

## Letter to the Editor—The Prosecutor’s Fallacy in George Clarke’s *Justice and Science: Trials and Triumphs of DNA Evidence*

Sir,

In his review of George “Woody” Clarke’s book *Justice and Science: Trials and Triumphs of DNA Evidence* (1), Paul Colman quotes, with apparent approval, a passage in which Clarke falls victim to the well-known prosecutor’s fallacy (2–5). The passage says that DNA evidence allows analysts to reach statistically compelling conclusions, such as “the chance that *someone else* could have left that bloodstain is approximately 1 in a quintillion” (emphasis added). As every forensic scientist should know, the quoted statement is not a conclusion that a forensic scientist can properly draw from DNA evidence. DNA evidence can, at best, establish the conditional probability of observing a particular DNA profile *if* it came from someone other than the suspect. DNA evidence cannot, by itself, establish the chances that someone other than the suspect could have left a bloodstain (2–5).

I assumed at first that Colman must have misquoted Clarke, but a quick review of the book showed otherwise. Clarke’s book is rife with instances of the prosecutor’s fallacy, including the following:

- “Testimony that the chances are one in 500 million, for example, that someone other than the defendant has left a sample of evidence is extraordinarily powerful.” (p. 23)
- “The chances that someone other than Simpson left one of the drops on the walkway was about one in 170 million.” (p. 84)
- “The chances that someone else had left that DNA: less than one in two quadrillion.” (p. 188)

All these statements mistakenly equate the frequency of a particular DNA profile (random match probability) with the probability that *someone other than the defendant* is the source of that profile (source probability). Through the use of Bayes’ theorem, it is easy to show that the two probabilities are not necessarily equal. In instances where other evidence against the defendant is weak, or where the defendant has a strong alibi, the probability that someone other than the defendant is the source of a profile matching the defendant may be far higher than the random match probability. Hence, statements like those in Clarke’s book can be highly misleading and prejudicial to defendants.

It is important that forensic scientists and lawyers understand the prosecutor’s fallacy, and avoid presenting fallacious statements in testimony, because *convictions obtained on the basis of such statements are subject to reversal*. The Ninth Circuit Court of Appeals recently overturned the conviction of Troy Don Brown for sexual assault of a child based, in large part, on testimony of a DNA

analyst that “improperly conflated random match probability with source probability” (6). The DNA analyst had initially testified (properly) that Brown’s DNA matched DNA found in the child’s underwear and that the probability of a random match in a reference population was 1 in 3 million. When pressed by the prosecutor to explain the findings a different way, the analyst testified (improperly) that “there was a 99.99967% chance that the DNA in [the child’s] underwear was from [the defendant] (6).” Citing this improper testimony about source probability, the Court reversed Brown’s conviction. Courts in the United Kingdom have also reversed convictions in cases in which DNA analysts fell victim to the prosecutor’s fallacy (4).

It is worrisome that a prosecutor (now judge) as prominent as Clarke should be ignorant of the prosecutor’s fallacy. Clarke has, by his own account, given hundreds of seminars in which he taught other lawyers about DNA evidence. Clarke’s book offers some clues as to the source of his problem. He reports that while attending conferences on DNA evidence “terms like ... ‘Bayes Theorem’ were enough to send me more than once to the water fountain outside the auditorium” (p. 18). Clarke’s aversion to Bayes’ theorem is an explanation, but not an excuse. For members of the forensic science community, there is no excuse for continuing ignorance of this important issue. When forensic experts give inaccurate and misleading testimony, it threatens to discredit the entire field of forensic science. If we are ever to address this problem, we must begin by recognizing fallacious statements and pointing them out. It is particularly important to do so when the fallacious statements are made by one who claims to speak with authority about forensic science.

## References

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