

DNA Evidence in the Ferguson Grand Jury Proceedings

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PHI 169 - Spring 2015



How Trustworthy is DNA Evidence?

Is it More Trustworthy than Eyewitness Evidence?

If the Premise Is True, Does the Conclusion Follow?

Premise: *The witness says she saw* the defendant around the crime scene at 3:30 PM on Wednesday February 14, 2013.

Conclusion: The defendant was around the crime scene at 3:30 PM on Wednesday February 14, 2013.

The conclusion follows only as a matter of probability. The witness might not be telling the truth.

If the Premise Is True, Does the Conclusion Necessarily Follow?

Premise: The Moon is either Green or Black.

Premise: The Moon is not Black.

Conclusion: The Moon is Green.

The conclusion always follows from the premises. There is no possible situation in which the premises are true and the conclusion is false.

If the Premise Is True, Does the Conclusion Necessarily Follow?

Premise: *The DNA test shows that the defendant matches with the blood found at the crime scene.*

Conclusion: The blood at the crime scene belongs to the defendant.

The conclusion follows only as a matter of probability. For example, the DNA test might be wrong.

DNA Evidence Is Based on Statistics and Probability

A. DNA **match** between

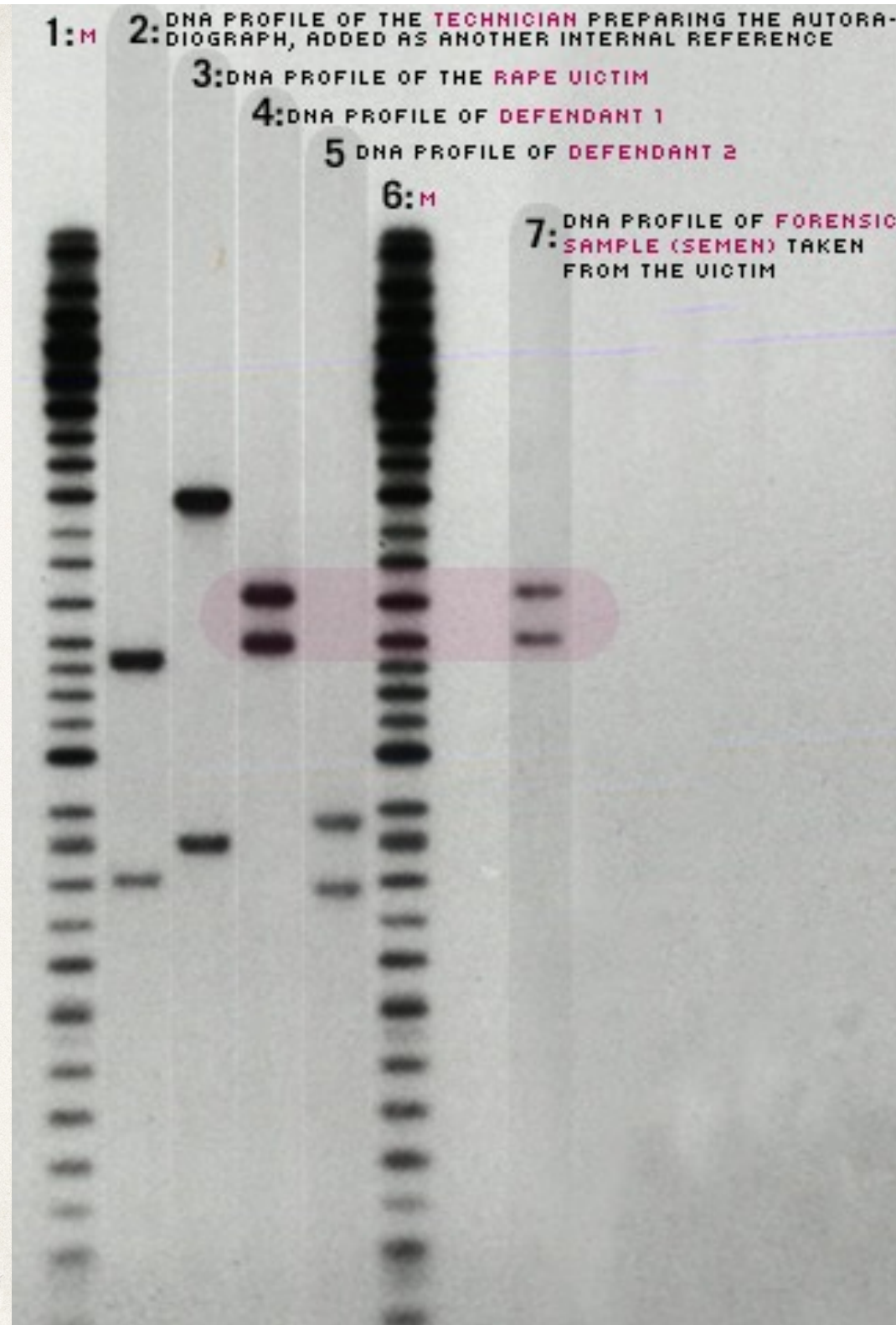
DNA profile from the crime scene

DNA profile from suspect accused (e.g. officer, MB)

B. **Estimated frequency** of DNA profile in a population (e.g. 1 in 10 or 1 in 100 billion)

What a DNA Match Looks Like

This is for a rape case



Back to the Grand Jury Proceedings

Palm of MB's Left Hand

RBS=Random Blood Sugar

“The DNA typing results obtained from Q5 (palm of Michael Brown's left hand, RBS) are consistent with being a mixture of two or more individuals. This profile can be separated into a major component profile consistent with Michael Brown and a minor contributor. ... *PO Wilson is included as a possible source of the minor contributor profile.* The observed mixture profile is 98 times more likely if it originated from Michael Brown and PO Wilson than if it originated from Michael Brown and an unknown individual in the in the general unrelated population.” (DNA report, p. 2)

MB's Left Hand Fingernails

“The DNA typing results obtained from Q9-1 (Michael Brown’s left hand fingernail) are consistent with being a mixture of three or more individuals. This profile can be separated into a major component profile consistent with Michael Brown and two or more trace contributors. ...*PO Wilson is excluded as a contributor to this mixture profile.*”

(DNA report, p. 2)

Backs of MB's Hands

(vol 19, p. 195)

“Q6 and Q8 backs of Michael Brown's hands, looks like there's no Officer Wilson's DNA on the backs of his hands?

A: That's correct, it is a single source profile consistent with Michael Brown.

Q: We had heard that Michael Brown was punching the officer in the face. Would you say that's inconsistent with those reports?

A: Well, on these particular items, it has RBS after it, reddish brown stain. So it is possible that PO Wilson isn't there, it's also possible he is not being detected due to the blood on the hand.”

Upper Left Thigh of Wilson's Uniform Pants

"The DNA typing results obtained from Q15 (RBS on the upper left thigh of PO Wilson's uniform pants) are consistent with being a mixture of two or more individuals. This profile can be separated into a major male component profile and a minor contributor consistent with PO Wilson. ...*Michael Brown is the source* of the major male component profile detected from Q15*" (DNA report, p. 2)

"*Conclusion based on the **calculated frequency of the DNA profile** being rarer than approximately 1 in 310 billion unrelated individuals (Caucasian, African American, Hispanic, and Asian population groups) which is approximately one thousand times the population of the United States." (DNA report, p. 3)

Interior Left Door Handle of Wilson's SUV



“The DNA typing results obtained from Q18 (interior left door handle of vehicle 108) are consistent with being a mixture of two or more individuals. This profile can be separated into a major male contributor profile and open or more minor contributors. *Michael Brown is the source* of the major male contributor profile.* Due to the limited genetic information available from the minor component the presence or absence of PO Wilson cannot be determined” (DNA report, p. 3)

Grand
Jury
Trans.
p. 179, vol 19

“Q18 was the *interior left front door handle of the vehicle*. The DNA typing results obtained from Q18 are consistent with being a mixture of two or more individuals. ... *Michael Brown is the source of the major male contributor profile*. ... presence or absence from PO Wilson cannot be determined.

Q: Can you tell us whether it was blood or saliva?

A: No, I cannot.

Q: Or skin cells, no?

A: No.

Wilson's Uniform Shirt Left Side and Collar

“The DNA typing results obtained from Q20-1 (PO Wilson's uniform shirt left side and collar) are consistent with being a mixture of three or more individuals. This profile can be separated into a major mixture of two individuals with a trace component. ... *Michael Brown and PO Wilson are included as contributors to this major mixture profile.* The observed major mixture profile is 2.1 trillion times more likely if it originated from Michael Brown and PO Wilson than if it originated from PO Wilson and an unknown individual in the in the general unrelated population.” (DNA report, p. 3)

Wilson's Uniform Pants Left Side

“The DNA typing results obtained from 021-1 (PD. Wilson's uniform pants left side) are consistent with being a mixture of three or more individuals. This profile can be separated into a major mixture of two individuals with a trace component. ... *Michael Brown and PO Wilson are included as contributors to this major mixture profile.* The observed major mixture profits is 34 sextillion times more likely if it originated from Michael Brown and PO Wilson than if it originated from PO Wilson and an unknown individual in the in the general unrelated population.” (DNA report, p. 3)

Wilson's Gun



“The DNA typing results obtained from Q19 (PO Wilson’s SIG P229, RBS) are consistent with being a mixture of three or more individuals. ...Michael Brown and PO Wilson are included as contributors to this major mixture profile. The observed major mixture is 2.1 octillion times more likely if it originated from Michael Brown and PO Wilson than if it originated from PO Wilson and an unknown individual in the in the general unrelated population.” (DNA report, p. 3)

Grand Jury Trans.

p. 182, vol 19

Q: So what can you tell us about the DNA on the gun again?

A: The hypothesis that it's these two individuals, PO Wilson and Michael Brown, is 2.1 octillion times more likely than it was PO Wilson and some unknown.

Q: When you say hypothesis, what do you mean?

A: Basically it's just how well that hypothesis explains the data... Hypothesis would be that supposing that these two particular individuals contributed it versus another individual and PO Wilson.

Q: ...So are you saying his DNA was on the gun?

A: That statement is supported by the data, yes.

Q: You can't determine if it was from skin cells or fluid?

A: Correct.

Nota Bene: The Expert Witness Is Committing a Probabilistic Fallacy

Statement of the Expert Witness before the Grand Jury

Q: ...can you tell us about the DNA on the gun again?

A: The hypothesis that it's these two individuals, PO Wilson and Michael Brown, is 2.1 octillion times more likely than it was PO Wilson and some unknown.

$\Pr(H \mid \text{mixture})$

*is 2.1 octillion times
more than*

$\Pr(\text{not-}H \mid \text{mixture})$

Statement in the DNA evidence report (p. 3)

The observed major mixture is 2.1 octillion times more likely if it originated from Michael Brown and PO Wilson than if it originated from PO Wilson and an unknown individual in the in the general unrelated population.

$\Pr(\text{mixture} \mid H)$

*is 2.1 octillion times
more than*

$\Pr(\text{mixture} \mid \text{not-}H)$

Why Is MB's DNA on the Gun?



“Q: ... there’s no way you can tell us is it because he touched the gun or because his blood may have been on there or some other portion, sweat or saliva, probably not saliva, but some other bodily fluids, you can't tell us exactly how his DNA got on that gun?

A: That’s correct.” (vol 19 p. 184)

Summary

MB's DNA was found on
the gun
SUV interior handle
wilson uniform (thigh, shirt and collar)

Wilson's DNA was found on
MB's palms of left hand
MB's left hand fingernails
not on MB's backs of the hands

A Sample Scenario

- ❖ In a homicide case, traces of blood are found on the crime scene
- ❖ The traces conclusively establish that whoever left them is the perpetrator
- ❖ **The only open question is, WHO left the traces?**
 - ❖ One man's DNA profile **matches** with the traces found at the crime scene
 - ❖ The DNA profile has a **statistical frequency of 1 in 100 million**
- ❖ Is that enough to convict?

