
The Role Of DNA In Forensic Science

The origin of DNA fingerprinting was discovered in 1984 by Dr Alec Jeffreys (Jackson and Jackson, 2011, p. 158). Over the decades, with technical developments in genetics, the original DNA fingerprinting procedure has undertaken a variety of modifications and refinements. DNA profiling has become so precise and sensitive that in the United Kingdom it is no longer allowed to be used as a sole piece of evidence in a criminal investigation, it has to be used alongside other procedures. Nevertheless, when it is applied it allows a biological sample found at a crime scene to be linked to the individual from whom it originated (Jackson and Jackson, 2011, p. 159). It is imperative to remember that when using DNA profiling to solve a criminal investigation you have to take into consideration that with the degree of amplification being used to analyse a DNA sample, it makes the method very sensitive. A single DNA molecule can give an easily detectable amount of DNA within only a few hours (Jackson and Jackson, 2011, p. 175). Due to the extreme sensitivity it must be noted that very great care must be taken when analysing these DNA samples in order to avoid contamination with other materials or forensic evidence.

Forensic evidence is a vital part of every criminal investigation. From the moment an officer enters a crime scene, up until the perpetrator is convicted any evidence found at the scene is crucial in determining the guilt or innocence of those who are convicted. DNA is one of the most common forensic evidence found at crime scenes and it could potentially still in some cases be the sole reason why a person gets convicted of a crime. Additionally, DNA is also significant in investigations as it can help exonerate the innocent, which is why anything found at a crime scene needs to be packaged in such a way that it cannot be contaminated or damaged. This is due to the fact that even DNA evidence itself can have its downsides since its analysis is subject to error and bias.

One of the most well-known cases where the contamination of DNA samples has led to a miscarriage of justice involved a man named Adam Scott, who was wrongly accused of raping a woman in Manchester due to faulty DNA evidence (Patrick Walter 2012). According to Peter Gill (2014) who was a professor of Forensic Genetics at University of Oslo, he stated that the Adam Scott case was a good example of confirmation bias, where inconvenient information that was given to the prosecution was either ignored or dismissed. Due to a technician at LGC Forensics not disposing a plastic tray after analysing it, which contained Adam Scott's DNA from an unrelated matter a cross contamination occurred leading to a misidentification. This was due to the fact that the plastic tray that was supposed to get disposed was reused in the analysis of a swab taken from a victim of rape (EuroforGen Network of Excellence 2017). It comes to show how vital it is to make sure that all exhibits found are handled appropriately. Integrity has to be ensured at all times since it shows that an evidential item has been dealt with appropriately and demonstrates that there was no interfering, addition or loss of material that could have taken place whether it was intentional or accidental. In order to ensure integrity, the continuity of evidence has to be recorded, which commences from the moment that an item has been marked as potential evidence. From then on, its location and movement must be accountable and documented until it is presented before Court and its disposal is authorised. It is important to remember that the continuity and integrity of evidence must be proved beyond all reasonable doubt in Court. This is in order to avoid errors such as the one mentioned above being made, where Adam Scott's DNA got mixed up with the genetic material taken from a rape Victim. The

Technician should have disposed the plastic tray as soon as it was done being used which he did not, due to this human error the perpetrator was never found and Adam Scott spent 5 months on remand for a crime he never committed.

On the other hand, the OJ Simpson case (Linder 2018) is an example that shows how DNA evidence was not enough to prosecute someone. During the course of Simpson's trial, many types of blood profile matches, extensive explanations about DNA profiling and how matches were found were put forward in court. The evidence given proved that there was a match between Simpson's blood and the drops of blood that were found at the scene. There was even a match between the footprints at the crime scene to the pair of shoes that Simpson had. However, the jury was not impressed by the repeated prosecutorial demonstrations of blood profile matches, such as a match between Simpson's blood sample and two drops of blood found at the crime scene alongside bloody footprints. This was due to the fact that the evidence given could not have proven beyond reasonable doubt that Simpson was the one who committed the crime, it could not prove that he in fact was there at the time of the murder. This could have been avoided if the defence did not solely rely on the DNA evidence, which is why it is important to remember that DNA evidence is used alongside other types of procedures. Another way of avoiding a situation like the one above from occurring is by thinking about the context of the evidence. It is important as an investigator to ask yourself could OJ Simpson's blood get there by other means? Could it have been transferred accidentally? Could someone possibly want to frame Mr Simpson? These are the kind of questions that should have been raised when carrying out that investigation.

Due to how complex DNA profiling is and how important it is to prevent innocent people from going to jail and convicting those who actually committed the crime, DNA alone cannot be the sole reason why a person gets convicted of a crime. According to a Forensic Science Regulator report (2012) even if DNA is found at a crime scene, it cannot be used to determine whether or not someone is guilty. DNA does not always convey how or when it got there or the body tissue it came from. Therefore, DNA needs to be perceived within a framework of additional evidence, rather than being the sole answer to solving a crime scene investigation. It is important to remember that knowing the background of any forensic evidence found at a crime scene is the key to solving any criminal investigation. DNA is unique to every individual and people leave a trail of it everywhere they go, meaning that in some cases DNA found at a crime scene might not necessarily have anything to do with the crime, which creates an issue. Thus, it is fundamental that while investigating a crime scene an investigator considers when and how that DNA might have gotten there. Asking such questions is crucial, since it helps to understand and possibly disclose information that could help eliminate any DNA that is not relevant to the case, or if its background DNA is the result of secondary transfer or contamination (Forensic Science Regulator 2012).

While DNA profiling can be helpful in an investigation, it needs to be noted that it should be used within a wider context along with any other evidence collected. A criminalist Paul Kirk (1953) said the following "However careful a criminal may be to avoid being seen or heard, he will inevitably defeat his purpose unless he can control his every act and movement so as to prevent mutual contamination with his environment, which may serve to identify him. Wherever he steps, whatever he touches, whatever he leaves – even unconsciously – will serve as a silent witness against him. Not only his fingerprints and his shoeprints, but also his hair, the fibres from his clothes, the glass he breaks, the tool mark he leaves, the paint he scratches, the blood or semen that he deposits or collects – all these bear mute witness against him. Physical

evidence cannot be wrong; it cannot perjure itself; it cannot be wholly absent. Only in its interpretation can there be error. Only human failure to find, study and understand can diminish its value.” For an investigator this is important to remember since it goes to show how vital the context of forensic evidence is. With forensic evidence the following questions need to be addressed: How was the evidence recovered? Who was involved? What is the background or the circumstances of that evidence being found? More importantly, how could have the evidence got there in the first place? Could it have gotten there by other means? In terms of DNA, it is important to ask yourself whether the DNA found at the crime scene could have gotten there due to someone else picking up that DNA accidentally without even noticing and potentially carrying it into the crime scene. There are numerous questions that should be addressed and answered in order to carry out a good investigation.

To conclude, it is safe to say that within the past few decades the improvements made to DNA profiling and DNA analyses are substantial. DNA technology is important to ensure a good level of accuracy and justice in the criminal justice system. Even DNA profiling evidence from biological samples increases the chances of finding the perpetrators in cases where there is lack of evidence or if no witnesses stepped forward. However, no matter how accurate DNA profiling and DNA analyses is, a crime scene investigator must not forget about the context of forensic evidence. Questions such as, ‘when and how did the evidence get there?’ need to be raised and answered before presenting anything to the court. More importantly, any DNA evidence presented to the court needs to be obtained alongside other types of evidence and not as a sole piece of evidence. This is to avoid cases like the OJ Simpson case from occurring. It is also crucial to note that any evidence sent to the lab need to be packaged appropriately to avoid contamination. Once those reach the lab any forensic scientist that is in charge of those evidence has to take great care to reduce any errors from occurring by making sure their methods have been carefully tested and are performed properly using calibrated equipment. This then has to be followed by a list of well-controlled procedures to prevent cross contamination. Following each of those steps will ensure that any crime scene investigation is carried out correctly and would hopefully result in the conviction or the release of an innocent person.