DISTRICT OF COLUMBIA COURT OF APPEALS

No. 05-CO-333

UNITED STATES, APPELLANT,

v.

RAYMOND A. JENKINS, APPELLEE.

Appeal from the Superior Court of the
District of Columbia
(F-320-00)

(Hon. Rhonda Reid Winston, Trial Judge)

(Argued October 25, 2005 Decided December 15, 2005)

Valinda Jones, Assistant United States Attorney, with whom *Kenneth L. Wainstein*, United States Attorney, *John R. Fisher*, Assistant United States Attorney at the time the brief was filed, and *Roy W. McLesse III* and *Michael T. Ambrosino*, Assistant United States Attorneys, were on the brief, for appellant.

Andrea Roth, Public Defender Service, with whom *James Klein*, Public Defender Service, was on the brief, for appellee.

Before WASHINGTON, *Chief Judge*, KRAMER, *Associate Judge*, and BELSON, *Senior Judge.*

WASHINGTON, *Chief Judge*: The United States ("government") appeals from the pre-trial order denying the introduction of DNA evidence against appellee Raymond A. Jenkins. The government challenges the trial court's determination that the methodology for calculating the statistical significance of a DNA match obtained through a database search – a "cold hit" – has not gained general acceptance in the relevant scientific community and thus could not be introduced under *Frye v. United States*, 54 App. D.C. 46, 293 F. 1013 (1923). Relying on our holding in *United States v. Porter*, 618 A.2d 629, 640 (D.C. 1992), the trial court further concluded that because it was

required to exclude evidence of the significance of a DNA match, evidence of the DNA match itself must also be excluded. This ruling effectively prevents the government from informing the jury that the DNA found at the scene of the crime matched Mr. Jenkins' DNA.

We agree with the trial court that evidence of a DNA match is made more probative when it is introduced in conjunction with statistical evidence that expresses the significance of the match as well as an explanation of the methodology used to arrive at those statistics. We disagree, however, with the trial court's determination that there is no general acceptance in the scientific community as to the methodology for calculating and expressing these statistics. In fact, the evidence in the record indicates that there is no debate in the relevant scientific community as to the methodology, mechanics, or mathematics underlying the various statistical formulas used to calculate significance, or in the results produced under the various formulas. Thus, we hold there is no lack of scientific consensus for the purposes of *Frye* or *Porter* and accordingly, we reverse.

I.

A. The Investigation[1]

On June 4, 1999, officers of the Metropolitan Police Department ("MPD") discovered the

[1] Because this is an appeal from a pre-trial order excluding evidence, the following overview of the investigation has not been presented to the lower court and is not part of the record of the trial proceeding. The factual recitations are taken from both the government's brief and Mr. Jenkins' brief. For the purposes of this appeal, the facts are not in dispute.

body of Dennis Dolinger in the basement of his home at 1516 Potomac Avenue, S.E., Washington, D.C. Mr. Dolinger had been stabbed several times in the head. Based on the condition of the crime scene, MPD concluded that Mr. Dolinger's assailant had also been injured during the fatal assault. Blood stains were found on clothing and other surfaces in the basement; traces of blood were found leading from the basement to the first and then the second floor of the house, and then outside to the front walkway and sidewalk; and bloody clothing was found in a room on the second floor. MPD also concluded that among other things, a diamond ring, a gold chain, and a wallet containing various credit cards were missing from Mr. Dolinger's house.

Less than twenty-four hours after Mr. Dolinger's murder, a man identified as Stephen Watson made several purchases using the victim's credit card. Further investigation revealed that Watson was in possession of other items taken from Mr. Dolinger's home. Pursuant to a warrant, Watson was arrested for felony murder while armed.

In continuing the investigation, MPD sent evidence samples from the crime scene to the Federal Bureau of Investigation ("FBI") for forensic analysis. The FBI also obtained blood samples from Watson, Dolinger, and other individuals ("known samples"). The FBI DNA laboratory tested the various blood samples at thirteen loci, also known as the "thirteen CODIS loci."[2] Based on this analysis, the FBI created a DNA profile for the samples. Although many of the samples collected at the crime scene matched Mr. Dolinger's DNA profile, none of the collected samples matched the

[2] Loci are locations on DNA that contain genetic material. The FBI always tests the same thirteen loci for use in the Combined DNA Index System ("CODIS"). It is variations in the loci – variations in the genetic material – that establish the DNA profile.

profiles of Watson or the known individuals.[3] The FBI DNA laboratory also concluded that a single person, whose identity was unknown at the time, was the sole contributor of the blood in numerous evidence samples.

Seeking further assistance, on November 16, 1999, the government contacted the Virginia Department of Criminal Justice Services ("DCJS") requesting that DCJS run the profile of the unknown person through Virginia's DNA database of 101,905 previously profiled offenders. Using only eight of the thirteen loci profiled by the FBI,[4] the DCJS reported that the evidence sample was consistent with the eight-loci profile of Robert P. Garrett, a known alias of appellee Raymond Anthony Jenkins.

At that point, the MPD investigation focused solely on Mr. Jenkins. A search warrant was obtained for Mr. Jenkins' blood, which was acquired on November 23, 1999. Using the same tools and method of analysis used on the previous evidence samples, the FBI created a thirteen loci profile for Mr. Jenkins' blood. Mr. Jenkins' thirteen loci profile matched the thirteen loci profile from the evidence samples obtained from the crime scene.

B. Pre-trial DNA Litigation - The *Frye* Motion

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[3] The government dismissed the felony murder charge against Watson.

[4] At the time of the database search, the Virginia DNA database contained profiles using only eight of the currently-used thirteen CODIS loci.

In March 2001, Mr. Jenkins filed a motion in limine to exclude the government's DNA evidence against him. Of the various attacks on the government's expected use of DNA evidence, the only one of consequence in this appeal is Mr. Jenkins' argument that the FBI's method of presenting the rarity statistic alone to express the significance of a DNA match of a crime scene sample with a suspect identified through a database search (a so-called "cold hit") is not generally accepted in the scientific community and is inadmissible under *Frye*. To support this proposition, Mr. Jenkins provides evidence that he believes establishes that there is a "raging debate" in the scientific and statistical community regarding the most appropriate method for calculating the significance of a cold hit.

In late March and early April, the trial judge held an evidentiary hearing on the issue of whether presentation of the rarity statistic alone in a cold hit case is a procedure generally accepted in the scientific community. Both parties submitted numerous appendices containing, among other things, scholarly articles from reputable professional journals and expert affidavits from leaders in the fields of genetics and statistics. In addition, the government presented the live testimony of Dr. Fred Bieber, a former member of the FBI's DNA Advisory Board,[5] and Dr. Ranajit Chakraborty, a professor at the University of Cincinnati College of Medicine, a preeminent scholar in his field and frequent collaborator with the head of the FBI's DNA laboratory, Dr. Bruce Budowle. Mr. Jenkins

[5] The DNA Advisory Board was established by the Director of the FBI pursuant to the DNA Identification Act of 1994 ("The Act"). *See* 42 U.S.C. § 14131 (a) (2000). The Act requires the Director of the FBI to convene a separate and distinct advisory board to develop quality assurance standards for DNA testing. In the instant case, no claim has been raised questioning the impartiality of the DNA Advisory Board, and we see nothing in the record or relevant case law to suggest any bias by this group.

called Wright State University Professor Dr. Dan Krane, a population geneticist and molecular biologist.

The FBI's method of calculating the significance of a DNA match is derived from the "product rule." After profiling thirteen specific loci on a strand of DNA, the FBI obtains, from published tables, the frequencies of variations in genetic material at each tested locus. After the frequency of each locus is calculated, the frequencies of all loci are multiplied together to obtain the frequency with which this particular profile would be seen in various population groups. This last process of multiplying the frequencies of the individual loci is known as the "product rule."[6] In a non-cold hit case – where the suspect is not first identified through a database search – the government states that this product rule derived number represents two concepts: (1) the frequency with which a particular DNA profile would be expected to appear in a population of unrelated people, in other words, how rare is this DNA profile ("rarity statistic"), and (2) the probability of finding a match by randomly selecting one profile from a population of unrelated people, the so called "random match probability." As the following discussion will show, random match probability and the rarity statistic are the product of the same calculation and are thus identical.

The government in its brief concedes that in a cold hit case, the product rule derived number

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[6] The product rule provides that "if two events are independent of each other, the probabilities of each occurring can be multiplied, and the resulting product is the probability of both events occurring." *State v. Link*, 25 S.W.3d 136, 144 (Mo. 2000); *see also Porter*, *supra*, 618 A.2d at 647-48.

no longer accurately represents the probability of finding a matching profile by chance.[7] The fact that many profiles have been searched increases the probability of finding a match.[8] Instead, the "database match probability" more accurately represents the chance of finding a cold hit match. This process of expressing the probability of a database search was created by the National Research Council of the National Academy of Science in 1996. It was the second recommendation of the National Research Council[9] addressing a means by which geneticists and statisticians can overcome the "ascertainment bias" of database searches. "Ascertainment bias" is a term used to describe the bias that exists when one searches for something rare in a set database.[10] The 1996 National Research Council report states that database match probability is calculated by multiplying the random match probability by the size of the database being searched. A match need not occur, however, in order to calculate the database match probability.

The government maintains, however, that regardless of the database search, the rarity statistic is still accurately calculated and appropriately considered in assessing the significance of a cold hit.

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[7] In other words, the product rule number no longer accurately expresses the random match "probability." That same product rule number, however, still accurately expresses the *rarity* of the DNA profile. Random match probability and rarity, while both identical numbers, represent two distinct and separate concepts. Only one of those concepts is affected by a database search: the random match probability.

[8] To illustrate: if the frequency of a given profile is expected to occur in 1 out of every 100,000 people, the chances of finding a match increase if one searches a database with 50,000 entries versus a database with only 10 entries.

[9] The first recommendation of the National Research Council occurred in a 1992 report. The 1992 report will be discussed in greater detail later in this opinion.

[10] Conceptually, the more populated the database is, the less impressive a match becomes.

The argument is that while a database search changes the probability of obtaining a match, it does not change how rare the existence of that specific profile is in society as a whole. Further, the government contends that the rarity statistic is a more significant number than database match probability when one tests at thirteen individual loci. To illustrate its contention, the government states that in the instant case, the rarity of Mr. Jenkins' thirteen loci profile is approximately: 1 in 26 quintillion in the African-American population, 1 in 870 quintillion in the Caucasian population, 1 in 1 sextillion in the Southeastern Hispanic population, and 1 in 4 sextillion in the Southwestern Hispanic population.[11] This rarity is, the government argues, both consistent and relevant regardless of the fact that Mr. Jenkins' identification is the product of a database search.[12]

As we pointed out earlier, Mr. Jenkins asserts that there is a "raging debate" in the relevant

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[11] Students of mathematics and those who just wish to augment their lexicon will note that in the United States, a "quintillion" is a number followed by eighteen zeros, and "sextillion" is a number followed by twenty-one zeros. Therefore, the preceding ratios would appear written out as: 1 in 26,000,000,000,000,000,000 in the African American population; 1 in 870,000,000,000,000,000,000 in the Caucasian population; 1 in 1,000,000,000,000,000,000,000 in the Southeastern Hispanic population; and 1 in 4,000,000,000,000,000,000,000 in the Southwestern Hispanic population.

Although not explained in the record, the preceding racial groups (African American, Caucasian, Southeastern Hispanic, and Southwestern Hispanic) were probably singled out because they most likely represent the four largest racial groups in the greater metropolitan District of Columbia area.

[12] The government's witnesses did testify that it is common practice at U.S. DNA laboratories to provide the rarity statistic – or random match probability – in its report. Those witnesses also admitted that most, if not all U.S. DNA laboratories also present, in addition to the rarity statistic, either the database match probability or some indication that a database was first searched along with the size of that database. Dr. Chakraborty, a witness the trial court greatly credited, stated that presentation of rarity alone in a cold hit case does not provide the complete picture, and that the database match probability should accompany that statistic.

scientific community as to which method of probability determination is the most significant for expressing a cold hit. Mr. Jenkins argues that in addition to the government's current approach of providing rarity,[13] there are three other schools of thought on this issue: (1) the original recommendation by the National Research Council in 1992, (2) the superceding 1996 approach by the same council, and (3) the position of a distinguished group of scientists, typically identified by the names of its two leading advocates – Professors David Balding and Peter Donnelly (the "Balding-Donnelly" approach). The two National Research Council approaches offer different solutions for accounting for ascertainment bias and both conclude that significance of a match decreases with the increasing size of the database. The 1992 National Research Council recommendation (also known as the "confirmatory loci approach") accounts for ascertainment bias by retesting the DNA samples using different loci than those originally used to obtain the cold hit. Elimination of the "tainted loci" from a retest neutralizes the initial ascertainment bias from the database search. In a second report issued in 1996, the Council recommended use of the database match probability as an appropriate method by which to compensate for ascertainment bias. It is unclear whether the 1996 recommendation advocates the presentation of database match probability alone, or a combination of database match probability and the rarity statistic (which is the same as the random match probability). The FBI's DNA Advisory Board suggests that the 1996 recommendation of the National Research Council is best read to require a presentation of both the

[13] The government indicated that, if requested by the trial court, it would be willing to present both rarity and database match probability statistics. According to the government during oral argument, its hesitation to provide database match probability without a trial court request stems from the potential prejudicial effect of informing the jury that Mr. Jenkins' DNA profile was already on file in a Virginia offender database.

database match probability and the rarity statistic.[14]

The Balding-Donnelly approach has a different perspective on database bias. Instead of focusing on the probability of obtaining a match, Balding-Donnelly focuses on the elimination of other profiles during the search. In their analysis, a match becomes more significant with larger database searches. They posit that in obtaining a match in a database search, one simultaneously eliminates other profiles as being the source of the sample. This elimination of known persons increases the chances that the identified individual is the actual source of the sample DNA. In Balding and Donnelly's model, there is a slightly greater probability that the person identified is the source of the DNA than that expressed by the random match probability.

Mr. Jenkins did not seek to persuade the trial court that the government's method of calculating significance was flawed and that one of the three methods presented was superior. Instead he relied on the existence of the debate itself to justify exclusion under *Frye*.

The trial court agreed with Mr. Jenkins. Finding a debate within the scientific community over the appropriate method of calculating statistical significance of a cold hit, the trial court felt obligated under *Frye* to exclude any evidence of probabilities and rarities. The trial court also concluded that because statistical probability of a match is at the very core of DNA evidence, exclusion of one must result in exclusion of the other. The trial court did, however, present the

[14] According to the testimony of the government witnesses as to the common practice of U.S. DNA laboratories, *see supra* note 12, it would appear that U.S. labs follow the DNA Advisory Board's approach.

government with the opportunity to present the National Research Council's 1992 formulation because it provided a more conservative result than the rarity statistic.[15] Not willing to accept so conservative a calculation of probability, the government timely appealed the pre-trial decision of the lower court. Arguing that there is no controversy for the purposes of *Frye*, the government seeks to introduce the rarity statistic. The government, however, has no objection to the additional

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[15] In *Porter,* we held that in light of the exclusion of the government's preferred evidence of statistical significance of a DNA match, the government may introduce the most conservative calculation available because such evidence is relevant and probative, and the scientific community at a minimum can agree that the real probability is no greater than the most conservative estimate. As we stated in *Porter*:

> If, as will be found in this case, a reliable match is made, but the probabilities attached are not reliable, should the proponent of the evidence be denied its admissibility altogether? Shouldn't the jury know that there was a match and that the possibility of the perpetrator being someone other than the defendant is remote, even if it is difficult to say precisely how remote? If, for example, many in the scientific community would agree that a probability is 1 in 1,000,000, but others, reasonably doubting the accuracy of that number, can only agree to 1 in 100,000, shouldn't a jury at least know the more conservative number? The defendant could not reasonably claim prejudice, and the prosecution could still bring important and reliable evidence to a jury's attention.

Porter, *supra,* 618 A.2d at 641-642 (quoting *People v. Mohit*, 153 Misc. 2d 22, 579 N.Y.S.2d 990, 993 (Westchester County Ct. 1992)). The fact that it is difficult to be precise does not preclude introduction of the most conservative estimate. *Id.*

The 1992 National Research Council's recommendation of use of confirmatory loci results in the most conservative number because it requires retesting using fewer loci than all the other calculations. The FBI DNA laboratory created a thirteen loci profile of the sample. Of those thirteen loci, the eight used in the DCJS search must be discarded on retesting. There is a higher probability of obtaining a match from a five loci profile used in the confirmatory loci approach than the thirteen loci matches conducted in all the other formulas.

introduction of the database match probability.[16]

II.

In our jurisdiction, the seminal case of *Frye v. United States*, *supra*, is the starting point in addressing questions of admissibility of scientific evidence. *See Porter*, *supra*, 618 A.2d at 633. In most situations, the "decision whether or not to admit expert testimony is addressed to the sound discretion of the trial court." *Id.* at 635 (citations omitted). Where the proponent of the expert testimony is introducing a new scientific technique, our review is *de novo*. *Id.*; *see also Cook v. Edgewood Mgmt. Corp.*, 825 A.2d 939, 949 (D.C. 2003); *Jones v. United States*, 548 A.2d 35, 42 (D.C. 1988). It is a "quintessential appellate function" to review a party's attempt to "establish the law of the jurisdiction in future cases." *Porter*, *supra*, 618 A.2d at 635 (citations omitted).

As a general matter, we allow the introduction of expert testimony in situations where "inexperienced persons are unlikely to prove capable of forming a correct judgment" upon the issue due to lack of study and knowledge of the subject matter. *Frye*, *supra*, 54 App. D.C. at 47, 293 F. at 1014. "When the question involved does not lie within the range of common experiences or common knowledge, but requires special experience or special knowledge, then the opinions of [skilled witnesses] . . . are admissible in evidence." *Id.* Not all purported expert testimony, however, is admissible. As the *Frye* Court held over three quarters of a century ago:

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[16] See *supra* note 14.

> Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define. Somewhere in this twilight zone the evidential force of the principle must be recognized, and while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.

Id.

As this court reiterated in *Porter*, "the *Frye* standard retards somewhat the admission of proof based on new methods of scientific investigation by requiring that they attain sufficient currency and status to gain acceptance of the relevant scientific community." *Porter*, *supra*, 618 A.2d at 633 (quoting *United States v. Addison*, 162 U.S. App. D.C. 199, 201, 498 F.2d 741, 743 (1974)). A proponent of a new scientific methodology must demonstrate by a preponderance of the evidence that this methodology has been generally accepted in the relevant scientific community. *See id.* (stating the above rule of law in terms of "scientific technology" instead of "scientific methodology"). "[T]he issue is consensus versus controversy over a particular technique, not its validity." *Id.* at 634 (quoting *Jones*, *supra*, 548 A.2d at 42). Tersely put, this court's inquiry is focused "on counting scientists' votes, rather than [on] verifying the soundness of a scientific conclusion." *Id.* (alteration in original). Furthermore, only consensus of the scientific community will satisfy *Frye*, not consensus of the various courts in the land. *Id.* (citation omitted) (acknowledging through implication that the majority of courts that follow the more liberal approach of *Daubert v. Merrill Dow Pharm. Inc.*, 509 U.S. 579, 113 S. Ct. 2786, 125 L. Ed. 2d 469 (1993) may be more prone to allowing introduction of new scientific techniques and methodologies). "If

scientists significant either in number or expertise publically oppose [a new technique or method] as unreliable, then that [technique or method] does not pass muster under *Frye*." *Porter*, *supra*, 618 A.2d at 634 (internal citations and quotations omitted). It is not the court's role to resolve disputes within the scientific community. *Id.* The very existence of a dispute precludes admission. *Id.*

The *Frye* analysis, however, begins and ends with "the acceptance of particular scientific methodology" and not the acceptance of a particular result or conclusion derived from that methodology. *Id.* (citing *Ibn-Tamas v. United States*, 407 A.2d 626, 638 (D.C. 1979)). The trial court erred in failing to focus on methodology. Based upon Mr. Jenkins' mis-characterization of the "debate," the trial court confuses and conflates distinct and independently significant statistical calculations. At the heart of this debate is a disagreement over the competing questions to be asked, not the methodologies used to answer those questions. The rarity statistic, the database match probability, and the Balding-Donnelly approach each answer unique and potentially relevant questions.[17] More importantly, there is no controversy in the relevant scientific community as to the

[17] We will not address the 1992 National Research Council recommendation as a competing formula in the debate cited by Mr. Jenkins. The record in this case leads this court to conclude that the 1992 recommendation is no longer accepted or followed by the relevant scientific community. The National Research Council promulgated the confirmatory loci approach in 1992 – thirteen years ago – in a different era of genetic testing. The circumstances that warranted the retesting of DNA without "tainted" loci no longer apply. Today the technology used to profile DNA is much more sophisticated, and the number of loci tested is significantly larger than it was a decade ago. The testimony presented in the lower court indicates that since 1996, the generally accepted means of compensating for ascertainment bias in U.S. DNA laboratories is either to provide the database match probability calculation recommended by the National Research Council in 1996, or to provide some indication that a database was searched along with the size of that database. Not since the confirmatory loci approach was superceded by the introduction of database match probability nine years ago has that formulation been used to negate ascertainment bias. Therefore, the 1992 National

(continued...)

accuracy of the various formulas. In other words, the math that underlies the calculations is not being questioned. Each approach to expressing significance of a cold hit DNA match accurately answers the question it seeks to address. The rarity statistic accurately expresses how rare a genetic profile is in a given society. Database match probability accurately expresses the probability of obtaining a cold hit from a search of a particular database. Balding-Donnelly accurately expresses the probability that the person identified through the cold hit is the actual source of the DNA in light of the fact that a known quantity of potential suspects was eliminated through the database search. These competing schools of thought do not question or challenge the validity of the computations and mathematics relied upon by the others. Instead, the arguments raised by each of the proponents simply state that their formulation is more probative, not more correct. Thus, the debate cited by Mr. Jenkins is one of relevancy, not methodology; and because both *Frye* and *Porter* focus on whether the methodology is generally accepted, there is no basis under *Porter* for the trial court to exclude the DNA evidence in this case.

In *Porter*, this court was asked, among other things, to address the issue of whether or not there was a general "consensus within the relevant scientific community in support of the FBI's calculation that the probability of a coincidental match was no higher than [the number determined by the FBI in a given case]." 618 A.2d at 631. Relying on the record presented, as well as the "lucid analysis" in the opinion of *People v. Barney*, 10 Cal. Rptr. 2d 731 (Cal. Ct. App. 1992), *Porter* held

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[17](...continued)
Research Council recommendation to test only confirmatory loci is not part of the debate cited by Mr. Jenkins.

that there was in fact a controversy in the relevant scientific community over the variables used in the calculations made by the FBI. This controversy stemmed from the basic disagreement concerning "the soundness of certain assumptions on which this calculation was predicated," particularly that,

> (1) [M]embers of the racial groups presented in broad data bases – Caucasians, Blacks, and Hispanics – mate within their groups at random, i.e., without regard to religion, ethnicity, and geography, and (2) that the DNA fragments identified by DNA processing behave independently, and thus are "independent in a statistical sense" – i.e., in the language of population genetics, they are in "linkage equilibrium."

Porter, *supra*, 618 A.2d at 636-637 (citing *Barney*, *supra*, 10 Cal. Rptr. 2d at 740 (quoting Lewontin & Hartl, *Population Genetics in Forensic DNA Typing*, SCIENCE, Dec. 20, 1991, 1745, 1746)). Population geneticists who opposed the assumptions that underlay the FBI rarity calculations contended that use of these broad databases could produce rarity figures for a defendant's particular subgroup that were in error by two or more orders of magnitude. *Id.* at 637 (citing *Barney*, *supra*, 10 Cal. Rptr. 2d at 740 (quoting Lewontin and Hartl, *supra*, at 1749)). The debate between the two schools of thought was described as "bitter" and "raging." *Id.* (citing *Barney*, *supra*, 10 Cal. Rptr. 2d at 741 (quoting Roberts, *Fight Erupts Over DNA Fingerprinting*, SCIENCE, Dec. 20, 1991, 1721, 1721).

The issue confronting us now, however, is substantially different from the issue that confronted us in *Porter*, in large part because of the substantially more sophisticated state of

population genetics and the science that underlies it. The debate now, as presented in this case, is over the relevancy of the statistics, and not the *assumptions* that underlie the calculation of those statistics. Thus, at one end of the spectrum there are proponents of the government's position that the rarity statistic can be appropriately presented without any other figures. At the other end, there are those who argue that rarity alone is an incomplete representation of the significance of a cold hit and that the probability of obtaining a match through a database search must also be presented. Somewhere in between there exists a third group who contend that looking at the database match probability is misguided, arguing instead that one must look at the probability that this match is correct in light of the fact that a specified quantity of known individuals were eliminated as the source of DNA.[18]

This debate does not address the underlying principles, math, or science behind the various formulas. As is evident from the record, each school of thought recognizes and accepts that the other school has accurately and properly reached its conclusion. If proponents of Balding-Donnelly were asked to calculate the database match probability, they would end up with the same number as those who follow the 1996 recommendation of the National Research Council. And if those who follow the 1996 National Research Council recommendation were asked to calculate the overall rarity of a profile, they would come up with the same number as the FBI's DNA laboratory. Unlike *Porter*, this is not a debate over the assumptions underlying the calculations. It is a disagreement over

[18] Obtaining a cold hit match from a database of 100,000 persons is also evidence that 99,999 people were identified as not being the source of the sample DNA. When calculating the probability that the cold hit is the right person, those 99,999 people can be excluded as the potential sources.

relevance.

There still exists controversy as to the appropriateness of the use of the rarity statistic, database match probability, or Balding-Donnelly calculation in a cold hit DNA match. This debate, however, still does not address the mathematics or methodology of the various computations. The argument cited by Mr. Jenkins is to the relevancy of the statistics, not the soundness of the calculation. The experts who testified unequivocally stated that no new method of mathematical calculation was being introduced. Dr. Krane, Mr. Jenkins' own expert, admitted that two issues may arise when obtaining a match from a database: (1) the rarity of the DNA profile, and (2) the probability of obtaining a match. Dr. Krane further admitted that not only could a jury conceivably want to know both numbers, but that there was nothing controversial about the science used to calculate the rarity statistic and that an initial database search does not change the rarity of a particular profile. Dr. Krane testified that he would be more than capable of calculating both rarity and database match probability, and would be able to explain and distinguish the two numbers for a jury. Dr. Krane, however, is of the belief that in a cold-hit case, the database match probability was "the question to be addressed" to the exclusion of others. In other words, Dr. Krane believes that the database match probability is more relevant than the rarity statistic.

The rarity statistic, the database match probability, and the Balding-Donnelly formulation do not purport to address the same issue. In reality, each formula answers a distinctly different question that may be of concern in a cold hit case. As the government correctly states, the rarity statistic

simply answers the question: "How rare is this specific combination of genetic material"? The database match probability answers the question: "What is the chance/probability of obtaining a match by searching this particular database"? And the Balding-Donnelly calculation answers the question: "What is the chance/probability that the person identified is the source of the sample in light of the fact that all other persons in the database search were eliminated"?[19] None of the questions are the same; more importantly, none of the answers are mutually exclusive.

The debate that exists is solely concerned with which number – rarity, database match probability, Balding-Donnelly, or some combination of the above – is most relevant in signifying the importance of a cold hit. Relevancy, however, is not a determination that is subject to the exacting standards set forth in *Frye*. A decision on the admission of relevant evidence – that evidence which tends to make the existence or non-existence of a fact more or less probable than would be the case without that evidence – is an issue entrusted to the trial court's sound discretion. *See, e.g., Dade v. United States*, 663 A.2d 547, 552 (D.C. 1995). Relevant evidence is properly introduced unless "its probative value is *substantially* outweighed by the danger of unfair prejudice." *See, e.g.*, *(William) Johnson v. United States*, 683 A.2d 1087, 1090 (D.C. 1996) (en banc) (emphasis added). When dealing with DNA evidence, the most probative evidence for a factfinder is that

[19] The case law is sufficiently developed for us to conclude with relative certainty that rarity and database match probability are both statistics that are accurate, highly probative, and of great value to the trier of fact. Case law, however, is not as developed with respect to the Balding-Donnelly calculation, and in fact, the 1996 National Research Council report notes that the Balding-Donnelly formulation has rarely been found suitable for use in explaining the significance of a DNA match in a criminal proceeding. *See* National Research Council, *The Evaluation of Forensic DNA Evidence*, 192-202 (1996). We therefore express no opinion as to whether the Balding-Donnelly statistic is probative.

which indicates whether or not the DNA obtained from a crime scene matches the DNA obtained from the suspect. The likelihood that the suspect is the actual source of the DNA is best expressed through the rarity of a particular profile. Thus, the rarity statistic is highly probative and will always be relevant. In fact, in this appellate record there is nothing that would suggest that the probative value of either the rarity statistic or the database match probability is substantially outweighed by its prejudicial impact.[20]

What is and is not relevant is not appropriately decided by scientists and statisticians. This court recognizes that as jurists we are not always in a position to determine what is good science and what is bad science. *Frye* directs us to defer to the determinations of the experts in the field to answer that question. Questions of relevancy, however, have never been outside of judicial competence. Determining what evidence is and is not relevant is a hallmark responsibility of the trial judge and that responsibility is not appropriately delegated to parties outside the court.

Our ruling today is a limited one. We hold only that the trial court erred in subjecting a

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[20] During oral arguments, the government stated that there was a concern that its presentation of the database match probability might prejudice Mr. Jenkins because it conveys information to the jury that he likely is a prior offender. See *supra* note 13. This prejudice, however, is no different than that which would have occurred had the trial court allowed introduction of statistics derived from the 1992 National Research Council recommendation to test confirmatory loci. In explaining why "untainted" loci were tested, the proffered expert would be required to state that Mr. Jenkins was first identified through a search of an offender database. Because countless trial courts, including the trial court in the instant case, have so readily accepted the statistics derived from testing untainted loci, we must surmise that conveying to the jury that the defendant was first identified through a search of an offender database has not been deemed so substantially prejudicial as to outweigh the probative value of such evidence.

debate on relevancy to the exacting *Frye* standard of general acceptance in the relevant scientific community. Such questions are reserved to the trial court's sound discretion. As presented, however, the record on review indicates no debate in the relevant scientific community over the methodology, mechanics, or mathematics of the three calculations; *Frye*, therefore, does not impede introduction of the statistics into evidence.

For the foregoing reasons, the order of the trial court is

Reversed and remanded for further proceedings consistent with this opinion.