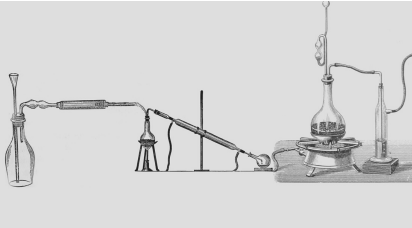


HOW DID THAT GET THERE?

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THE MYSTERY OF INDIRECT DNA TRANSFER

FRANCES HERTZOG, BARRISTER / JO MILLINGTON, FORENSIC SCIENTIST



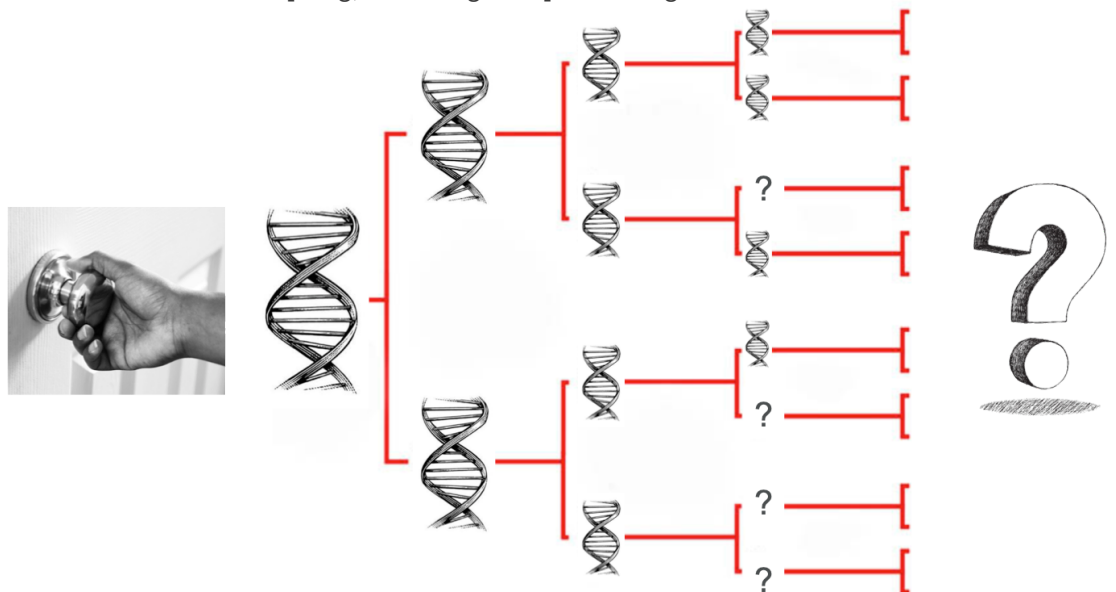
DNA TRANSFER

Routine forensic DNA analysis uses a test generically referred to as 'DNA 17'. It is an extremely sensitive method that can generate DNA profiles from extremely small amounts of material. The test itself is optimised for around a 100 nucleated cells, but in reality it can generate interpretable and usable profiles from much less than that, a few cells could be enough.

The ability of the science to generate profiles from trace amounts of biological material has implications in determining **how**, and **when** any DNA may have been deposited. The 'how' is typically addressed in terms of direct or indirect methods of transfer. In any environment where a source of DNA exists, there is the potential for that DNA to transfer to other surfaces, although this is not infinite. It is therefore crucial that forensic practitioners employ methods to minimise opportunities for inadvertent contamination in sampling, handling and processing.

“

How did that get there?



THE MILLION DOLLAR QUESTION

The question is 'can forensic scientists ever say how or when DNA could have been deposited?' and in true scientist fashion, the answer is 'it depends!'

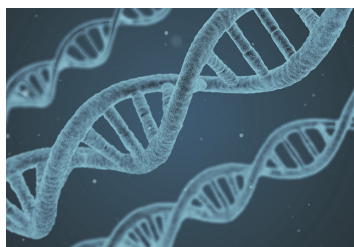
Are we dealing with an identifiable and confirmed body fluid? Can we be confident the sample is pure and has not been mixed with other sources of DNA? Do we have a 'good' full or 'major' DNA profile? If yes, then we *might* be able to attribute the DNA to the body fluid that was detected and then talk about what that body fluid (e.g. blood, semen, saliva) could mean in the context of the case circumstances.

KNOWLEDGE BASE



Whilst there is a growing body of research addressing issues of DNA transfer and persistence, the application of the data to casework scenarios can be challenging. No one scenario is exactly the same as the next. This means that there is insufficient data from experimentation of touched surfaces, using the same sensitive DNA test as is used routinely in casework to identify precisely how 'DNA' transferred. Indirect transfer of DNA, that is the transfer of DNA by a vector or intermediate surface, can outweigh DNA that has been deposited directly, where the apposite conditions are met - especially if a body fluid is available as the source material.

WHAT ABOUT DNA MIXTURES?



Mixed DNA results add a level of complexity to an evaluation. It is not an overstatement to say that DNA mixtures (especially those where there is no clear prominent/major contributor) rarely provide information to determine unequivocally **how** i.e. direct v indirect, or **in what order** any of the DNA was deposited. The DNA result alone does not tell us **what form** any of the DNA took, so that means the biological nature of the sample, and in cases where material from different surfaces has been combined into a single sample, it is also not possible to say **where** any of the DNA may have been present originally.

Taken in combination these factors mean that, more often than not, definitive interpretations cannot be provided.

WHAT ABOUT COMPLEX DNA MIXTURES?

If an individual's reference DNA profile has been compared to a mixed DNA result and no statistical evaluation of a potential match has been done, then the result must be considered evidentially inconclusive.

The Forensic Science Regulator (FSR) has published guidance on this in the document 'DNA Mixture Interpretation. Issue 2. 2018. FSR-G-222'. [LINK to GUIDANCE](#)

Guideline 15 outlines that: **'qualitative evaluations should only be presented as investigative opinions for intelligence purposes, rather than evaluative opinions'** - this means that they should not be conveyed in a way that the investigator could consider that they have evidential weight. This can only be determined if a statistical calculation (including using specialist methods) can be progressed.

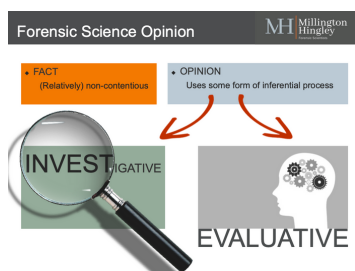
Prior to this guidance, rulings such as R v Dlugosz, R v Pickering and R v MDS [2013] EWCA Crim 2 had set out a basis on which qualitative DNA opinions could be put to the court. This practice is no longer supported.



If no statistical evaluation of a potential DNA match has been done, then the result must be considered evidentially inconclusive

As an **evaluator**, we undertake 'defendant-centred' thinking ... this means using our expertise to help others make inferences and answer questions. The most robust way to weigh up the scientific findings is to consider both sides of the story, based on accounts provided by the prosecution and defence, in light of the information available. This approach can be de-railed when there is no defence alternative, such as in no comment cases. In these circumstances it is possible that the potential significance of the findings, in light of the allegation, could be overstated. When forensic scientists are invited to operate in evaluator mode, we can be at our most helpful to the court. However, we are also at our most vulnerable ... because we can be misled by others. Not necessarily intentionally, but if the information that we have is limited or wrong, or if our knowledge is incomplete, then our evaluation could be influenced by that. Much our thinking around contextual bias of course focuses on this problem.

EVALUATION



NO COMMENT CASES



Evaluation of DNA results in cases where there is no alternative can appear to optimise the strength of support for the action that is being considered. For example, recognise any of these?

"the presence of DNA matching XX indicates that some form of DNA transfer has occurred. This could include him having touched the firearm"

"the DNA finding was in keeping with XX having had contact with the inside of the pocket, as alleged"

"there could be other explanations and if XX provides an alternative, the findings could be evaluated further"

CASE STUDY 1

Forensic Science Reporting

MH Millington
Hingley

Streamlined Forensic Reporting

In one of the case examples, the complainant was attacked by a group of people and their bag was snatched. During the struggle the complainant's coat was ripped, supposedly as a result of being grabbed. A sample of material was recovered from the damaged area of the coat and subjected to DNA profiling. The SFR indicated that the sample comprised *cellular material*, that a *full DNA profile* had been obtained and that the profile *matched an individual, Male 1, with a match probability of 1 in a billion*. That individual was charged and brought to trial. It wasn't until the trial that a witness statement regarding the DNA match was requested. That statement outlined that in fact the DNA result comprised a **mixture of DNA from at least 6 individuals**. There was no clear major contributor of DNA and because of its complexity, the result was not suitable for a specialist statistical evaluation. In the absence of any reliable method by which to evaluate the complex information in the DNA profile it rendered the result inconclusive. This was a long way from a match probability of a billion as presented in the SFR.

CHECKLIST 1: FORENSIC REPORTS

Does the report include an evaluation of the DNA findings in context with the case?

If **no**, ask for it to be done!

If **yes**, have the findings been evaluated against the prosecution and defence alternative?

If **no**, do you know what 'your' expert is going to say when asked to consider the defence scenario?

SOLE & DECISIVE CASELAW

The following cases outline some of the caselaw relevant to DNA evidence:

R v FNC [2016] EWCA Crim 1732

R v Tsekiri [2017] Crim 40

R v William Jones [2020] EWCA Crim 1021

R V FNC [2016] EWCA CRIM 1732

The Court of Appeal allowed an appeal by the Prosecution against a terminating ruling. The case was based solely on the presence of very high DNA match from semen deposited during the commission of an offence. **Case to answer.** [LINK to R v FNC](#)

V TSEKIRI [2017] CRIM 40

Where DNA was left on an article at the scene of a crime, it can, without more, raise a case to answer. The expert evidence in this case was that secondary transfer was unlikely to be an explanation for the presence of DNA at the scene. Whether it will raise a case to answer will depend on the facts of the case. [LINK to R v TSEKIRI](#)

CHECKLIST 2: TSEKIRI



Where DNA was left on an article at the scene, it can, without more, raise a case to answer

Consider:

- Is there any evidence of another plausible explanation for the presence of the defendant's DNA on the item other than involvement in the crime?
- Was the article associated with the offence itself?
- How readily moveable was the article in question?
- Is there evidence of some geographical association between the offence and offender?
- In the case of a mixed profile, is it the major contributor?
- Is it more or less likely that the DNA was deposited by direct or indirect transfer?

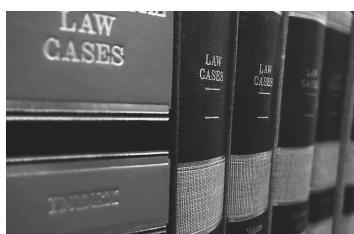
This list, of course, is not exhaustive and each case will depend on its own facts.

R V WILLIAM JONES [2020] EWCA CRIM 1021

In this case a high level of DNA from D was detected on the firing pin of a grenade. No comment interview – save for denial of handling item and the expert opinion was that the DNA findings were 'within the range of expectation if he had contact with it'. The Joint Report stated that it was not reasonable to expect anyone to be able to account for the way their DNA could have been transferred. [LINK to R v JONES](#)

THE RULING

- Geographical location did not assist in distinguishing between direct or indirect transfer
- No conclusion could be reached re: the likelihood of direct or indirect transfer
- Direct transfer more probable than indirect transfer – height of the evidence –
- probability not sufficient for a finding of guilt
- The evidence could not be supported by a s.34 CJPO Act direction



CASE STUDY 2 R V EM

Against the backdrop of a no comment interview, 4 areas of DNA (mixed profiles) including DNA that matched D was detected on 2 guns and 1 gun box that had been found together.



JOINT EXPERT REPORT

- One possibility, he touched the items – if he did, cannot say when or if he was the last person to handle it.
- Another possibility the DNA transferred indirectly
- In order to assess how likely indirect transfer could be, an alternative version of events would need to be provided.

Crown's expert outlined that without an alternative explanation they could not say whether direct or indirect transfer of DNA was more likely.



Do you know where your DNA is?

Submission of no case to answer – allowed

- No s.34 direction – R v Smith[2011] EWCA Crim 1011
- Proximity of D's address to recovery of firearms did not assist
- Evidence was at best neutral as to direct / indirect transfer

- Is the DNA profile the sole and decisive evidence in the case?
- Is there any supporting evidence?
- If not – conference between the Police, CPS and counsel

CONSIDER THE FACTS OF THE CASE

- **Can it be said that indirect transfer is improbable?**
- **If it can't – consider whether there is a realistic prospect of conviction**

- Is the DNA profile the sole and decisive evidence in the case?
- Do the facts of the case call for an explanation in interview?
- Instruct a DNA expert to comment on indirect transfer

JOINT EXPERT REPORT

- One explanation direct
- Another explanation indirect
- Cannot say which more likely without an alternative explanation

Submission of no case

"You may be horrified to think that on the way to court today you may have left many traces of your DNA behind on your journey. On the bus, the train, in your car, even the desk you're leaning on now. **Imagine for one minute you did get the bus here today.**

As you stand up to get off the bus, the driver hits a pothole and you grab onto the post to steady yourself. You get off and you come to court, doing your civic duty as you've been summonsed here to do. **Five months later, you get a knock at the door. It's the police.** They want to know why your DNA was found on a screwdriver left at the scene of a burglary. **You're horrified.** You haven't burgled anyone's house. It can't be you! You think to yourself. Ah, but the police have had the sample tested and the results are in – it's a billion times more likely to be your DNA and one other person, they tell you, than if the DNA came from two other people unrelated to you. What can you say other than I didn't do it? **Can you explain to the police how your DNA came to be on that screwdriver?** You don't know that the next person who got off the bus grabbed hold of the same handrail as you, just as they went off to burgle a house armed only with a screwdriver. You'd have no idea would you, as to how your DNA came to be there?

How could you possibly come up with an explanation?"

CHECKLIST 3: PROSECUTION

CHECKLIST 4: DEFENCE



Every contact leaves a trace ... sometimes we know about it, sometimes we don't

JURY SPEECH



Make it personal so that the jury can appreciate how issues of DNA transfer could relate to them

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