally?” (2013) 25 *NZULR* 844.

David Turner “Towards a DNA Dystopia? Human Rights Concerns under the Criminal Investigations (Bodily Samples) Amendment Act 2009” [2011] *New Zealand Law Students Journal* 502.

Angela van Daal and Andrew Haesler “DNA evidence: current issues and challenges” (2011) 23(7) *Judicial Officers Bulletin* 55.

Rhonda Wheate “The Importance of DNA Evidence to Juries in Criminal Trials” (2010) 14 *The International Journal of Evidence & Proof* 129.

Robin Williams and Paul Johnson “Circuits of Surveillance” (2004) 2(1) *Surveill Soc.* 1.

E. Parliamentary and Government Materials

Legislation Design and Advisory Committee *Legislation Guidelines* (March 2018).

Ministry of Justice and Treasury *Criminal Investigations (Bodily Samples) Amendment Bill 2009: Regulatory Impact Statement* (February 2009).

Police Manual *DNA Sampling*.

United Kingdom Human Genetics Commission *Nothing to hide, nothing to fear? Balancing individual rights and the public interest in the governance and use of the National DNA Database* (November 2009).

F. Reports

Frank Vincent *Report: Inquiry into the Circumstances that Led to the Conviction of Mr Farah Abdulkadir Jama* (Victorian Government Printer, 2010).

Law Commission *The Use of DNA in Criminal Investigations* (NZLC IP43, 2018).

Criminal Investigations (Bodily Samples) Amendment Bill 2003 (221-2) (select committee report).

G. Internet Resources

Sylvia Bell (ed) *Brookers Human Rights Law – New Zealand Bill of Rights Act 1990* (online ed, Thomson Reuters).

Mathew Downs (ed) *Cross on Evidence (NZ)* (online ed, LexisNexis).

Simon France (ed) *Adams on Criminal Law – Rights and Powers* (online ed, Thomson Reuters).

Institute of Environmental Science and Research “About the DNA Databank” <www.esr.cri.nz>.

Institute of Environmental Science and Research “DNA Techniques Available for Use in Forensic Case Work” (2016) <www.esr.cri.nz>.

Erin Murphy “The Dark Side of DNA Databases” *The Atlantic* (online ed, Washington, D.C., 8 October 2015).

Sense about Science and EUROFORGEN *Making Sense of Forensic Genetics: What can DNA tell you about a crime?* (25 January 2017) <senseaboutscience.org>.

H. Other

William Thompson “The Potential for Error in Forensic DNA Testing (and How that Complicates the Use of DNA Databases for Criminal Identification)” (paper presented to Council for Responsible Genetics National Conference, New York, June 2008).