

## A Mistaken DNA Identification? What Does It Mean?

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[This entry has been rewritten, corrected, expanded and modified by taking into account comments received from readers.]

By Andre A. Moenssens

Various press reports released in early February make mention of a British case wherein a local police department confessed to having identified an innocent person as a criminal by a DNA test that was said to be in error. A U.K. police agency that had secured near 100 convictions on the basis of DNA testing, admitted that, as far back as April of 1999, they had matched a sample taken from the scene of a burglary to six loci on the DNA molecule of one of 700,000 persons whose DNA was collected in the national database. The suspect was a man with advanced Parkinson's disease, who could not drive and could barely dress himself. He lived 200 miles from the site of the burglary. His blood sample had been taken when he was arrested, and then released, after hitting his daughter in a family dispute. He was arrested despite his protestations of innocence and alibi evidence that he was babysitting a sick daughter at home. Police dismissed these protestations stating that "it had to be him" since the DNA matched. The odds of the arrestee's DNA being wrongly matched against that of the crime scene were said to be one in 37 million.

It is only when the suspect's solicitor demanded a retest using additional markers, after the suspect had been in jail for months, that further testing was done. This testing, using a total of 10 loci, showed an exclusion at the additional four loci. The interpretation of the original test's results, given by law enforcement officials, were proven to be inaccurate. The suspect was then released from custody. The new British ten-loci test, it is said, only "offers a one in one billion chance of a mismatch" according to Scotland's Evening News of February 9, 2000!

Was the result reported after an examination of six loci an "erroneous" or "false" identification? No. There was indeed a "match" at six loci. What confuses lawyers, judges, lay persons, and indeed the police who make use of the results, is that they do not understand the true meaning of the statistics used by the experts. All but the initiated believe that when a DNA "match" is reported with odds of one in 37 million, we will encounter a like match in the DNA pattern only once in 37 million people. To test whether this is a common misunderstanding, the author [Prof. Moenssens], when lecturing to some 100+ trial judges, asked them what they understood the meaning of the testimony to be. All those who responded viewed the report as having said that this defendant's particular DNA pattern would occur only once in 37 million individuals.

According to DNA scientist Keith Inman, co-author with Norah Rudin of the recently published treatises *An Introduction to Forensic DNA Analysis* (CRC Press, 1997) and *Principles and Practice of Criminalistics* (CRC Press, 2000), it should be understood that the calculated frequency is an estimate, and can be off by an order of magnitude in either direction. Further, Inman said that "studies show that when databases grow, more loci (more discriminating loci) are required to support a strong inference of a common source." In other words, despite the statistical calculation of 1 in 37 million on six loci, that does NOT mean that the six loci cannot match more than one person in 37 million. According to population geneticists, it is indeed possible to have the six loci match in perhaps many dozens of individuals whose DNA is contained in a databank of 700,000.

Knowing that the non-expert judges, lawyers, and lay jurors will take the one in 37 million testimony to mean what it appears to say, is it ethical for a forensic expert to testify to the staggering statistical probabilities without explaining what the true meaning of the testimony is? And what obligation does the DNA analyst have to tell the jury that they must integrate the DNA evidence with other evidence when deciding whether the suspect is the perpetrator?

Keith Inman regards a "hit" (or "match") as nothing more than probable cause to look at the individual whose DNA has been matched to a sample stored in the database more closely, not the definitive and final disposition of his future in the criminal justice system. He states that "detectives and attorneys (perhaps even a few forensic scientists) need to be much better educated about the inferential nature of physical evidence. With well informed investigative people, the potential for arresting innocent people, as perhaps occurred in the U.K. case, will be minimized, while with ill-informed or biased agents, mistakes will happen with 13 loci, too." [Emphasis supplied by editor.]

The police in Great Britain maintain a DNA database which has grown from 470,000 potential suspects in 1998 to over 700,000 during 1999. The U.K. database is managed by the Forensic Science Service. It is now reported that ten loci will henceforth be used routinely when comparing known samples against unknown DNA fragments. The FBI is reported to test 13 different loci, which minimizes the chance of matching an innocent suspect by chance. State and local laboratories, however, do not always test as many loci as are used by our top national law enforcement agency.

Will this result in wholesale appeals by the thousands of persons convicted through DNA testing? Stephen Niezgodia of the FBI is reported to have characterized the possibilities as "mind-blowing" in a story that appeared in USA Today on February 8. The story also suggests that U.S. officials recognize similar mismatches may occur here as DNA testing occurs more routinely. The American database of DNA specimen is reported to be about half of the one existing in the U.K. The larger the database, the greater the possibility for adventitious hits, which is how Mr. Inman characterized the British case.

Perhaps a disturbing sidelight is that this misinterpretation of the statistical results in light of the case circumstances was revealed by British authorities only in January of 2000 when a law enforcement conference of DNA specialists worldwide met in Washington D.C. The mistake was not publicly acknowledged for almost a year after it occurred. When British authorities were questioned about the failure to reveal the error, a Home Affairs spokesperson said, "No system is 100 percent foolproof." It must also be noted that the retest was done at the insistence of the defendant's attorney. The unlikelihood of this suspect being able to commit the crime of which he was accused did not spark the retest. Forensic Science Service officials were said to have refused comment on the case to the press.

The U.K.'s Daily News of February 11, 2000, reported that when the mistake was discovered some six months later, the arrestee was released without an apology and given a brief letter stating that charges against him were being dropped because "there was not enough evidence to provide a realistic chance of conviction." No admission of error to the innocent person who had been arrested was to be forthcoming. The cavalier way in which law enforcement agencies deny making mistakes, and admit them only when the evidence is so overwhelming that errors can no longer be denied, does more to undermine the public confidence in law enforcement than the mere fact of the discovery of an error itself would do.

Yet, DNA reliability has been lauded nationally as the most reliable evidence known, and persons criticizing the meaning of the proffered statistical calculations have been treated as lunatics and "Neanderthals." It is clear that many people do not understand statistics, and law enforcement officers, prosecutors, defense attorneys, judges and jurors should also understand that DNA matches based on six DNA loci – or whatever number of loci tested – are not the end of the inquiry, but only the beginning of more investigative hard work.