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Authors' Response

Sir,

Thank you for the opportunity to respond to Professor William C. Thompson's letter to the editor regarding Paul Colman's review of my book, *Justice and Science: Trials and Triumphs of DNA Evidence*. I shall address Professor Thompson's comments directly, inasmuch as his letter does not appear to focus on Mr. Colman's review.

Professor Thompson criticizes my descriptions of statistical probabilities in *Justice and Science* relating the chances that an evidentiary sample derived from someone other than the matching party. He describes some of them as inappropriate "instances of the prosecutor's fallacy." I am disappointed that Professor Thompson's comments are based on a self-described "quick review" of my book. Even in the case of a general interest non-fiction publication such as *Justice and Science*, details matter.

Justice and Science carefully sets out the history of forensic DNA typing in the United States, primarily through the prism of cases in which I personally participated. The genesis of the various DNA technologies is recounted, along with the development of statistical models used in court to ascribe significance to DNA profiles determined to be consistent. Early in the book I was careful to describe the importance and meaning of the term "random match probability" (1) and to detail the early legal controversies that surrounded the uses of match probabilities in the courtroom (2). I also provided case-specific references to the meaning of random match probabilities (3) and, as an aid to the reader in want of further guidance, I included a definition of random match probability in a glossary at the conclusion of the book (4).

Professor Thompson is correct that the use of any matching DNA statistical frequency for purposes of asserting or establishing a probability of guilt is error. Professor Thompson, himself, and a co-author described over 20 years ago the "prosecutor's fallacy" being improperly utilized when any leap is attempted from statistical frequencies of biological sample profiles to likelihood of guilt (5). The connection between the use of matching probabilities and any probabilistic assertion of guilt in *Justice and Science* is, however, absent.

The reference by Professor Thompson to the United States Court of Appeals, Ninth Circuit, opinion issued in 2008 of *Brown v. Farwell* (6) is, indeed, instructive. The court found that the testifying DNA analyst presented improper testimony in answer to a question that sought further explanation of the correctly testified-to random match probability of approximately 1 in 3 million. Specifically, the analyst then testified that there was a 99.99967% chance that the defendant's DNA was the same as that discovered in the victim's underwear. The Ninth Circuit concluded that the analyst's testimony "demonstrated a near 100% chance of [defendant's] guilt" (7). Habeas corpus relief was granted the defendant—although based not only on the above testimony, but also additional error determined to have occurred in the analyst's calculation of the likelihood of a sibling having the same profile as the defendant (8). Further requests in the case for rehearing and even rehearing by the entire Ninth Circuit remain pending in *Brown v. Farwell* as of the writing of this response.

No statistical or legal bar exists, to this writer's knowledge, to an attorney arguing to a trier of fact—usually a jury in a serious criminal case—that all of the evidence in an individual case justifies the conclusion that, for example, DNA recovered from an evidentiary item came from the defendant. Colin Aitken, the respected statistician from the University of Edinburgh, has described the differing roles of the statistician as expert witness versus the statistician as a hypothetical member of a jury deciding the fate of a charged defendant (9). In the former task, the statistician is to evaluate the significance of the evidence from a purely advisory role; in the latter, all of the non-DNA evidence—the "prior odds"—is to be weighed alongside the statistical probabilities. Only then is a trier of fact permitted to decide the question of guilt; including, with the assistance of the statistical evidence, the option of conclusively deciding whether the evidence actually came from the defendant—or did not.

While attempting to communicate statistical findings in a correct manner should always be sought, misdirection should be avoided. Statistical assertions of probability of guilt are erroneous and can be extraordinarily prejudicial to a charged defendant. However, no prohibition exists of closing argument by a prosecuting or defense attorney that attempts to convince a jury that the biological evidence at issue came from a specific person. The same principle has existed for decades, predating the development of forensic DNA testing techniques. *Justice and Science* seeks to describe nothing different. It is worrisome that the "ignorance" ascribed to this writer by Professor Thompson may be the product of a failure to read—in its entirety—*Justice and Science*.

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