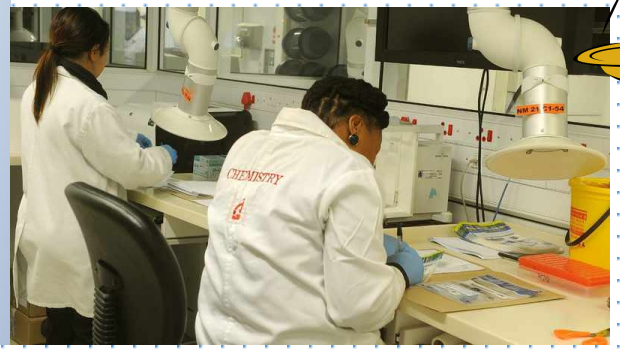
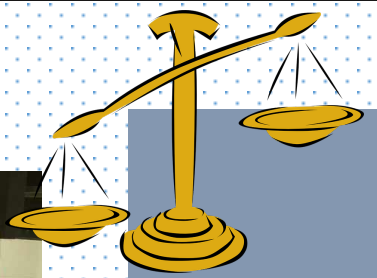
From Crime Scene to Court: Perspectives on DNA evidence





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Topics to be discussed -

Presentation of DNA evidence in GBV cases
Chain of custody issues & DNA evidence in the courtroom;
Credentials & Expert Testimony
Evaluation of DNA evidence

Perceptions and misconceptions about DNA

- The CSI effect has two quite contradictory elements. The first is that jurors may be overwhelmed by the presentation of expert evidence and convict. This is especially so where the DNA evidence is inconclusive. There is a tendency of jury members to overrate DNA evidence. As a consequence the introduction of DNA evidence may result in more convictions than are warranted. Goodman-Delahunty J and Tate D (2006) DNA And The Changing Face Of Justice. Australian Journal of Forensic Science, vol 38, pages 97-106.
- The second aspect is where jurors ask for or demand additional forensic evidence and refuse to convict where there is an absence of forensic evidence. Franzen R (2002) CSI Effect On Potential Jurors Has Some Prosecutors Worried. Santiago Union Tribune 16 December 2002.
- Journalists in the USA coined the phrase CSI effect in 2002. The media were quick to attribute a change in attitude of jurors because of the influence of the television show. In turn academics picked up the issue.
  - **DNA in the Local Court - the CSI effect - Andrew Haesler SC Deputy Senior Public Defender**
  - https://www.publicdefenders.nsw.gov.au/Pages/public_defenders_research/Papers%20by%20Public%20Defenders/public_defenders_dna_local_court_csi_effect.aspx

“Wherever he steps, whatever he touches, whatever he leaves, even unconsciously, will serve as a silent witness against him. Not only his fingerprints or his footprints but his hair, the fibers from his clothes, the glass he breaks, the tool mark he leaves, the paint he scratches, the blood or semen he deposits or collects. All of these and more, bear mute witness against him. This is evidence that does not forget. It is not confused by the excitement of the moment. It is not absent because human witnesses are. It is factual evidence. Physical evidence cannot be wrong, it cannot perjure itself, it cannot be wholly absent. Only human failure to find it, study and understand it can diminish its value”
Edmond Locard

DNA evidence as tool to solve crimes

DNA evidence is used to solve crimes in two ways:

- If a suspect is known, a sample of that person's DNA can be compared to biological evidence found at a crime scene.
- The results of this comparison may then help establish -
- whether the suspect was at the crime scene or
- whether he or she committed the crime.

- If a suspect is not known, biological evidence from the crime scene can be analyzed and compared to offender profiles in existing DNA databases to assist in identifying a suspect.
- Through the use of DNA databases, biological evidence found at one crime scene can also be connected to other crime scenes, linking them to the same perpetrator or perpetrators.

How can DNA evidence assist in criminal cases?

- DNA evidence, for example, can be used to address the following questions in a rape case:
- a) **Source level:** Is the accused the source of the semen found at the crime scene?
- b) **Sub-source level:** Is the DNA found at the scene or in the victim's vagina DNA from semen of the accused or other cellular material?
- c) **Activity level:** Did the accused have intercourse with the victim?
- d) **Offence:** *Did the accused rape the victim?*
    - *Can DNA actually prove rape/defilement?*

    - Meintjies-van der Walt L and Dhliwayo P "DNA Evidence as the Basis for Conviction" PER / PELJ 2021(24)

Kabago v Republic, Criminal Appeal No. 38 Of 2021 (Tanzania High Court Moshi)

- The Court of Appeal in the case of *Rasul Hemed vs Republic*, Criminal Appeal No. 202 of 2012 (unreported) held:
- *"We wish to also point out here that we do not agree with Miss Hyera that there was required to be DNA evidence in the circumstances of this case to establish whether it was the appellant who raped PWL The reason is clear that such evidence would be irrelevant here because the issue before the court was rape. In our view, DNA evidence would be relevant where the concern of the court was to determine paternity rather than rape. In the circumstances."*
- In view of the above holding, a DNA test is not a necessary Ingredient in establishing rape offences as the key ingredient is penetration as earlier noted. The issue should be apart from the absence of the DNA test, was there other credible and reliable evidence to prove the offence of rape against the appellant beyond reasonable doubt.

prosecution of sexual violence crimes is still difficult due to improper evidence collection, analysis, and interpretation of the results to secure any conviction for rapes

women are raped and strangled to death but most of the criminals are going free due to lack of forensic DNA that could tie them to the victim or crime scene

"DNA can be used in sexual and gender-based violence cases as a silent witness… It can be used to accurately identify and convict a perpetrator.” - **Chief Forensic Scientist Dr. Tapiwa Nyamukure (Zimbabwe)**

What are your biggest challenges / concerns in dealing with DNA evidence and why?

General Rule: Admissibility of scientific evidence in criminal cases depends on whether –

- the evidence tends to prove or disprove a fact that, under the applicable law, might matter to the outcome of the case;
- the expert presenting the evidence is qualified;
- the information is derived from scientifically acceptable procedures; and
- the potential for unfair prejudice or time-consumption substantially outweighs the probative value of the information.

The South African law of evidence, which governs expert testimony, is broadly based on the English system and therefore expert evidence will be admissible whenever it is relevant and if it can be of assistance to the court

Forensic evidence

- Forensic evidence is categorised as ***circumstantial evidence*** as it relies on inferences to connect it to a conclusion of fact.
- This involves a witness, in this case, a forensic expert witness (examiner) analysing and laying the scientific foundation for the forensic evidence when it is taken into consideration in court.
- The expert witness gives testimony in court based on his or her acquired skills and expertise on the application of forensic science methods/techniques to the evidence obtained at a crime scene
- DNA analysis is recognised as the "gold standard" for forensic feature-comparison methods.

Forensic evidence

- DNA analysis is recognised for having a higher capacity to support conclusions about individualisation which refers to matching forensic evidence to a particular accused person or exonerating persons that were wrongfully convicted of a crime.
- It is important to note that this is not to state that DNA analysis is error-free, but rather to state that when compared to the other forensic feature comparison methods, DNA analysis has a higher standard for the validity and reliability of evidence.

  - Olaborede A and Meintjes-van der Walt L "The Dangers of Convictions Based on a Single Piece of Forensic Evidence" PER / PELJ 2020(23) -

The 2021 International Association of Forensic Sciences' (IAFS) Sydney Declaration defines forensic science as follows:

- *Forensic science is a case-based (or multi case-based) research-oriented endeavour using the principles of science to study and understand traces—the remnants of past activities (such as an individual's presence and actions)—through their detection, recognition, examination and interpretation to understand anomalous events of public interest (e.g., crimes, litigations, security incidents).*

Concerns / challenges in presenting DNA evidence in court and best practices

Challenges with DNA evidence in court

- *S v Maqhina* 2001 1 SACR 241 (T)
- ***”in situations where the accused's guilt depends solely on the results of scientific analysis – it is important that the testing process, including the control measures applied, be executed and recorded with such care that it can be verified at any time by an objective expert and trial court".***

Shortcomings of the DNA evidence that were pointed out in the *Maqhina* 2001 case:

- (a) The expert of the forensic science laboratory had not followed appropriate standard protocols.
- (b) The person(s) conducting the tests were not suitably qualified.
- (c) The expert of the forensic science laboratory had failed to run certain duplicate tests, which according to the defence expert, made it impossible to determine the reliability of the test.
- (d) The forensic science laboratory was not an accredited laboratory.

DNA evidence in South Africa: Lessons learned to date
Antonel Olckers Article 2013

- Analysing 4 cases, the following amongst other issues were reported -
- (a) Use of unvalidated methods for DNA evidence submitted to court: SvP; SvA,
- (b) When the expert was asked if she was aware of instances where 9 STR loci gave a match, and 15 did not, she replied: we have . . . ‘‘never ever seen that in our country’’. SvR. The fact that this expert has not seen it is because the lab has not looked for it (personal communication), yet the court is brought under the impression that the phenomenon does not exist in South Africa. This error was perpetuated in the judgement of this case, as well as the judgement on appeal.
- (c) The following was testified with regard to SOPs ‘‘. . .for each procedure we use there is a standard operating procedure . . .’’ SvA. Contradictory testimony was however delivered under cross examination: ‘‘. . .according to our SOP cannot be done. . .’’, SvA. ‘‘. . .SOP says we are not allowed to do that. . .’’, SvA.
- (d) Submission of scientific results to court in a letter, instead of the legally required Section 212(4)(a) affidavit. This practice continues to the present and is in conflict with the above section of the South African Criminal Procedures Act 51 of 1977.
- (e) Hearsay evidence regularly presented to court. The analyst who performed the analysis does not testify in court, instead the so called ‘‘reporting officer’’ testifies. This is in direct conflict with the South African Criminal Procedures Act 51 of 1977.
- (f) Disregarding the duplication requirement in an SOP at the time of analyses, SvR

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- A trend was noted over the past 15 years in the South African courts. This trend has a multi-factorial origin and highlights the problems faced in the use of forensic science evidence in court. Although there have been improvements on how DNA evidence is gathered and presented in court, due to the fact that certain cases have been contested at the DNA evidence level, multiple issues remain that have not yet been addressed when DNA evidence is submitted to court. These issues include:
  - accreditation,
  - regulation of the forensic science profession,
  - continued education,
  - training of court officials,
  - quality assurance,
  - biased testimony,
  - lack of transparency with regard to processes and procedures followed in the forensic community,
  - incorrect interpretation of DNA evidence,
  - lack of scientific knowledge (including the scientific method) by DNA experts,
  - awareness by the legal profession and
  - an over emphasis on the prosecuting perspective.
- These same aspects continue to plague current cases.

CHAIN OF CUSTODY OF DNA EVIDENCE

The chain of custody can technically be defined as the movement and location of real evidence from the time it is obtained to the time it is presented in court.

- The chain of custody of evidence is a record of individuals who have had physical possession of the evidence.
- Documentation is critical to maintaining the integrity of the chain of custody.
- Maintaining the chain of custody is vital for any type of evidence.

The chain of evidence relating to the collection, sealing, safekeeping, sending and receipt by the forensic laboratory for analysis, rules out any tampering or substantial alterations of the evidence.

This is necessary both to ensure its admissibility in a judicial proceeding and its probative value in any subsequent investigation.

In practical terms, a chain of custody is the documentation and testimony that proves that the result or conclusion that the State seeks to prove is based on the evaluation of evidence that has not been altered or tampered with in any way since it was obtained.

Chain of custody: Handling the evidence

- The accused, or his or her legal representative, frequently challenges the chain of custody of a sample that has undergone DNA analysis.
- The purpose of such a challenge is to ensure that the sample is indeed what it purports to be and that it was not intentionally or accidentally altered in any way prior to being tested.
- When presenting evidence, the State has to prove that the chain of custody of the sample in question was intact.
- Legislation can authorises the submission of affidavits in which the handling of exhibits and samples is described.
- In such cases it may not be necessary to lead viva voce evidence.

Meticulous procedures for evidence collection, documentation and preservation should be followed.

Chain of custody: Handling the evidence

- In *S v Van Tonder* 1976 3 SA 391 (T) it was held that:
- if the chain of custody is disputed, the state has to prove that
  - the sample was properly sealed,
  - that it reached the laboratory in the same condition as it was in when dispatched, and
  - that it could not be opened without breaking the seal.
- If necessary, it will then be incumbent upon the state to subpoena the person/s who
  - sealed,
  - transported or
  - received
- the sample to give evidence as to the correctness of the procedure

Challenges with DNA evidence in court

- **No chain evidence to proof the chain of custody** – which is the foundation to proof the link between evidence and Accused
  - ***chain evidence as to the chain in custody, regarding "the means of verifying the authenticity and legal integrity of trace or sample evidence by establishing where the evidence has been and who handled it prior to the trial"***
    - Meintjes-van der Walt *DNA in the Courtroom*, cited in ***Adams v S*** 2012 ZAECGHC 55 (25 June 2012) para 5.

S v Matshaba 2016 (2) SACR 651 (NWM)

- *The importance of proving the chain of evidence is to indicate the absence of alteration or substitution of the exhibits. If no admissions are made by the defence the state bears the onus to prove the chain of evidence.*
- *The* ***state must establish the name of each person who handled the evidence, the date on which it was handled and the duration. Failure by the state to establish the chain of evidence affects the integrity of such evidence and thus renders it inadmissible****.*

S v Khauta 2020 (2) SACR 547 (FB)

- The s 212 affidavit on which the court relied
  - failed to indicate the persons from whom the DNA samples were taken, or
  - how the sealed bags in which the DNA samples were contained reached the forensic analyst (the author of the s 212 of the CPA affidavit).
- Appeal court held the DNA evidence to be inadmissible and set the convictions aside.

Who are all involved in the chain of custody of DNA & how are their evidence presented to court?

How can chain of custody problems be addressed?

Best practices to present to court the DNA chain of custody evidence

Evaluation of expert testimony

Generally the court must be satisfied that:

- (a) the expert witness not only has specialist knowledge, training, skill or experience but can furthermore, on account of these attributes or qualities, assist the court in deciding the issues;
- (b) that the witness is indeed an expert for the purpose for which he is called upon to express an opinion;
- (c) that the witness does not or will not express an opinion on hypothetical facts, that is facts which have no bearing on the case or which cannot be reconciled with all the other evidence in the case.

DNA doesn’t solve crimes in isolation. DNA profiling is an effective investigative tool to be used within the wider context of all other evidence in a case.

Whether DNA evidence alone is sufficient to convict will be influenced by the following:

- a) DNA as circumstantial evidence;
- b) whether the sample was properly collected at the crime scene, and from the victim or suspect;
- c) whether the chain of custody is intact;
- d) whether the sample was not contaminated in the laboratory;
- e) whether the sample, after being received at the forensic laboratory, was properly analysed in line with the appropriate scientific protocols; and

Continue: Whether DNA evidence alone is sufficient to convict will be influenced by the following:

- f) whether the reading and interpretation were accurate. This can be influenced by whether one is dealing with the following phenomena:
  - i) single DNA profiles;
  - ii) mixed DNA profiles;
  - iii) partial DNA profiles;
  - iv) or cold hits.

- Meintjies-van der Walt L and Dhliwayo P "DNA Evidence as the Basis for Conviction" PER / PELJ 2021(24)

S v SB 2014 (1) SACR 66 (SCA)

- [28] The court a quo preferred the evidence of Col Otto to that of Dr Oosthuizen. The court based this finding essentially on three grounds. First, it said Dr Oosthuizen only gave evidence in respect of the electropherograms and did not personally examine 'the specimen', presumably referring to the samples. Second, Dr Oosthuizen gave no evidence in respect of control measures in the laboratory, as was alluded to by Col Otto; and third, Dr Oosthuizen 'never gave evidence relating to the basis of his conclusions'.
- [29] None of these reasons bear any scrutiny. **Neither the examination of the samples nor the control measures used in the laboratory have any relevance on the issue on which the experts disagreed, namely the proper interpretation of the electropherograms.** Colonel Otto made it clear that her interpretation is based on what is reflected on the electropherograms that she brought to court, and she did not say that there is anything on the originals thereof that cannot be detected on the copies that were made available to Dr Oosthuizen. And it is clear from what I have said that the statement, that Dr Oosthuizen gave no basis for his conclusions, is simply wrong.
- [30] In my judgment the evidence of Dr Oosthuizen should in fact have been preferred to that of Col Otto. Properly analysed, the evidence of Col Otto quoted above, which was the **only evidence by her on the point in issue, means no more than that it is possible that allele 22 at locus FGA may have been lost in the mixture. It does not exclude the reasonable possibility that that allele was never there.**

S v SB 2014 (1) SACR 66 (SCA)

- [31] **Dr Oosthuizen has a PhD in molecular human genetics and is experienced in the interpretation of electropherograms. He was an objective witness who gave credit and made concessions when due. Importantly, his opinion, that allele 22 cannot be detected at locus FGA on the electropherograms of pad 1 or pad 2, is based on logical and cogent reasoning**. It is scientifically accepted that a sample more enriched with DNA will show a higher peak on an electropherogram than the less enriched sample. It is not disputed that pad 1 was more enriched with male DNA (sperm) than pad 2. Dr Oosthuizen in evidence graphically illustrated this by comparison of the electropherogram of pad 2 with that of pad 1. This accords with the evidence of Col Otto that semen was targeted when the samples were taken, but that, despite this, there was a bigger component of the victim's female DNA on pad 2 than on pad 1. This quantitative element of the interpretation of the electropherograms was not taken into account by Col Otto. I find the reasoning that led to Dr Oosthuizen's conclusion, that allele 22 at locus FGA is not present on the crime-scene samples, convincing.
- [32] For the reasons mentioned there is, at the very least, a reasonable doubt as to whether the STR profile of the appellant could be read into the STR profile of pads 1 and 2. In any event, even on the assumption that this could be done, there is no clear evidence on record as to the probability of that occurrence in the particular population. In addition, **the probabilities arising from the facts point strongly to the innocence of the appellant**. As a result of the factual circumstances related above, the trial court appears to have found that the appellant raped the girl before she went to church with her mother on the day in question, and that she was thereafter again raped by accused No 2 and at least one other male. This is highly improbable, on the evidence of the mother of the child and on the general probabilities.

STR - short tandem repeat profiling method

While judicial
officers are entitled to conduct legal research in deciding disputes, controversy and ambiguity exist on whether judicial research on facts should be allowed (ie about scientific /medical / forensic aspects etc).

In South Africa, the Constitutional Court
in S v Van der Walt 2020 (2) SACR 371 (CC) focused on procedural fairness and held that ***independent judicial research violates accused persons' right to challenge evidence in terms of s 35(3)(i) of the Constitution***.

Will the availability of DNA evidence make a difference in dealing with gender based violence and femicide cases? How & why?

What can we do to deal effectively with backlogs in GBVF and specifically sexual offences cases in courts in general?

Best practices