

SUPPLEMENTARY EXPERT REPORT COVER PAGE

| Expert Personal Details | |
|--------------------------------|-------------------------------|
| Title: | Ms |
| Family Name: | Gerhard |
| Given Names: | Jae |
| Expert Work Details | |
| Occupation: | Principal Scientist |
| Company: | Independent Forensic Services |
| Work Address: | |
| Suburb/Town: | |
| State: | NSW |
| Post Code: | |
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| Work Telephone: | |
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SUPPLEMENTARY EXPERT REPORT

Section 177, Evidence Act 1995 No. 25

| | | | |
|--------------------|--|-------------------|------------|
| Name: | Jae Gerhard | Telephone: | ██████████ |
| Address: | Independent Forensic Services ██████████ | | |
| Occupation: | Principal Scientist Independent Forensic Services | | |

This report should be read in conjunction with the report issued by me on the 29 May 2023

STATES:

1. This statement made by me accurately sets out the evidence that I would be prepared, if necessary, to give in court as a witness. This statement is true to the best of my knowledge and belief and I make it knowing that, if it is tendered in evidence, I will be liable to prosecution if I have wilfully stated in it anything that I know to be false, or do not believe to be true.

2. I acknowledge that I:
 - (i) have read the Expert Witness Code of Conduct in Schedule 7 of the NSW Uniform Civil Procedure Rule (Amendment 82) 2016, under the Civil Procedure Act 2005 and,
 - (ii) agree to be bound by the Code

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Jae Gerhard
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3. Qualifications and Experience:

- 3.1. I hold a Bachelor of Science (in Biomedical Science)(Honours) from the University of Technology, Sydney.
- 3.2. I also hold a Certificate IV in Scene of Crime Examination from Canberra Institute of Technology and a Certificate IV in Workplace Training and Assessment.
- 3.3. I am currently an Industry Fellow at the Centre of Forensic Science at the University of Technology, Sydney.
- 3.4. I have been employed in the forensic science field since 2002. During this time, I have undergone training and gained extensive knowledge and experience in forensic case assessment, item examination using various techniques for detecting and sampling biological material for DNA analysis, bloodstain pattern analysis, and the analysis and interpretation of DNA for criminal case work and human identification.
- 3.5. During the course of my employment, I have also undertaken numerous training courses and seminars (including but not limited to):
- ANZFSS 25th International Symposium on Forensic Science ‘Forensics: Designing the future’ Brisbane, (2022)
 - Applying a Casework Assessment and Interpretation Approach to Probabilistic Genotyping Results Evaluative reporting for contact traces/activity level reporting workshop, International Symposium on Human Identification (2022)
 - 31st International Symposium on Human Identification (ISHI) (2020)
 - International Association of Bloodstain Pattern Analysts Annual Conference, (2020)
 - International Symposium on Human Identification (2020)
 - Validation Principles, Practices, Parameters, Performance Evaluations, and Protocols Workshop, International Symposium on Human Identification (2020)
 - Case for DNA Evidence Based on Probabilistic Genotyping Workshop, International Symposium on Human Identification (2020)
 - STRmix™ User Training (2016)
 - ANZFSS 23rd International Symposium on the Forensic Sciences “Together Informing Justice” in Auckland, New Zealand (2016)
 - Exploring Ways to Report DNA Findings given Activity Level Propositions Workshop (2014)
 - ANZFSS 22nd International Symposium on the Forensic Sciences “Detect, Decipher

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- and Deliver: the Future of Forensic Evidence” in Adelaide, Australia (2014)
- Advanced DNA Interpretation (2013)
- International Society of Forensic Genetics World Congress, Melbourne Australia (2013)
- ANZFSS 21st International Symposium on the Forensic Sciences “From Convicts to Criminalistics” in Hobart, Australia (2012)
- Clandestine Laboratory Safety and Investigation (2011)
- Laboratory Based Bloodstain Pattern Analysis (2011)
- Impressions and Expressions, Expert Evidence in Report and Courts facilitated by the Australian Academy of Forensic Sciences (2011)
- Interpretation of Complex DNA Profiles (2010)
- ANZFSS 20th International Symposium on the Forensic Sciences “Forensic Science on Trial” in Sydney, Australia
- Bloodstain Pattern Analysis (2010)
- ANZFSS 19th International Symposium on the Forensic Sciences “Domestic Crime to International Terror” Melbourne, Australia (2008)
- Digital Crime Scene Photography (2006)
- Scene of Crime Examination (2005)
- Fingerprint Fundamentals (2005)
- Ridgeology (2005)
- Crime Scene Photography (35mm Film) (2005)
- Rapid Response and Disaster Victim Identification (2004)
- ANZFSS 17th International Symposium on the Forensic Science “Challenges and Changes” Wellington, New Zealand (2004)
- Bloodstain Pattern Analysis (2003)
- Introduction to Hair and Fibre Analysis (2003)
- Introduction to Crime Scene Analysis (2003)
- Court Presentation of Evidence (2003)
- Statistics for Forensic Biology (2003)

3.6. I am also a member of the following professional bodies:

- Australian and New Zealand Forensic Science Society (ANZFSS), professional member
- International Association of Bloodstain Pattern Analysts (IABPA)
- International Society of Forensic Genetics (ISFG)

3.7. I undertake annual proficiency testing in the areas of forensic DNA interpretation, including Y-STRs and bloodstain pattern analysis (BPA).

3.8. I have been accepted as an expert and given evidence in the following courts:

- NSW Local Court
- NSW District Court
- NSW Supreme Court

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- County Court of Victoria
- Supreme Court of Victoria
- District Court of South Australia
- Federal Court of Western Australia
- Coroners Court of Northern Territory
- Supreme Court of Northern Territory
- Supreme Court of Queensland
- Tauranga District Court (New Zealand)

4. Appendix A contains a list of references.

5. Source Material

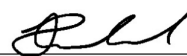
5.1. In the preparation of this report, I have been supplied and reviewed the following:

- Letter of Instruction Special Commission of Inquiry into LGBTIQ hate crimes – death of Scott Miller – 26 July 2022 (sic)
- FASS Investigative File – Part 1 (SCOI.84765)
- FASS Investigative File – Part 2 (Submission sheets)
- Folder containing photos of shirt (SCOI.84763)

6. I have been requested to review the DNA testing conducted by the New South Wales Forensic and Analytical Science Service (NSWFASS) and answer a number of questions outlined in the above letter of instruction.

7. The opinions in this report are wholly or substantially based on my specialised knowledge and experience.

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8. Limitations and Assumptions

- 8.1. This report is independent and impartial and expresses my opinions based on the information provided. Should additional information be supplied I reserve the right to revise my findings.

9. Technical information

9.1. DNA Profiling

- 9.1.1. Standard DNA profiling used in forensic biology laboratories tests areas of the autosomal DNA, known as short tandem repeats (or STRs).
- 9.1.2. Autosomal DNA is inherited from the mother and the father. This form of DNA analysis is most commonly used for the identification of individuals, due to its discriminating power.
- 9.1.3. DNA testing in this case has spanned over an approximate 15-year period. During this time there were advancements in DNA testing.
- 9.1.4. In 1997, an early form of DNA testing was conducted on samples in this matter. In 2010 - 2012, the test in use at NSWFASS (known as DAL at the time) was Profiler Plus®, which tests 9 areas of the autosomal DNA plus a sex determining region in a single test. This testing system has now also been superseded.

9.2. Trace DNA: transfer and persistence

- 9.2.1. Trace DNA is DNA from which it is not possible to identify the type of cells that the DNA originates. In recent years there has been significant advancement in the sensitivity of forensic DNA testing and it is now no longer possible to assume that any trace DNA profiles are the result of recent direct contact [1, 2] or touching. This type of DNA was previously referred to as touch DNA but this term has been superseded by the terms direct and indirect DNA transfer, to reflect the many modes in which DNA can be transferred.
- 9.2.2. It has been demonstrated that individuals can transfer DNA through normal activities, like talking, sneezing, coughing, breathing or shedding skin cells in an environment [3]. In addition, it has been identified that an individual can transfer sufficient quantities of DNA to generate a complete DNA profile from 30 seconds of

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speaking in an environment [4]. This transfer can occur for distances up to 5m, with the closer the proximity, the greater the probability of transferring DNA [3].

9.2.3. DNA can be deposited in a number of ways. For example, it can be deposited through handling an object or wearing clothing, and this is referred to as primary or direct DNA transfer. However, due to the sensitivity of modern DNA profiling, DNA can also be detected when it has been transferred indirectly via another person or an object. This is known as secondary transfer [5] or indirect DNA transfer. For example, 'Person A' shakes hands with 'Person B' who then contacts an object. The DNA from 'Person A' is detected on the object even though they have never had contact with the item. Sometimes the DNA transfer can involve additional steps, for example, an individual touches a door handle, a second individual touches the same handle and this second individual deposits the DNA of the first individual onto another item, person or surface.

9.2.4. Studies have demonstrated that not only indirect transfer occurs, but DNA can be transferred many times in a variety of ways [2, 5-10].

9.2.5. DNA can be deposited onto an individual or their clothing through social contact, either directly or indirectly, and includes DNA transfer by speaking in an environment with no physical contact [11]. An individual can also transfer DNA that has been deposited on them to other surfaces by their routine actions, including onto the inner surfaces of garments [7].

9.2.6. Experimental data has also demonstrated that neither the quantity of DNA recovered nor the quality of the DNA profile obtained can be reliably used to determine the nature of deposition i.e. direct or indirect DNA transfer [8]. This is due to transfer, persistence and recovery of trace DNA on/from persons and/or objects being a highly complex and multifactorial process [12].

9.2.7. To add further complexity in the evaluation of trace DNA, it is possible for individuals to have contact with items and a DNA profile is not recovered [13].

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10. DNA testing conducted by NSWFASS during 2010 - 2012

- 10.1. Based on the casefile information supplied, DNA testing was carried out on the jeans (item 1) and the JAG t-shirt (item 2) in 2011
- 10.2. Item 1(DAL item 6b): jeans
- 10.2.1. DNA samples (tapelifts) were collected from the inside front and back pockets of the jeans.
- 10.2.2. DNA testing of these samples was unsuccessful. That is, no DNA information was obtained from these samples.
- 10.3. Item 2 (DAL item 5): Jag t-shirt
- 10.3.1. No additional DNA samples were collected from this t-shirt. Rather, the DNA extracts that were collected in 1997, and analysed using an early form of DNA testing (DQ α testing), were retested with the current DNA testing system at the time, Profiler Plus®.
- 10.3.2. I have reviewed the results of the DNA testing and it is agreed that single source DNA profiles, that is DNA profile that have originated from only one individual, were obtained. These DNA profiles match the reference DNA profile of Mr Miller.
- 10.3.3. Statistical evaluations have been supplied in the forensic biology casefile for the early form of DNA testing, however, it is not possible to verify the input. However, the order of magnitude reported is within expectations for the type of DNA profile obtained. It does not appear that a statistical evaluation has been performed for the Profiler Plus® DNA testing. However, it should be noted, that when DNA profiles match an individual that is the complainant or deceased in a matter, that NSWFASS does not always conduct a statistical evaluation of these DNA profiles.

11. Possible further testing of the jeans (item 1) and t-shirt (item 2)

- 11.1. Item 1: jeans
- 11.1.1. Based on an examination conducted by Independent Forensic Services on the jeans on the 08 May 2023, no blood was detected on the jeans, however, there was some generalised staining which has a dirty appearance on the front and back of the jeans.

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- 11.1.2. In my opinion, this staining had the general appearance of dirt and none of this staining tested positive for a presumptive test for blood, in my opinion further DNA testing of this staining would be of little evidential value.
- 11.1.3. There was also a sticky type material that was observed on the inside cuffs/seams of the jeans. This material was also tested for the presence of blood, which was not detected.
- 11.1.4. It may be possible to do some form of chemical analysis on the jeans to further identify the dirt type material and the sticky residue. However, the opinion of a forensic chemist should be sought as to what types of analysis could be performed to identify this material and the probative value of such testing.
- 11.1.5. Trace DNA testing of the jeans
- 11.1.5.1. Trace DNA is DNA that cannot be attributed to a biological fluid, it also encompasses DNA that is deposited by handling or touching items or is shed into the environment.
- 11.1.5.2. Some trace DNA testing has already been conducted on the inside pockets of the jeans. This testing was unsuccessful. However, current DNA testing methodology, known as PowerPlex21® testing, is much more sensitive than the Profiler Plus® testing conducted on these samples. It could be possible to re-test these DNA samples with this more sensitive technology. It would also be possible to collect further samples from the pockets, however, as samples have already been collected from these areas and cellular material has been removed, in my opinion, DNA testing of the DNA extracts of samples collected from the pockets should be prioritised.
- 11.1.5.3. While it is possible that further testing for the presence of trace DNA could be conducted on other areas of the jeans of Mr Miller, this testing would require speculative testing areas of the clothing that may have been touched by another individual(s).
- 11.1.5.4. When considering the probative value of such testing, consideration should be given to the fact that this clothing has been re-examined on multiple occasions and there is the possibility that DNA (whether it be trace DNA or bloodstaining) could have been re-distributed on other areas of the clothing. Furthermore, the DNA testing would be conducted with the current and more

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sensitive for of DNA testing PowerPlex® 21 DNA testing. This means there is the increased risk of detecting complex mixed DNA profiles as well as detecting DNA that may not be relevant to the matter.

11.1.5.5. In addition, section 9.2 describes the limitations to DNA testing, even if trace DNA testing is conducted on the clothing, and a DNA profile(s) were obtained, it would not be possible to evaluate whether this DNA was deposited through some form of contact with Mr Miller or via indirect DNA transfer through his social interactions.

11.2. Item 2: JAG t-shirt

11.2.1. Based on the examination of the t-shirt conducted on the 08 May 2023, the overall bloodstain patterns had the appearance of originating from the wearer of the t-shirt. However, there are a number of small discrete stains that could potentially originate from someone other than the wearer of the t-shirt, that warrant further DNA testing.

11.2.2. These stains appear on the front centre of the t-shirt, rear left sleeve and centre of the back of the t-shirt and have been identified on the photographs in Annexure B.

11.2.3. In my opinion, these stains should be submitted for DNA testing to rule out any other contributors to the staining on the t-shirt. However, it would be worth noting that to sample these stains in the most appropriate manner for DNA testing, given their age, these stains should be excised or cut out from the t-shirt.

12. **Conclusion**

12.1. In my opinion, based on the information supplied and the results of testing to date, further DNA testing of the jeans (item 1) is unlikely to produce results that are of probative value. However, it may be worth seeking the opinion of a forensic chemist as to what types of testing are available in relation to identifying the material with dirt type appearance and the probative value of such testing.

12.2. It is recommended that DNA testing of small discrete staining on the centre front of the t-shirt (item 2), and the rear left sleeve and centre back of the t-shirt is conducted to rule out any additional contributors to the apparent blood staining.

12.3. In my opinion, further trace DNA testing of the jeans (item 1) or t-shirt (item 2) would require speculative testing areas of the clothing which is likely to be of limited probative value

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Supplementary Expert Report of Jae Gerhard
Case No: IFS2023020
Inquest into the death of Mr Scott Miller

however, the DNA extracts from the pockets could be re-tested with current DNA testing methods. Given the limitations outlined in section 9.2. it would not be possible to evaluate if any DNA detected was the result of contact with Mr Miller to cause injury or through some form of social interaction or indirect DNA transfer.

Signature: _____

A handwritten signature in black ink, appearing to read "Jae Gerhard", written over a horizontal line.

Jae Gerhard
Independent Forensic Services
21 August 2023

Appendix A

1. Phipps, M. and S. Petricevic, *The tendency of individuals to transfer DNA to handled items*. Forensic science international, 2007. **168**(2-3): p. 162-168.
2. Goray, M. and R.A. van Oorschot, *DNA transfer during social interactions*. Forensic Science International: Genetics Supplement Series, 2013. **4**(1): p. e101-e102.
3. Puliatti, L., O. Handt, and D. Taylor, *The level of DNA an individual transfers to untouched items in their immediate surroundings*. Forensic Science International: Genetics, 2021. **54**: p. 102561.
4. Port, N.J., et al., *How long does it take a static speaking individual to contaminate the immediate environment?* Forensic science, medicine, and pathology, 2006. **2**(3): p. 157-163.
5. Goray, M., et al., *Secondary DNA transfer of biological substances under varying test conditions*. Forensic Sci Int Genet, 2010. **4**(2): p. 62-7.
6. Goray, M., et al., *Secondary DNA transfer of biological substances under varying test conditions*. Forensic Science International: Genetics, 2010. **4**(2): p. 62-67.
7. Breathnach, M., et al., *Probability of detection of DNA deposited by habitual wearer and/or the second individual who touched the garment*. Forensic Science International: Genetics, 2016. **20**: p. 53-60.
8. Meakin, G. and A. Jamieson, *DNA transfer: review and implications for casework*. Forensic Science International: Genetics, 2013. **7**(4): p. 434-443.
9. Helmus, J., T. Bajanowski, and M. Poetsch, *DNA transfer—a never ending story. A study on scenarios involving a second person as carrier*. International journal of legal medicine, 2016. **130**(1): p. 121-125.
10. Buckingham, A.K., M.L. Harvey, and R.A. van Oorschot, *The origin of unknown source DNA from touched objects*. Forensic Science International: Genetics, 2016. **25**: p. 26-33.
11. Meakin, G. and A. Jamieson, *DNA transfer: review and implications for casework*. Forensic Sci Int Genet, 2013. **7**(4): p. 434-43.
12. Gosch, A. and C. Courts, *On DNA transfer: the lack and difficulty of systematic research and how to do it better*. Forensic Science International: Genetics, 2019.
13. Meakin, G.E., et al., *Evaluating forensic DNA evidence: Connecting the dots*. WIREs Forensic Science, 2020.

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