

IN THE SUPERIOR COURT OF THE STATE OF DELAWARE

IN AND FOR NEW CASTLE COUNTY

STATE OF DELAWARE                    )  
  )  
  )  
v.    ) I.D. No. 9809019760  
  )  
WILLIAM HAMMONS                    )

**UPON MOTION IN LIMINE TO ADMIT  
SCIENTIFIC EVIDENCE – GRANTED**

Date of Hearing: September 19, 2001  
Date of Decision: September 19, 2001  
Date of Written Opinion: March 28, 2002

Donald R. Roberts, Esquire, Deputy Attorney General, Wilmington, Delaware for  
the State.

Andrew J. Witherell, Esquire, Wilmington, Delaware for the Defendant.

PEGGY L. ABLEMAN, JUDGE

This is the Court's written decision concerning the admissibility of mitochondrial DNA evidence following a pretrial hearing on a Motion In Limine filed by defendant, William Hammons, seeking the admission of such expert scientific evidence pursuant to Rule 708 of the Delaware Rules of Evidence and United States Supreme Court and Delaware case law interpreting the rule.

Although the scientific validity and reliability of DNA typing has previously been upheld by this Court and by Courts in other jurisdictions, the Court is asked in this case to consider a newer type of DNA testing called mitochondrial DNA (mtDNA), which examines the mitochondria rather than the nucleus of the cell, a process which has been available to the scientific community since 1996. After considering the evidence at the hearing on September 19, 2001, the Court granted the defendant's motion to admit evidence of mtDNA analysis, the results of which exclude defendant as the person whose pubic hair was retrieved from the victim. This written decision sets out the basis for the Court's ruling.

### **Factual and Procedural Background**

Defendant has been charged in an eleven-count indictment with two counts of Rape in the First Degree, two counts of Kidnapping in the First Degree, one count of Attempted Rape in the First Degree, three counts of Forgery Second Degree, one count of Assault in the Third Degree (misdemeanor) and two misdemeanor counts of Criminal Impersonation. These charges arise from two

separate incidents that occurred two days apart involving two different victims. In one incident, for which defendant is charged with kidnapping and attempted rape, the victim observed the defendant as he fled and has since identified the defendant. In the other incident, the attacker had placed a T-shirt over the victim's head and she is thus unable to identify the assailant.

Hair samples found on the underpants of the victim who cannot identify the attacker were analyzed for DNA by Reliagene Laboratories in New Orleans, Louisiana and were compared to DNA from blood samples obtained from the defendant. Because the hair found on the victim contained a limited amount of nuclear DNA, the testing and analysis was accomplished by the use of a more novel scientific technique involving the analysis of mitochondrial DNA, or DNA obtained from the mitochondria of the cell rather than from the nucleus.

Analysis of the hair sample utilizing this technique resulted in a clear difference between the DNA in the hair sample and the DNA in defendant's blood. Since the sequences did not match, the analysis resulted in a clear exclusion of defendant as the donor of the hair. As a consequence, it is the defendant in this case who seeks the admission of mitochondrial DNA results into evidence. A hearing on defendant's Motion in Limine on the admission of this evidence was

conducted pursuant to the United States Supreme Court decision in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*<sup>1</sup>

### **Evidence at Daubert Hearing**

At the hearing conducted for the purpose of determining the admissibility of this scientific evidence, the Court heard testimony from Dr. Sudhir Simha, President and Laboratory Director of Reliagene Laboratories (“Reliagene”). Dr. Simha founded Reliagene in 1990. It specializes in DNA testing for paternity, forensic purposes, and more recently, genetic diseases. He supervises a staff of 60 employees, whom he trains and for whom he approves protocols and methods.

Dr. Simha received a Bachelor of Science degree and a Master in Chemistry degree from the Indian Institute of Technology in India. In 1977, he was a research scholar in the area of molecular biology and genetics at the University of Miami. From 1980 until 1984 he served as an Assistant Professor and a Research Associate Professor at its School of Medicine.

In 1984, Dr. Simha became the Director of AIDS Research Company in New Orleans where he also taught DNA testing to medical students at Tulane University. He has published numerous papers on the subject of DNA, and has been invited to speak in Brazil, Japan, and America on the subject of the validation of mitochondrial DNA testing. He has published papers for the prestigious

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<sup>1</sup> 509 U.S. 579 (1993).

National Academy of Science, and in February 1999, Dr. Simha presented a paper on mitochondrial DNA sequencing at the American Academy of Forensic Science. He is a member of that Academy and is a member of TWIG, the Technical Working Group on DNA Analysis methods, as well as SWIG, the Scientific Working Group on DNA Analysis Methods. Dr. Simha's curriculum vitae spans eight pages, with the majority of his vast accomplishments in the field of DNA testing, analysis, and methods. His laboratory has met all of the required standards for accuracy based upon independent proficiency testing every year.

Dr. Simha testified that Reliagene's laboratory has been certified previously in Delaware, that it has contracts with several other states to perform DNA testing, including Washington, Nebraska, Oklahoma, and Mississippi, and that it performs paternity testing for Massachusetts, Ohio, Wisconsin, Alabama, and Georgia. His laboratory was one of the first to be accredited for DNA testing. It has met all accreditation standards, including the American Society of Crime Laboratory Directors, a special certification awarded to only five labs in this country. Dr. Simha is actually one of the individuals responsible for inspecting other laboratories to determine if they meet these same standards for DNA testing. Reliagene has five or six certifications for their DNA methods, and the sequencing machine it uses for mtDNA is the same as human gene sequencing.

After describing his extensive credentials, Dr. Simha distinguished between nuclear DNA testing and mtDNA testing and provided a thorough review of the process of mtDNA sequence analysis, based on his extensive expertise in the field.

Since the admissibility of mtDNA evidence is an issue of first impression in Delaware, it is helpful to review the process of mtDNA sequence analysis, a process which is described in great detail in an eleven-page document prepared by the FBI Laboratory and jointly submitted by the parties as an aid to the Court in its understanding of this type of evidence. This document, together with the testimony of Dr. Simha, provides the basis for the following discussion concerning the scientific evidence at issue herein.

Mitochondrial DNA analysis was first implemented for forensic purposes by the Federal Bureau of Investigation in June of 1996. It is based on the Polymerase Chain Reaction (PCR) method of DNA analysis. It is particularly useful in cases where the source typically does not contain sufficient DNA for nuclear DNA analysis, such as bones, teeth, and hair.

DNA is the genetic material carried by each living organism. DNA molecules are replicated in the cell and copies are transmitted from generation to generation. The vast majority of the DNA in a cell is stored in cell centers called the “nucleus”, and the DNA found there is termed “nuclear DNA.” Its length and sequence are the result of the combination of two different sets of DNA, a set

inherited from the mother, and a set inherited from the father. With the exception of identical twins, no two human beings have exactly the same DNA.

Mitochondria are much smaller molecules that differ from nuclear DNA not only in location but also in sequence and mode of inheritance. A mitochondrion is a compartment in the cell known as the “powerhouse” because it is responsible for providing the cell with energy. The DNA located within mitochondria is called mitochondrial DNA or mtDNA.

Mitochondrial DNA also differs from nuclear DNA in that nuclear DNA is found in the single nucleus of the cell whereas cells may contain thousands of mitochondria, each of which may contain many copies of mtDNA. This source of DNA is particularly useful in circumstances where the amount of DNA in a sample is limited. Where the sources of DNA recovered from a crime scene have little nuclear DNA, scientists now have the option of characterizing mitochondrial DNA in a sample.

Another feature of mtDNA that is helpful to forensic scientists is the fact that mtDNA is inherited solely from the mother. Thus, in situations where known samples are obtained from individuals with the same maternal lineage, such as a brother and a sister, the DNA sequences should, in the absence of a mutation, exactly match each other. The limitation inherent in this technique is that it cannot

discriminate between two individuals who are maternally related, as nuclear DNA analysis is able to do.

Mitochondrial DNA analysis is based upon the same principles already recognized and accepted in nuclear DNA analysis, but the process looks at a different location of the genes. Unlike nuclear DNA, mtDNA cannot be used to establish positive identification because mtDNA consists of a single marker that is approximately 16, 569 base pairs in length. By comparison, nuclear DNA consists of approximately three billion base pairs and many discrete markers that may be compared to establish a positive match between DNA samples. Because mtDNA has only one marker, the probability of a random match is much higher between mtDNA samples than between nuclear DNA samples. Thus, mtDNA is significantly less probative of identity than nuclear DNA.

The process by which mtDNA is analyzed consists of several steps. First, the hair sample is subjected to microscopic analysis. If the hairs appear microscopically similar then further analysis is performed on a molecular level to determine whether or not the hair is consistent with originating from a particular person.

In the next step, the hair is washed to remove any contaminating materials surrounding or coating the sample. After the sample is washed, the DNA is extracted by placing it in a solution. By grinding and shearing, the hair is exposed

to a mixture of organic chemicals, which separate the DNA from other biological molecules. The organic mixture is spun in a centrifuge and the DNA is soluble in the top water-based layer, while the rest of the cellular components are soluble in the bottom organic layer. The top layer is then removed and filtered for further separation from other cellular materials.

The next step is amplification by Polymerase Chain Reaction (PCR). PCR is the technique that extracts a small amount of DNA and copies it in a process known as amplification. The two strands of the DNA helix are separated from one another by heat. The original DNA molecules in the extract, called the templates, separate into their component strands. A new DNA strand is made with an enzyme that copies the existing DNA molecule and the copying process is repeated numerous times. During each repetitive cycle, the amount of DNA in the reaction is doubled, thus ultimately providing many more copies of the original DNA. Prior to sequencing, the amount of product generated by PCR is determined using a capillary electrophoresis machine. Blank samples and known control samples are used in order to assess the amplification of the samples.

The next step is sequencing by a method known as Sanger's method. This process determines the sequence of bases in an individual's mtDNA. This sequencing process differs from PCR in that a set of the A, G, C, and T bases, with slight chemical differences, is added to the reaction mix. These altered bases also

carry a fluorescent dye, which is readily detected by an automated machine. As they become incorporated into the growing DNA strand, the process of synthesis ends due to the inability of the enzyme to add another base to the altered fluorescent one. The normal bases compete with the altered basis for incorporation into the new strand. The result is a collection of DNA products which, when pooled, have altered bases inserted at every possible position in the area to be sequenced.

Finally, the numerous products resulting from the sequence reaction are separated, based upon their length, through gel migration. This step is sequence determination. The size of the pores in the gel matrix regulate the distance that each DNA product travels. These products all begin from the same starting point on a gel and the fluorescent detector from the sequencing machine reads off the bases. The machine will generate a chromatogram, or colored graph, depicting the wavelength of the dye that it reads one base at a time. The sequence of the DNA is then determined from a series of these sequencing reactions. Although mtDNA analysis is a sensitive process which can be affected by contamination, in accordance with approved standardized procedures, any sample in which contamination exceeds ten percent is discarded. Moreover, if contamination were to occur, it would not cause false inclusion, but rather a false exclusion.

In addition to the various analytical processes involved in DNA sequencing that have been described above, Dr. Simha also testified about the possibility of heteroplasmy, which is the presence of two or more mtDNA sequences in the same individual, or mutation. These slight mutation changes are very rare but the procedures in his laboratory contain built-in controls, which take heteroplasmy into account in cases of exclusion and inclusion. Dr. Simha testified that there was no evidence of heteroplasmy in the samples analyzed in this case.

### **Standard for Admissibility of Scientific Evidence**

The proper standard for the admissibility of new or novel scientific evidence was substantially modified as a result of the landmark 1993 United States Supreme Court decision in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*<sup>2</sup> In that case, it was held that the long accepted *Frye* test, or “general acceptance” common law test for admission of such evidence, had been substantially superseded by Rule 702 of the Federal Rules of Evidence. The *Daubert* decision essentially eliminated general acceptance as an absolute prerequisite to admissibility, and replaced it with the requirement that the trial Judge must ensure that any and all scientific testimony or evidence is not just relevant, but also reliable.

Under the former *Frye* standard, the admissibility of scientific evidence depended upon whether the scientific technique had been “sufficiently established

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<sup>2</sup> 509 U.S. 579.

to have gained general acceptance in the particular field in which it belongs.”<sup>3</sup> The underlying assumption was that general acceptance was demonstrative of reliability. In Delaware, the codification of the Rules of Evidence in 1980 resulted in an expansion of the *Frye* standard such that the general acceptance test was no longer the sole criteria for assessing the admissibility of scientific evidence.<sup>4</sup>

In the *Daubert* case, two minor children born with serious birth defects, and their respective parents, brought suit against the respondent in a California state court, alleging that their birth defects had been caused by the mother’s ingestion of Bendectin during pregnancy. Bendectin is a prescription anti-nausea drug marketed by respondent Merrell Dow Pharmaceuticals.

The suit was removed to federal court on diversity grounds. The primary issue in the case involved the admissibility of expert testimony regarding the correlation between the use of the drug during pregnancy and birth defects of the child born following that pregnancy. In holding that the testimony of expert scientific witnesses was admissible as long as the standards of reliability and relevance under the Federal Rules were met, the Court found the *Frye* standard to have been superseded by the Federal Rules of Evidence. It further found that

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<sup>3</sup> *Frye v. United States*, 293 F. 1013, 1014 (1923).

<sup>4</sup> See *Santiago v. State*, 510 A.2d 488, 489 (Del. 1986); *Fensterer v. State*, 493 A.2d 959, 962 n.3 (Del. 1985), *rev’d on other grounds*, 474 U.S. 15 (1985); *Nelson v. State*, 628 A.2d 69, 73 (Del. 1993).

nothing in the text of FRE 702 requires the standard of general acceptance in the scientific community as an absolute prerequisite to admissibility.

The Delaware Supreme Court has similarly rejected *Frye* as the sole test for the admissibility of scientific evidence.<sup>5</sup> Instead, consistent with FRE 702 and *Daubert*, for an expert to testify as to his or her opinion based upon the results of a test he or she performed, the expert must establish that the test is “reasonably relied upon by experts in the field,”<sup>6</sup> and the evidence must satisfy pertinent Delaware Rules of Evidence concerning admissibility. Specifically, a trial court must also find the evidence both relevant and reliable.

In ruling on the admissibility of DNA expert testimony, involving the analysis of nuclear DNA, the Delaware Supreme Court set forth five factors that must be considered under our evidentiary rules: 1) whether the expert being offered is qualified [DRE 702]; 2) whether the evidence offered is otherwise admissible, relevant, and reliable [DRE 401 & 402]; 3) whether the bases for the opinion are those reasonably relied upon by experts in the field [DRE 703]; 4) whether the specialized knowledge being offered will assist the trier of fact in understanding the evidence or in determining a fact in issue [DRE 702]; and 5)

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<sup>5</sup> See *Santiago*, 510 A.2d at 489; *Fensterer*, 493 A.2d at 962 n.3; *Nelson v. State*, 628 A.2d at 73.

<sup>6</sup> *Santiago*, 510 A.2d at 490, citing DRE 703.

whether such evidence would create unfair prejudice, confuse the issues, or mislead the jury [DRE Rule 403].<sup>7</sup>

### **Admissibility of Hair Sample**

This case is somewhat atypical in that it was the State who originally sought DNA testing of the hair sample, and ultimately mtDNA testing through Reliagene Laboratories. When the result excluded defendant, however, it was the defendant who sought a pretrial ruling on the admissibility of the evidence. The State did not present any expert testimony to challenge or contest the procedures and findings of Dr. Simha or Reliagene resulting in a proceeding that was not as adversarial as it could have been had the results been different. However, since this Court has the benefit of the developing knowledge in this area, the resulting decision to admit the evidence is not as likely to evoke controversy.

In this case, the State has conceded that the evidence satisfies the fourth and fifth prongs of the above analysis. That is, the State agrees that the specialized knowledge being offered will assist the trier of fact and that the evidence will not create unfair prejudice, confuse the issues, or mislead the jury. For this reason, the focus of this Court's inquiry must be upon whether the expert witness is qualified, whether the evidence offered by the defendant is reliable and relevant, and finally, whether the tests and procedures followed by Reliagene Laboratories in analyzing

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<sup>7</sup> *Nelson*, 628 A.2d at 73.

the mitochondrial DNA in this case are those reasonably relied upon by experts in the field of human genetics.

Turning to the first inquiry, the Court finds that Dr. Simha, the expert offered by the defendant, is highly qualified in the area of DNA analysis, both nuclear and mitochondrial. With his extensive education and experience in the field of human genetics, including his role as a professor at Tulane University, teaching DNA testing to medical students, and his role as the director of a laboratory that is fully certified to perform mitochondrial DNA analysis for several states, there is little question that Dr. Simha is highly qualified to explain the testing process and its results to the jury. Not only has the witness presented numerous papers and publications on mitochondrial DNA sequencing, he is part of scientific and technical working groups on DNA methods and is responsible for inspecting other laboratories to determine if they meet established standards. Unquestionably, Dr. Simha is properly qualified in the area of mtDNA analysis.

The second inquiry concerns the reliability and relevance of mtDNA evidence. Mitochondrial DNA analysis is a recognized scientific methodology that has been used for many purposes, including the identification of bodies from the Vietnam and Gulf Wars. While the forensic application is a more recent development, the technique is based on the Polymerase Chain Reaction (PCR) method of DNA analysis, which is routinely used in laboratories and has been

widely accepted in courts across the country as scientifically reliable.<sup>8</sup> The foregoing state court decisions, and the expert testimony before this Court in the evidentiary hearing pursuant to *Daubert*, establish that the process has been subjected to peer review and publication, that a known potential rate of error exists, that uniform standards control the techniques and operations, and that the FBI Laboratory has validated the process. The underlying science and technology has thus gained general acceptance in the scientific community.

In *Pappas*,<sup>9</sup> the Connecticut Court gave a detailed historical review of the scientific community's acceptance of the procedures used to extract and graph the chemical bases of mtDNA, citing the National Research Council of the National Academy of Sciences Committee on DNA Technology in Forensic Science. That committee, consisting of eminent scientists and jurists, was assembled in 1992 to address the concerns of the scientific, legal, and forensic communities about the viability of DNA typing evidence. The report of the committee fully endorsed the DNA typing technology itself and even went so far as to recommend that Courts

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<sup>8</sup> See *State v. Scott*, 1999 WL547460, at \*10 (Tenn. Crim. App. 1999), citing *State v. Begley*, 956 S.W.2d 471 (Tenn. 1997)(In Tennessee, PCR DNA testing is “statutorily regarded as trustworthy and reliable,” and expert testimony is not required for its admissibility.); *State v. Ware*, 1999 WL233592, at \*17 (Tenn. Crim. App. 1997)(“mitochondrial DNA is extensively studied . . . . It’s very well understood and characterized”); *State v. Council*, 515 S.E.2d 508 (S.C. 1999); *State v. Pappas*, 776 A.2d 1091 (Conn. 2001); *State v. Underwood*, 518 S.E.2d 231 (N.C. Ct. App. 1999).

<sup>9</sup> 776 A.2d 1091.

take judicial notice of the scientific acceptability of the procedures used to extract and compare DNA alleles.

A second committee that was convened in 1996 reviewed and updated the conclusions of the 1992 report, particularly the issues relating to the statistical calculation of population frequencies of DNA types. That committee concluded that “PCR-based methods are prompt, require only a small amount of material and can yield unambiguous identification of individual alleles. The state of the profiling technology . . . [has] progressed to the point where the admissibility of properly collected and analyzed DNA data should not be in doubt.”<sup>10</sup>

The foregoing case law, expert evidence of record, and pertinent legal and scientific commentaries overwhelmingly support the conclusion that the procedures used to extract and chart the chemical bases of mitochondrial DNA – extraction, PCR amplification, capillary electrophoresis, and the use of an automated sequencing machine to generate a chromatograph – are scientifically valid and generally accepted in the scientific community. While issues regarding contamination or the existence of heteroplasmy (mutation) are not insignificant, and may bear on the weight of mtDNA evidence in a particular case, those

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<sup>10</sup> See Committee on DNA Forensic Science: An Update, National Research Council, “The Evaluation of Forensic DNA Evidence,” p. 36 (1996)(Committee Report II).

possibilities do not undermine the admissibility of the results of the mtDNA sequencing process used in this case. As the Supreme Court noted in *Daubert*, the focus of a validity assessment “must be solely on principles and methodology, not on the conclusions that they generate.”<sup>11</sup>

The question of relevance is straightforward in this case. Since the victim of the rape is unable to identify the perpetrator, identity is clearly at issue. The source of the hair found in the victim’s underwear is therefore relevant as it has a tendency to make a fact of consequence more probable or less probable than without the evidence. This conclusion is manifest. While mtDNA testing does not give proof of identification as conventional DNA testing does, “absolute certainty of result is not required.”<sup>12</sup> Mitochondrial DNA testing is sufficiently relevant to warrant its admissibility.

The last factor to be considered under DRE 703 is whether the bases for the expert opinion are those reasonably relied upon by experts in the field. The foregoing discussion and citations establish that experts in the field have accepted mitochondrial DNA technology. With more than seven years of solid research, testing, and publications in peer-reviewed scientific journals on mtDNA analysis,<sup>13</sup> the process has been widely accepted in the scientific and legal communities.

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<sup>11</sup> *Daubert*, 509 U.S. at 580.

<sup>12</sup> *State v. Catoe*, 336 S.E.2d 691, 692 (N.C. App. 1985), *cert. denied*, 344 S.E. 2d 1 (1986).

<sup>13</sup> *See Council*, 515 S.E. 2d 508.

Moreover, it is accepted that mtDNA analysis can provide results when genomic DNA analysis of hair, known to contain scant amounts of DNA, cannot.

All of the state appellate and trial courts that have considered the methodology of mtDNA analysis in criminal trials thus far have concluded that it is scientifically valid and admissible,<sup>14</sup> either under *Daubert*, state rules of evidence or statutes.

Since the defendant's proffer of mtDNA evidence meets all of the requirements of *Daubert* and the Delaware Rules of Evidence for the admission of scientific evidence, the Court holds that the mitochondrial DNA evidence is admissible in this case.

### **Assessing the Significance of MTDNA Evidence**

Much of the disagreement among geneticists, and most of the conflict in Court decisions, concerns the statistical significance of a match of DNA patterns. Because a match between two DNA bands means little without data on probabilities, the calculations of statistical probabilities is an integral part of the process. As the Delaware Supreme Court noted in *Nelson*, involving comparison of nuclear DNA samples, “[t]o say that two patterns match, without providing any scientifically valid estimate . . . of the frequency with which such matches might

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<sup>14</sup> See *Pappas*, 776 A.2d 1091; *Underwood*, 518 S.E.2d 231; *Council*, 515 S.E.2d 508; *Scott*, 33 S.W.3d 746; *People v. Klinger*, 713 N.Y.S.2d 823 (County Ct. 2000).

occur by chance, is meaningless.”<sup>15</sup> Indeed, Courts have even considered the statistical calculation step as the more important of the two pieces of information which constitute DNA evidence.<sup>16</sup> The Delaware Supreme Court in *Nelson* held that it was error for the trial court to admit evidence of a match after finding the corresponding statistical calculation to be inadmissible as scientifically unreliable.<sup>17</sup>

In the *Pennell* case, the Delaware Superior Court held that DNA identification evidence was relevant, and that the testing procedures were generally relied upon by experts in the field. Although the expert opinion regarding a match of DNA samples was admissible, the statistical probabilities of such a match (one in one hundred billion) were disallowed. The Court noted that a probability of one in 100 billion created the risk of undue prejudice to the defendant.

The trial court decisions in *Nelson* and *Pennell* preceded the NRC report which reviewed the techniques that allow comparison of DNA samples to establish a match, and the statistical methods used to explain the meaning of that match. The Committee Report fully endorsed the DNA typing technology itself, even going so far as to recommend that courts take judicial notice of the scientific acceptability of the procedures used to extract and compare DNA alleles.

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<sup>15</sup> *Nelson*, 628 A.2d at 76, quoting DNA Committee Report at 74.

<sup>16</sup> See, e.g., *U.S. v. Porter*, 618 A.2d 629, 640 (D.C. 1992).

<sup>17</sup> *Nelson*, 628 A.2d at 76. But see, *State v. Pennell*, 584 A.2d 513 (Del. Super. 1989).

Subsequent decisions involving the significance of DNA evidence, specifically the probability of a coincidental match, suggest that the lack of consensus on the statistical significance of DNA evidence should not exclude probative DNA evidence if the deficiencies can be corrected through the use of conservative estimates.<sup>18</sup> If appropriately conservative, the probability estimates of a coincidental match should be admissible.

Mitochondrial DNA, unlike nuclear DNA, is not a unique identifier because it is shared by individuals within a given maternal line.<sup>19</sup> Because the frequencies of mtDNA types in the entire population are not known, statistical statements based upon a sample of the population may be used to estimate that frequency. Statistical methods used to derive mtDNA frequencies, while not entirely a matter of consensus among scientists and statisticians, are nonetheless considered likely to be helpful to the jury in assessing the probative value of the mtDNA evidence, and have generally been held to meet the threshold standard for admissibility. So long as there is a consensus that the chances of such a match are no greater than some very small fraction, then the evidence is probative and should be admitted on an

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<sup>18</sup> *Porter*, 618 A.2d at 643. See also *People v. Mohit*, 579 N.Y.S.2d 990 (County Ct. 1992) (admitting DNA typing evidence but limiting statistical calculations to the most conservative estimate).

<sup>19</sup> A match of nuclear DNA samples is highly probative of identity since it is considered unique to each human, except in cases of identical twins.

appropriately conservative basis.<sup>20</sup> Moreover, although the population database with which mtDNA samples are compared (3-4000) is small in comparison to the millions of samples in the nuclear DNA database, the process is nevertheless sufficiently discriminatory to warrant its admissibility. As the South Carolina Court noted in *Underwood*,<sup>21</sup> “absolute certainty of result is not required.” It is sufficient that the technique provides an objective confirmation of the subjective microscopical comparison performed on the hairs.

Although the statistical probabilities and significance of a match are generally subjects for expert testimony, and matters for analysis by the trial courts, it is not necessary to reach those issues in the case at bar. Since the evidence in this case establishes that the defendant is excluded, rather than included, as a potential donor of the questioned sample, the question of the statistical probabilities of a match does not arise here. Nor is the size or extent of the database relevant to the precise evidentiary question before this Court. The hair sample here was not a match to the defendant’s DNA and his exclusion as the donor of the hair sample is absolute. Accordingly, defendant simply cannot be

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<sup>20</sup> In 1994, Delaware enacted a statute providing that evidence of a DNA profile is admissible to prove or disprove the identity of any person, if the proper written notification is provided in advance to the opposing party or parties. The particular data to be included in the notice is set forth in the statute, which, on its face, applies to *nuclear* DNA test results since it defines “DNA profile” as “an analysis that utilizes the restriction fragment length polymorphism analysis of DNA . . . .” DEL. C. ANN. tit. 11 § 3515 (2001).

<sup>21</sup> 518 S.E.2d at 240.

considered as a match under any standard of probability. Thus, the Court's decision to admit evidence of the mitochondrial DNA is conclusive without the necessity of any statistical analysis.

**Conclusion**

Based upon the evidence presented at the Daubert hearing, the Defendant's Motion in Limine for the admission of mitochondrial DNA evidence is granted as scientifically reliable and relevant.

**IT IS SO ORDERED.**

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**PEGGY L. ABLEMAN, JUDGE**