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<u>United States v. Pinninonna,</u> 885 F. 2d 1529 (11th Cir. 1989) (<u>en banc</u>)	
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Section 56.020	
<u>Code of Virginia (1950)</u>	
Section 192 270.5	

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OTHER SOURCES

PAGE(S)

- Alfous, P.,
"Geneticists Attack NRC Report As
Scientifically Flawed,"
259 Science pp. 755-756 (1994)
- Budowle, B.; Monson, K. L.; Giusti, A.M.; Brown, B. L.
"The Assessment of Frequency Estimates of Hae
III-Generated VNTR Profiles in Various Reference
Databases"
Journal of Forensic Sciences,
JFSCA, Vol. 39, No. 2 (1994)
- "Evaluation of Hinf I-Generated VNTR Profile
Frequencies Determined Using Various Ethnic
Databases,"
39 Journal of Forensic Sciences 988-1008
(July 1994)
- Monson, K. and Budowle, B.,
"A Comparison of the Fixed Bin Method with the
Floating Bin and Direct Count Methods: Effect of
VNTR Profile Frequencies Estimation and Reference
Population,"
38 Journal of Forensic Sciences, 1037-1050
(September 1993).
- Chakraborty, R.
"Effects of Population Subdivision and Allele
Frequency Differences on Interpretation of DNA
Typing Data for human Identification"
Proceedings from Third International Symposium
on Human Identification, 1992
- Chakraborty, R., and Kidd, K.,
"The Utility of DNA Typing in Forensic Work"
Science, Vol. 260, pp. 1735-1739
(December, 1991)
- Cohen, J.,
"The Ceiling Principle is Not Always Conservative
in Assigning Genotype Frequencies for Forensic
DNA Testing,"
51 Am.J.Hum.Genet. pp. 1165-1168 (1992)
- Devlin, B. and Risch, N.,
"A Note on Hardy-Weinberg Equilibrium of VNTR Data by
Using the Federal Bureau of Investigations' Fixed-Bin
Method,"
51 Am.J.Hum.Genet. 549-553 (1992).

TABLE OF CITATIONS

(Continued)

OTHER SOURCES

PAGE(S)

- Devlin, B., Risch, N., Roeder, K.,
"Statistical Evaluation of DNA Fingerprinting:
A Critique of the NRC's Report,"
Science, Vol. 259, p. 748, February 1993
- Federal Bureau of Investigation
"VNTR Population Data: a Worldwide Study"
(1993)
- Lewontin, R. and Hartl, D.,
"Population Genetics in Forensic DNA Typing,"
254 Science, pp. 1745-1750, (1991)
- Slimowitz, J., and Cohen, J.,
"Violations of the Ceiling Principle: Exact
Conditions and Statistical Evidence,"
53 Am.J.Hum.Genet. 314-323 (1993)
- Weir, B.S.,
"Forensic Population Genetics and the National
Research Council (NRC),"
52 Am.J.Hum.Genet. 437-440 (1993)

IN THE SUPREME COURT OF FLORIDA

THE STATE OF FLORIDA,

Petitioner,

v.

CASE NO. 83,935

MIGUEL ANGEL VARGAS,

Respondent.

MERITS BRIEF OF PETITIONER

PRELIMINARY STATEMENT

This is a petition for discretionary review of a question certified by the First District Court of Appeal to be of great public importance pursuant to Article V, Section 3(b)(4) of the Florida Constitution.

The Petitioner, THE STATE OF FLORIDA, will be referred to herein as "the State." The Respondent, MIGUEL ANGEL VARGAS, will be referred to herein in his posture before the trial court as "the defendant." References to the record on appeal will be by the use of the symbol "R" followed by the appropriate page number(s). References to the transcript of proceedings will be by the use of the symbol "T" followed by the appropriate page number(s).

STATEMENT OF THE CASE AND FACTS

Prior to his scheduled trial, the defendant moved in limine to preclude evidence relating to DNA analysis of crime scene materials and samples of his blood taken pursuant to warrant. At a hearing conducted with regard to this issue, experts from both sides testified.

The facts presented in the First District Court opinion are as follows:

. . . the state and defense put on two expert witnesses during the hearing on the motion in limine. For the state, Dr. James M. Pollock, a forensic serologist for FDLE, and Dr. Martin Tracey, professor of biological sciences at Florida International University, testified. For the defense, Dr. Leslie Sue Lieberman, professor of anthropology and pediatrics at the University of Florida, and Dr. Edward Kittredge Wakeland, professor of pathology and laboratory medicine at the University of Florida, testified.

Dr. Pollock specializes in DNA analysis at FDLE. He received his training in DNA analysis from the FBI Forensic Research and Training Center in Quantico, Virginia. He has also attended seminars in DNA analysis, and has been a member of a technical working group sponsored by the FBI which meets three or four times a year at the FBI research and training center. Dr. Pollock said in his opinion, RFLP analysis, used by the FBI and FDLE, is generally accepted in the scientific community as reliable. Dr. Pollock explained in detail the RFLP process, and said he conducted the tests in each of the three cases involved here. In each case, appellant's DNA profile matched the DNA taken from the crime scene.

On conducting the population frequency portion of the analysis, Dr. Pollock used the FBI series of data bases, which he opined are generally accepted by members of the scientific community as being reliable. He obtained probabilities of one in 30 million in two cases pertaining to appellant, and one in 60 million in

the third case pertaining to appellant (using an updated data base) of finding an unrelated individual having the same DNA profile.

On cross-examination, Dr. Pollock said it was generally accepted for most cases that substructure does not affect the population frequency calculations. He indicated he uses all three data bases, for Caucasians, Blacks, and Hispanics, in calculating the population frequencies, because often you don't know the suspect's background when conducting the tests; he called this the general population approach, which he said was the most conservative approach. He said there is no controversy in the scientific field over whether a profile for a member of a diverse ethnic group can be calculated using present data bases if one uses a general population frequency. He acknowledged that current scientific articles dispute his conclusion about ethnic substructure affecting frequencies, but said the individuals who raised the dispute were not forensic scientists. He said DNA analysis has supporters outside the forensic community as well. Dr. Pollock acknowledged there could be substructure in isolated population groups, such as on Indian reservations or South Pacific islands. He had never studied the population history of Puerto Rico.

Dr. Tracey testified as an expert in the field of molecular biology and population genetics. He had worked and done research in RFLP analysis, and had reviewed work done at the FDLE lab, and said it is widely accepted in the general scientific community as a reliable testing method. Dr. Tracey had reviewed the analysis done in the three cases involved here, and he agreed with Dr. Pollock's conclusions. He stated the process of applying population genetics to DNA identification to ascertain the probability of the sample coming from someone other than the suspect is generally accepted in the scientific community.

When asked on cross-examination whether there is a great deal of controversy in the scientific community about whether substructure, especially among Hispanics, affects the accuracy of the FBI's probability statistics, Dr. Tracey said "there is a great deal of argument about whether ... two data bases for subpopulations, principally within ethnic or within racial groups, are adequate to calculate accurate statistics." He opined that "there is a good deal of disagreement, principally because people are asking different questions

[I]f you use a Mexican or Nicaraguan or Cuban or Puerto Rican data base, you are likely to get different numbers. Those numbers may differ -- as much as in order of magnitude, it could go from 1 in a billion, down to 1 in millions. It would not reduce the number to 1 in 10 or 1 in 100s." He prefers to use a human data base because " it's impossible to equate the ethnicity or race of a suspect with a perpetrator until you're done."

Asked whether there is a significant controversy, considering recent publications questioning the data bases, Dr. Tracey said there was significant misunderstanding as to the appropriate questions to ask. Dr. Tracey acknowledged a data base compiled in Canada for Indians living in Ontario due to concern over the population frequency statistics, stating he was working on a similar study himself. He said the alleles differ, but the odds do not quantitatively differ. He said the solution to the substructuring problem suggested by Hartl and Lewontin was to use the highest frequencies; he acknowledged that was not the method used here, but he could sit down and calculate the frequencies using that method, and it would not change the qualitative answer.

Dr. Lieberman was qualified as an expert in human evolutionary biology, biomedical anthropology, and the phenotypical makeup of the Caribbean population. She stated that for a variety of sociological, geographical, and historical reasons, based on her research and experience, she would not expect the Puerto Rican population to be in Hardy-Weinberg equilibrium.

Dr. Lieberman said she understood the FBI Hispanic data base was drawn from Texas, which would be largely Mexican-American Hispanics, and Miami, which would be largely Cuban Hispanics. She said she believed there would be greater variation in island populations. She said she believed the FBI data bases were generally accepted by forensic scientists, but that does not have anything to do with whether the Puerto Rican population is in Hardy-Weinberg equilibrium. She added that scientists outside the FBI might have different opinions. She acknowledged the controversy reflected in certain published scientific articles by Hartl and Lewontin and Chakraborty. Dr. Lieberman had not done any DNA analysis in a criminal context.

Dr. Wakeland testified as an expert in molecular biology, population genetics, and molecular genetics of polymorphisms. He had reviewed material provided by FDLE as well as pertinent scientific articles. He stated the existing controversy in the scientific community relates "totally" to the calculation of the probability that someone else in the population could also match the crime scene DNA sample, because the frequency tables are poorly defined and poorly constructed. He said the substructuring issue is being hotly debated among population geneticists at this point. Asked whether DNA profiling is generally accepted among the scientific community of molecular biologists and population geneticists as reliable for use in criminal trials, Dr. Wakeland said at this point it is not clear that the calculated frequencies are accurate and there's a tremendous amount of disagreement about that fact." He stated that "in order to make the probability calculations, one must assume both Hardy-Weinberg equilibrium and linkage equilibrium within the data base used to calculate the probability, "this in turn requires the assumption that there is not population substructure, and the issue of substructuring as it relates to Hardy-Weinberg equilibrium "currently is being very heavily debated among population geneticists. On cross-examination, Dr. Wakeland said he was not an expert in forensic DNA analysis, and he had not done any forensic work. He agreed that the concept of applying population genetics to DNA profiling was widely accepted within the scientific community, and that a large number of labs use the FBI data bases.

The trial court denied the motion in limine, finding that DNA evidence was not novel at that point in American jurisprudence, therefore precluding the need to engage in a consideration of the different standards of proof for admission of novel scientific evidence. It did, however, conduct such an analysis to explain that each standard of proof had been met. Although the trial court applied the standard that the evidence must be reliable and relevant, the court made specific note of the fact that the evidence sought to be admitted also satisfied the requirements of

Frye v. United States, 293 F. 1013 (D.C. Cir. 1923), and Stokes v. State, 548 So. 2d 188 (Fla. 1988). The court specifically found that:

All of the expert witnesses who testified were in agreement that the DNA testing procedures and the application of population genetics to the test result are generally accepted by the scientific community as reliable. The dispute among the expert witnesses addressed the sufficiency of the data bases used to calculate the probability that someone else in the population would have the same DNA profile as that identified for the Defendant. This dispute goes towards the weight of evidence, rather than its admissibility and is an issue for the ultimate trier of fact. (Vol. VII, 1126-1127).

On appeal, the First District Court of Appeal, after finding that the Frye test was the appropriate standard to be utilized, vacated the trial court's order on the motion in limine concluding that the defendant had "demonstrated that the method by which FDLE arrived at population frequencies of one in 30 million and one in 60 million, using the FBI data bases, is not generally accepted in the relevant scientific community" and the frequencies were therefore not admissible. The District Court remanded the matter back to the trial court for further consideration based upon Dr. Tracey's testimony that problems resulting from the possible effects of population substructure could be corrected by using the

highest frequencies in accordance with the ceiling principle. The court also certified the following question as one of great public importance:

IS THE FDLE (FBI) METHOD OF CALCULATING POPULATION FREQUENCIES FOR PURPOSES OF DETERMINING THE POSSIBILITY THAT SOMEONE OTHER THAN DEFENDANT MATCHES THE DNA TAKEN FROM THE CRIME SCENE IN DNA PROFILING GENERALLY ACCEPTED IN THE RELEVANT SCIENTIFIC COMMUNITY FOR USE IN CRIMINAL TRIALS IN FLORIDA; IF NOT, IS A MORE CONSERVATIVE METHOD OF ESTIMATING POPULATION FREQUENCIES GENERALLY ACCEPTED IN THE RELEVANT SCIENTIFIC COMMUNITY FOR USE IN CRIMINAL TRIALS?

SUMMARY OF ARGUMENT

The First District Court erred in finding that the trial court improperly admitted DNA evidence on the grounds that the State had allegedly failed to establish that the method used by FDLE to calculate the frequency statistics was generally accepted by the relevant scientific community. The evidence presented at the hearing overwhelmingly supported the trial court's ruling, as does the current trend of scientific thought. The District Court incorrectly believed that the existence of controversy precluded admission of the evidence.

The District Court improperly based its finding of lack of general acceptance on the ceiling principle which it also promotes as the solution to the potential effect of substructure population. This principle does not meet the requirements of Frye and is itself not generally accepted in the relevant scientific community.

ARGUMENT

ISSUE

THE FIRST DISTRICT COURT ERRED IN FINDING THAT THE STATISTICAL ANALYSIS UTILIZED BY FDLE IN THIS CASE IS NOT GENERALLY ACCEPTED WITHIN THE RELEVANT SCIENTIFIC COMMUNITY.

PRINCIPLES UNDERLYING DNA ANALYSIS¹

Before the legal issue presented may be addressed, it is essential to have a basic understanding of the principles underlying DNA analysis. The human body contains, in total, approximately ten trillion cells which contain the building blocks of human life, DNA. Almost every cell contains a nucleus which contains a DNA molecule. Each DNA molecule, in turn, contains the genetic code which is unique to that living creature.

Each DNA molecule is distributed across forty-six sections of the nucleus called chromosomes, which are arranged in twenty-two pairs, plus one pair of sex chromosomes. In each pair of chromosomes, one set is inherited from each parent. The DNA molecule, a double helix structure, resembles a spiral staircase in which each step is composed of a pair of four organic bases. These base pairs, adenine "A", guanine "G", cytosine "C", and thymine "T," pair predictably "A" with "T" and "C" with "G". Thus, the order of the bases on one side of the staircase determines the

¹ The information contained in this initial introductory section has been condensed from a number of sources including United States v. Jakobetz, 955 F. 2d 786 (2d Cir. 1992), and United States v. Bonds, 12 F. 3d 540 (6th Cir. 1993).

order of the bases on the opposite side. Ninety-nine percent of these base pairs are identical for all humans.² The remaining one percent of bases pairs which differ account for ethnic, racial and individual differences between persons.

This variation in base pair sequences which distinguish individuals is critical to forensic DNA analysis. Chromosomes contain many physical locations or loci which are occupied by different DNA sequences in base pairs. With the sole exception of sex chromosomes, normal individuals have two copies of any given sequence at a particular locus because human chromosomes come in pairs, one of which is inherited from each parent. Genetic variants at a particular location are called alleles. When the copy inherited from each parent differs, and two alleles appear at the locus, they are called heterozygous. When the copies are the same, and thus appear only as one allele, they are called homozygous. While any one person may have only two alleles at a given location, many different alleles can exist for that same location within the population. It is these genetic differences between individuals, known as polymorphisms, that are the foundations of DNA analysis.

Current technology makes it impossible, because of the prohibitive time and cost involved, to examine all of the base pairs in an individual. DNA analysis therefore examines a small portion of a specific area of a person's genetic makeup. Forensic DNA testing focuses on examining several loci containing highly

² Identical twins share identical DNA, however.

polymorphic, or hypervariable alleles, generally at four different locations. By following this process, conclusions may be reached as to whether an individual's DNA matches that contained in evidence found at a crime scene.

Scientists generally agree that the theories which underlie DNA typing are valid. It is undisputed that DNA varies substantially among individuals and that these variations can provide a basis for distinguishing between sources of samples.

In performing DNA analysis, a "print" of the DNA is made. "RFLP" or Restriction Fragment Length Polymorphism is the technique of analysis utilized by FDLE in this case. RFLP involves a seven step process which permits scientists to detect and distinguish varying regions of DNA (polymorphisms) by their length or band size.

In step one, called extraction, DNA is isolated from the specimen which is typically comprised of blood, semen, or hair. In cases involving sexual assault, the specimen, which is usually a mixture of semen, vaginal cells and fluid, must be separated into its male and female portions. DNA, usually in the form of blood samples, is also generally taken from the suspect and the victim for comparison purposes.

In step two, digestion, the DNA is then "cut" by being treated with a restriction enzyme which separates it into fragments. The enzyme, depending upon its type, cuts the DNA at specific points known as restriction sites where the enzyme recognizes a certain

code or sequence of base pairs. As a result, the DNA is cut into millions of fragments of varying length. The locations of the restriction sites and the respective length of the fragments differ among individuals due to the highly variable VNTR's (variable number tandem repeats) that exist between the sites where the DNA is severed.

Step three, electrophoresis, separates the DNA fragments by length. The fragments are placed in one end of an agarous gel which is divided into lanes. When an electric charge is passed through the gel, the negative charge of the DNA causes it to migrate along the gel to the positive end. Because shorter fragments move faster, the fragments are arranged according to their relative length. Several lanes of DNA whose length is known, called size markers, are contained within the gel.

In step four, known as Southern Transfer, the DNA spiral staircase is split, or denatured, into two sections down the middle when the hydrogen bond between the two rungs of the ladder is severed. This process is likened to unzipping a zipper. The single strand of DNA is then transferred to a nylon membrane in the same position it occupied on the gel.

During step five, hybridization, a specific radioactive tagged probe is applied to each highly polymorphic site to locate and visualize those fragments on the membrane. The probe, a single strand of DNA, will seek out and bind to a complementary single strand base sequence on the membrane.

The membrane is then placed against a piece of x-ray film. The radioactive probe exposes the film, leaving a visual pattern wherever the probe binds to the DNA resulting in an autoradiograph or autorad, in step six. When a single probe is used, two bands generally appear in each lane, one from each parent. FDLE, like the FBI, currently uses four probes to analyze four different loci for comparison purposes.

In the final step, identification, the bands are compared, using two techniques. First, the bands are visually compared. If the bands from the known and unknown sample do not align, there is no match. The examiner then determines whether the results are either inclusive or sufficient to exclude the suspect as the source of the unknown DNA. If the bands visually match, the examiner then does a second computerized measurement using a match window to determine if the bands are within a predetermined percentage of each other to declare whether a match results.

ADMISSIBILITY OF DNA ANALYSIS UNDER FRYE

Pursuant to this Court's decision in Flanagan v. State, 625 So. 2d 827 (Fla. 1993), the test enunciated in Frye v. United States, 293 F. 1013 (D.C. Cir. 1923), is utilized to determine the admissibility of novel scientific evidence. Under this standard, the issue is whether the evidence of the frequency of the defendant's DNA profile is sufficiently established to have gained general acceptance in the relevant scientific community to which it belongs.

"General acceptance exists when a substantial portion of the pertinent scientific community accepts the theory, principles and methodology underlying scientific testimony because they are grounded in valid scientific principles." United States v. Bonds, 12 F. 3d 540, 561 (6th Cir. 1988). Further, general acceptance in the scientific community is equated with a showing that the scientific principles and procedures on which experts testimony is based are reliable and scientifically accurate. Id., quoting United States v. Brown, 557 F. 2d 541 (6th Cir. 1977). However, as the Brown Court observed, "[a]bsolute certainty of result or unanimity of scientific opinion is not required for admissibility." Id., at 556. See also: United States v. Kominski, 821 F. 2d 1186, 1200 (6th Cir. 1987)(Krupansky, J., concurring)("[A]bsolute certainty of result or unanimity of scientific opinion is not required for admissibility so long as the conclusions drawn by the experts are based on generally accepted and reliable scientific principles."), aff'd., 487 U.S. 931, 108 S. Ct. 2751; United States v. Franks, 511 F. 2d 25, 33 n. 12 (6th Cir.), cert. denied, 422 U.S. 1042, 95 S. Ct. 2654, 45 L. Ed. 2d 693 (1975)(General acceptance "merely synonymous with reliability").

In United States v. Stifel, 433 F. 2d 431 (6th Cir. 1970), the Court also reasoned that absolute certainty is not a prerequisite to a finding of general acceptance.

[N]either newness nor lack of absolute certainty in a test suffices to render it inadmissible in court. Every useful new development must have its first day in court. And court records are full of the conflicting opinions of doctors, engineers and accountants to name a few . . . Id. at 438.

The Bonds Court engaged in perhaps one of the best discussions on the subject of general acceptance, finding that the test was designed merely to uncover whether there is a general agreement of scientists in a particular field and insure that the data is not based upon mere speculation or conjecture. Id. at 562. While ordinarily a principle or procedure must be accepted by a majority in the relevant field, the absence of such a majority does not necessarily rule out general acceptance. Id. Significantly the Court stated:

And even substantial criticism as to one theory or procedure will not be enough to find that the theory/procedure is not generally accepted. Only when a theory of procedure does not have the acceptance of most of the pertinent scientific community, and in fact a substantial part of the scientific community disfavors the principle or procedure, will it not be generally accepted. See, e.g., Novack v. United States, 865 F. 2d 718, 725 (6th Cir. 1989) (theories were neither "widely accepted" or "generally accepted" in the medical community). Id.

Decisions of other courts on the admissibility of DNA evidence are highly relevant to this Court in its determination of the appropriateness of the lower court's findings in this case. See: State v. Davis, 814 S. W. 2d 593 (Mo. en banc 1991)(in determining general acceptance, courts look for guidance to other jurisdictions); cf., State v. Woodall, 385 S. E. 2d 253 (W. Va. 1989) (when senior appellate courts have concluded that a test is generally accepted by the scientific community, trial courts may take judicial notice of that test's reliability).

The following jurisdictions, utilizing a Frye analysis, have ruled that DNA evidence was admissible as it was generally accepted in the relevant scientific community: People v. Wesley, 611 N.Y.S. 2d 97 (N.Y. 1994); People v. Johnson, 1994 WL 245739 (Ill. App. 4th Dist., June 7, 1994); People v. Stremmel, 630 N. E. 2d 1301 (Ill. App. 2 Dist. 1994); Fishback v. People, 851 P. 2d 884 (Colo. 1993); State v. Johnson, 498 N. W. 2d 10 (Minn. 1993); State v. Kalakosky, 852 P. 2d 1064 (Wash. 1993); Polk v. State, 612 So. 2d 381 (Miss. 1992); State v. Montalbo, 828 P. 2d 1274 (Haw. 1992); Harris v. Commonwealth, 846 S. W. 2d 678 (Ky. 1992); Smith v. Deppish, 807 P. 2d 144 (Kan. 1991); Prater v. State, 820 S. W. 2d 429 (Ark. 1991); Hopkins v. State, 597 N. E. 2d 1297 (Ind. 1991); State v. Davis, 814 S. W. 2d 593 (Mo. 1991); State v. Ford, 392 S. E. 2d 781 (S.C. 1990); State v. Woodall, supra.; State v. Harris, 866 S. W. 583 (Tenn. Cr. App. 1992); People v. Adams, 489 N. W. 2d 192 (Mich. App. 1992); Commonwealth v. Rodgers, 605 A. 2d 1228 (Pa. Super. 1992); Glover v. State, 787 S. W. 2d 544 (Tex. App. 1990); Cobey v. State, 559 A. 2d 391 (Md. App. 1989); People v. Castro, 545 N.Y.S. 2d 985 (N.Y. Sup. 1989).

Numerous other jurisdictions, using a standard other than Frye, have also admitted DNA evidence. See: United States v. Jakobetz, 955 F. 2d 786 (2d Cir. 1992)(DNA evidence found to be probative, material and reliable); State v. Pennington, 393 S. E. 2d 847 (N.C. 1990)(expert testimony was uncontroverted that DNA profiling was considered reliable within the scientific community); Hicks v. State, 860 S. W. 2d 419 (Tex. Cr. App. 1993)(DNA evidence found to be reliable and relevant); State v. Futch, 860 P. 2d (Ind.

App. 1993)(DNA testing sufficiently reliable to be probative evidence); State v. Pierce, 597 N. E. 2d 107 (Ohio 1992)(DNA evidence held to be relevant); State v. Brown, 470 N. W. 2d 30 (Iowa 1991)(DNA evidence reliable); United States v. Bonds, 12 F. 3d 540 (6th Cir. 1993)(DNA passes the test set forth by the United States Supreme Court in Daubert³ and is admissible.)

Also of great significance is legislative acceptance of DNA evidence. Six states have enacted statutes allowing the introduction of DNA evidence at trial, including: Maryland [MD. Ann. Code Section 10-915 (Supp. 1989)], Minnesota [Minn. Stat. Ann. Section 634.25 and 634.26 (Supp. 1989)], Nevada [Nev. Rev. State. 56.020 (Supp. 1989)], Louisiana [La. Rev. State. Ann., 15-441.1 (Supp. 1990)], Indiana [I.C. 35-37-4-10 (Indiana 1990)], and Virginia [Va. Code Section 19.2 270.5 (Code of Va. 1950, as amended)].

The First District improperly found that the existence of controversy on the subject precluded a finding of general acceptance in compliance with Frye. This finding is incompatible with the realities of modern science. It is difficult to find any area of scientific evidence which does not contain a variety of contrary points of view. Criticism of varying points of view is at the very heart of all scientific thought. Instead, the correct standard is that set forth in Bonds. So, long as the theories underlying DNA analysis are reliable and are recognized as such,

³ Daubert v. Merrell Dow Pharmaceuticals, Case No. 92-102 (U.S. June 28, 1993).

then conflicting views as to the interpretation of those results, i.e., the conclusions to be drawn from them, does not preclude their admissibility.

As hereinafter set forth, in reaching its conclusion, the District Court failed to consider or account for the fact that at the time of the hearing a majority of members of the scientific community accepted the procedures utilized by FDLE. This majority, however, was affected by a ground swell of opposition fueled by the NRC Report and the Lewontin and Hartl Science article it was based upon which was published after the January 1992 hearing. The District Court's opinion was thus based upon materials which were not presented to the trial court for its consideration at the time of the hearing. The district court, in relying upon the Report and its progeny, also ignored the fact that the NRC Report and its supporters have undergone extensive criticism by opponents who have challenged the assumptions underlying the Report and have rejected it. Thus, the premises relied upon by the District Court in concluding that FDLE's methods were not generally accepted, have themselves been proven invalid and unreliable. The FDLE procedures which the trial court found admissible have therefore been vindicated since the only thing used to discredit it, i.e., the NRC Report, has itself been found to be in error. The trial court, if the decision were before it today, would, of necessity, make the identical ruling finding the evidence admissible.

As previously stated, the fact that controversy, even significant controversy, exists does not preclude admission of DNA

evidence once the initial determination that general acceptance exists is made. At that point, as numerous courts have recognized, the existence of contrary points of view becomes a question of weight, rather than one of admissibility. In People v. Adams, 489 N. W. 2d 192 (Mich. App. 1992), for example the court in a Frye state addressed a challenge to the statistical accuracy of a Cellmark database, nevertheless upheld admission of the statistical evidence finding that questions relating to the size of the database or whether it is in Hardy-Weinberg equilibrium go to the weight of the evidence, not its admissibility. See also: People v. Axell, 1 Cal. Rptr. 2d 411 (Cal. App. 2 Dist. 1991); Hopkins v. State, 579 N. E. 2d 1297 (Ind. 1993); Springfield v. State, 860 P. 2d 435 (Wyo. 1993).

In United States v. Bonds, supra., the Court noted that the lower courts in that case had admitted the DNA evidence under the Frye standard which had subsequently been superceded by the Daubert standard. Bonds challenged the FBI Caucasian database on the grounds that it failed to account for the possibility of ethnic substructure. The Court, citing to United States v. Jakobetz, 955 F. 2d 786 (2d Cir.), cert. denied, ___ U.S. ___, 113 S. Ct. 104, 121 L. Ed. 2d 63 (1992), noted that "[j]his substructure argument involves a dispute over the accuracy of the probability results, and thus this criticism goes to the weight of the evidence, not its admissibility." 12 F. 3d at 564. The Bonds Court noted that the government's witness indicated that the statistical results were not distorted by the possibility of ethnic substructure because the government's methods of estimating frequencies were still

conservative. Of great significance was the fact that the defense could not speculate regarding the existence of substructure. The Court held:

[t]he district court correctly found that it could not examine this dispute going to the accuracy of the results, but could only examine whether the testimony was based upon generally accepted (and scientifically valid) theories and procedures. The evidence and testimony presented at this Frye hearing demonstrate that the DNA evidence was not based on untested or unacceptable theories or procedures. Because the DNA results were based on scientifically valid principles and derived from scientifically valid procedures, it is not dispositive that there are scientists who vigorously argue that the probability estimates are not accurate or reliable because of the possibility of ethnic substructure. The potential of ethnic substructure does not mean that the theory and procedures used by the FBI are not generally accepted; it means only that there is a dispute over whether the results are as accurate as they might be and what, if any, weight the jury should give those results. Id. at 564-5.

Despite the overwhelming recognition of DNA evidence in legal proceedings, the defendant below contended and the First District Court of Appeal found that the manner in which FDLE calculated the statistical frequencies was not generally accepted by the relevant scientific community. Although the court did not specifically define the relevant scientific community, it appears to have adopted the definition of the term utilized in United States v. Porter, 618 A. 2d 629, 634 (D.S. App. 1992). The Porter Court defined the relevant scientific community as "those whose scientific background and training are sufficient to allow them to comprehend and understand the process and form a judgment about it." The State would respectfully assert, however, that the

relevant scientific community should be more narrowly defined. The definition set forth above ignores the fact that the relevant scientific community should be those scientific fields in which the evidence belongs. Jakobetz, supra.; Bonds, supra. Thus, while the profiling and interpretation of DNA evidence involves molecular biology and population genetics,⁴ the relevant scientific community cannot logically be limited to these fields to exclude forensic scientists. Rather, the better practice is to define the relevant scientific community as those individuals in the forensic sciences with expertise in the fields of molecular biology and population genetics. This is due to the fact the fields of molecular biology and population genetics do not, for example, account for the use of DNA analysis and interpretation in forensic applications where the ethnic or racial background of a suspect may not be known or known absolutely, because of a difference in their theoretical origins.

This Court should reject a definition of relevant scientific community which is loosely defined to include any scientific group which can understand the concepts involved so as to have an opinion thereon and should instead define the community as forensic scientists including those individuals who are experts in the fields which underlie the procedures and interpretation of DNA evidence within the criminal forum.

⁴ United States v. Jakobetz, 747 F. Supp. 250, 256 (D.C. Vt. 1990); People v. Axell, 1 Ca;. Rptr. 2d 411, 424 (Cal. App. 2d Dist. 1991).

The First District Court erred in reversing the trial court by ruling the FDLE methods of calculating population frequencies was not generally accepted. The evidence presented at the hearing disproves that conclusion.

Dr. Martin Tracey testified as to the existence of matches to the defendant's DNA in all three of the cases presented for analysis. He testified that the procedures and analysis used was both reliable and widely accepted in the scientific community. (T. 1796-97). The techniques were specifically designed to yield highly conservative results, (T. 1798), largely because of the conservative binning procedures used. Dr. Tracey acknowledged the posture taken by Professors Lewontin and Hartl with regard to the existence of population substructure, but noted that Lewontin had earlier concluded that ethnic differences were totally unimportant to biological sciences. (T. 1814, 1817). Dr. Tracey stated that the existence of controversy in the field resulted from differences in the questions which were being asked by the various experts. (T. 1813, 1818). He was aware of the fact that studies of ethnic subgroups were being done, and testified that while the alleles do differ, the odds of their frequency did not qualitatively differ. (T. 1818). Dr. Tracey utilized a general population approach⁵ in calculating his figures because of the impossibility of equating ethnicity or race. (T. 1813). He was aware of the recommendations

⁵ This approach has been described as highly conservative, since it utilizes a procedure in which the allele frequencies over the three main population databases is examined and the one presenting the highest frequency is then picked for each allele. United States v. Chischilly, 30 F.3d 1144, 1158, n. 29 (9th Cir. 1994).

of Lewontin and Hartl with regard to accounting for substructuring in the population and stated that if his figures were recalculated in accordance therewith, he would nevertheless get essentially the same numbers. (T. 1816).

Dr. James Pollock, the individual who performed the tests in this case, testified that the FBI databases utilized were widely used throughout the country in criminal cases and were generally accepted in the scientific community. (T. 1694-6). Dr. Pollock used conservative match criteria in his work. (T. 1729). The expanded updated Hispanic database used in his analysis of the Ware case, reflected the Hispanic population of Florida, not just Miami. (T. 1750-2). While he acknowledged that there might be minor differences in allele frequencies across ethnic and racial populations, it was generally accepted that substructuring does not affect the frequency calculations for criminal cases. (T. 1755-6). Generally, in criminal cases, the ethnic heritage of the defendant is unknown; as a result, he utilizes a general population approach in calculating the frequency. (T. 1756). There is no controversy regarding the use of a general population approach. (T. 1757). Although Dr. Pollock had not studied the population history of Puerto Rico, he had studied various Hispanic groups and had not found any alleles which stood out. (T. 1777).

Defense expert, Dr. Lieberman had no expertise in the area of forensics or population genetics. (T. 1851). She had prepared no gene frequencies for the Puerto Rican population, (T. 1862), and could not determine if the population data utilized by Dr. Pollock

was accurate. (T. 1889). Nevertheless, Dr. Lieberman testified that she "would not expect" the Puerto Rican population to be in Hardy-Weinberg equilibrium. (T. 1870). She did not know the nature or accuracy of the databases relied upon and presented no evidence which established that the FBI databases were unreliable. Her opinion was based upon census information which was at least nine years out of date. (T. 1855). Similarly, her unsupported conclusions that she expected the database would not be in Hardy-Weinberg equilibrium was not proven to be fact, and if fact, it was not proven that the reliability of the result was significantly effected.⁶ Clearly, Dr. Lieberman's lack of expertise in the requisite fields excluded her from the relevant scientific community and her testimony was worthy of only minimal credence, at best.

Dr. Wakeland, the only other defense expert, testified that he was unsure of the method by which the FBI calculated its figures, and had no idea how the population sample for the database was done, or what it represented with respect to the makeup of the population as to ethnic origin or sub-population structure. (T. 1927). Dr. Wakeland acknowledged that the FBI database was used by a large number of labs throughout the world and that DNA evidence was widely accepted. (T. 1961). Nevertheless, he believed that Lewontin and Hartl's suggestions should be adopted to account for

⁶ Dr. Lieberman's opinion that the FBI databases were not in Hardy-Weinberg equilibrium was proven to be incorrect. Devlin, B. and Risch, N., "A Note on Hardy-Weinberg Equilibrium of VNTR Data by Using the Federal Bureau of Investigations' Fixed-Bin Method," 51 Am.J.Hum.Genet. 549-553 (1992).

the existence of subpopulations. Dr. Wakeland had no experience in forensic DNA criminal applications and was aware that forensic DNA work must take into account things not considered in academic applications. (T. 1957). He was aware that a large number of experts dispute his position and believed that while subpopulations might have some variation, the inaccuracies caused thereby would be small. (T. 1969-70).

The evidence presented at the trial court hearing thus established the propriety of the trial court's ruling. Defense expert Dr. Lieberman's testimony was not worthy of credibility, and while Dr. Wakeland subscribed to the approach propounded by Lewontin and Hartl, he conceded a majority of individuals in the scientific community utilized the FBI databases which were generally accepted. None of the defense experts had done research or had other data to support their contentions with regard to the existence of substructure and its effect on the population databases used. None had examined the accuracy of the databases and neither had experience in molecular biology or population genetics in the forensic field. In direct contrast, the testimony of the State's witnesses established that the databases were widely accepted and the methods used, both in the binning process and the conservative method of calculation, would account for the existence of any variation due to the possibility of substructure in the population. The trial court did not err in this finding.

Despite this fact, the First District Court found that the State had failed to meet its burden of establishing the manner in

which FDLE calculated the statistical frequency was generally accepted by the relevant scientific community because it did not account for the existence of subgroups within the population. It bases its conclusion on certain sentiment in the scientific community, and case law generated by it, which took place after the January 1992 hearing. As will be discussed hereafter, the relevant scientific community now which rejects the position adopted by the district court and the NRC Report.

The District Court seeks to correct this alleged failure on the part of the State by promoting use of the ceiling frequency which it contends will yield a conservative probability estimate. The flaw in the conclusion reached by the First District is that it presupposes that the general scientific community agrees that various substructures or subpopulations exist within the population which differ genetically in a way which significantly affects forensic DNA testing. This is not the case, however. The great majority of population geneticists do not believe that subpopulations of races or ethnic groups have any meaningful effect on DNA testing. One of the major problems with the theory of subpopulation is the underlying assumption that subpopulations are homogenous distinct groups. Even the most casual of observers can discern that due to migration and interbreeding, most subpopulations are anything but homogenous. The irony of the position taken by the First District Court is that the theory on which it is based, that substructuring in the population significantly affects the calculation of allelic frequencies, cannot withstand a Frye analysis.

Numerous articles which represent current thought in the majority of the scientific community post-NRC Report refute the notion, adopted as an underlying assumption for the NRC Report, that substructuring has any appreciable effect on the analysis of DNA. Significantly, premises and questions on which the NRC Report was based have been rejected or answered. For example, the NRC report assumed for the sake of argument that substructuring in populations existed. It further assumed that the existence of these subgroups would impact upon the frequency calculations. One of the things that the Report called for, studies of individual subgroups to determine if they do, in fact, have an impact on DNA frequency calculations, has been undertaken.

In one such study, Dr. Bruce Budowle and several of his colleagues examined population data generated by the forensic community from both the United States and around the world to assess the frequency of a certain allele within specific populations. Many of the populations studied fell within the category of subpopulations. The conclusion of the study was that "subdivision either by ethnic group or by U.S. geographic region, within a major population group does not substantially affect forensic estimates of the likelihood of occurrence of a DNA profile." Budowle, B., Monson, K.L., Giusti, A.M., and Brown, B.L., "The Assessment of Frequency Estimates of Hae III-Generated VNTR Profiles in Various Reference Databases," Journal of Forensic Sciences, JFSCA, Vol. 39, No. 2, March 1994, pp. 319-352.

This study specifically found that the data from comparisons of regional U.S. black population databases are "very telling of the absence of the effects of population substructure on the estimate of likelihood of occurrence of a DNA profile in the general population." Id. A Haitian database analyzed also showed very few differences in allelic frequencies when compared with the FBI's black database. Id. Despite genetic differences between Chinese, Japanese, and Malaysian populations, the study revealed few differences in profile frequency estimates. Id. Significantly, Dr. Budowle established that even though the southwestern and southeastern Hispanic populations consisted of different racial admixtures, there were very few differences for frequency estimates of the target profiles, 1964 in all, among the Hispanic sample comparisons. Id. at 347. The study further concluded that fixed binning techniques, such as the one used in this case, reduces differences within ethnic groups. It also made note of the fact that another expert had calculated the confidence intervals of DNA profile estimates using FBI generated population databases and found that the intervals were narrower than the range of estimates observed in the across major-groups scatter plots. Thus, they concluded that the most appropriate approach in making frequency calculations was to estimate the likelihood of occurrence of a particular DNA profile in each major group. "Additionally, the significance of the magnitude of the very few differences that were observed wanes when it is taken into consideration that the binning procedure used yields conservative estimates." Id. at 349. The study flatly rejected the need for alternative approaches for

calculating allele frequencies such as the ceiling principle, because empirical data established that "VNTR frequency data from major population groups provide valid estimates of DNA profile frequencies without significant consequences for forensic inferences." Id. The study was thus fully supportive of and established the reliability of the techniques used in the instant case.

Dr. Ranajit Chakraborty, one of the world's foremost population geneticists, has studied the effects of subpopulation extensively. In a recent study, he concluded that "... sufficient measures of conservatism are already in place in the current methods of computation of DNA profile frequencies, and there is no need for any further ad hoc principles." Chakraborty, R. "Effects of Population Subdivision and Allele Frequency Differences on Interpretation of DNA Typing Data for Human Identification," In Proceedings from the Third International Symposium on Human Identification, 1992, Promega Corporation, Madison, Wisconsin. With coauthor, Kenneth Kidd, Dr. Chakraborty commented that with theory and examples, they had established that procedures currently utilized did not require "fixing" to be used in courts because "no meaningful change in the interpretation of a DNA match occurs by using the current data." Chakraborty, R., and Kidd, K., "The Utility of DNA Typing in Forensic Work," Science, Vol. 260, pp. 1735-1739, (December, 1991).

Most significantly, the FBI, in 1993, published "VNTR Population Data: a Worldwide Study" in which it acknowledged

concerns regarding hypothetical problems in the use of population data for determining the likelihood of occurrence of DNA profiles for forensic purposes. The study set forth the legal question as what was the likelihood that someone other than the suspect was the source of the evidentiary material, noting that while the relative rarity of a DNA pattern in a suspect's ethnic subgroup might be of some academic interest, it is not particularly relevant in a legal setting. The authors noted that:

[t]o use the specific ethnic background of the suspect (which may be impossible to define) would presuppose that he or she is the true perpetrator. However, if the true perpetrator were known a priori, there would be no need for statistical estimates. Furthermore, if a particular subgroup were chosen as the reference database, for the majority of cases this would insinuate that a member of one subgroup is a more likely source of the crime scene evidence. Since the ethnicity of those people who are potential perpetrators rarely, if ever, is known, statistical estimates must be based on some sort of general population database.

While the ethnic background of the suspect is not germane to selecting a reference database, the possible impact of different allele frequencies in subpopulations on statistical estimates has been a bit more elusive for a few courts. Id. at 1.

As a result of this fact, the FBI generated VNTR population data to determine the forensic significance of subpopulations on statistical inferences drawn from general population databases. The study reached several significant conclusions: 1) there are sufficient population data available to determine whether or not forensically significant differences might occur when using different population databases, 2) that subdivision, either by ethnic group or by U.S. geographic region, within a major

population group does not substantially affect forensic estimates of the likelihood of occurrence of a DNA profile, 3) that estimates of the likelihood of occurrence of a DNA profile using major population group databases (e.g., Caucasian, Black, and Hispanic) provide a greater range of frequencies than would estimates from subgroups of a major population category; therefore, the estimate of the likelihood of occurrence of a DNA profile derived by the current practice of employing the multiplication rule and using general population databases for allele frequencies is reliable, valid, and meaningful, without forensically significant consequences, and 4) that the data do not support the need for alternate procedures, such as the ceiling principle approach for deriving statistical estimates of DNA profile frequencies. Id. at pp. 1-14. Thus, the reliability and general acceptance of the FBI/FDLE procedures utilized here is affirmed. See also: Budowle, B., Monson, K., Guisti, A., Brown, B., "Evaluation of Hinf I-Generated VNTR Profile Frequencies Determined Using Various Ethnic Databases," 39 Journal of Forensic Sciences 988-1008 (July 1994); Monson, K. and Budowle, B., "A Comparison of the Fixed Bin Method with the Floating Bin and Direct Count Methods: Effect of VNTR Profile Frequencies Estimation and Reference Population," 38 Journal of Forensic Sciences, 1037-1050 (September 1993).

New cases which are not caught in the approximately two year time warp which seems to affect judicial opinions based upon scientific data which is outdated also support this contention. State v. Futrell, 436 S. E. 2d 884 (N.C. App. 1993).

Furthermore, the First District Court's attempt to promote the ceiling principle as a solution to the perceived problem of substructure in calculating population frequencies is improper. The ceiling principle is not in conformity with Frye as it is not generally accepted in the scientific community.

The ceiling principle is an acknowledged attempt on the part of the NRC to reach a compromise in the way population frequencies are calculated due to the existence of a difference in opinion generated by theory that the existence of subpopulations affect frequency calculations. In April of 1992, a committee created by the NRC released a report on DNA typing. This report assumed that substructure population did, in fact, exist for purposes of DNA analysis. (NRC Report at p. 80). The Report called for studies of substructure population to assess differences in the frequencies of alleles within that subgroup, but in the interim, recommended the use of the ceiling principle. (NRC Report at p. 82, 90). The Report advised that one hundred members of fifteen to twenty relatively homogenous ethnic groups, preferably those represented in the United States, should be sampled to determine the frequency of alleles. The ceiling principle should then be used to calculate frequency figures from these new databases. The largest frequency for an allele in any of the groups tested, or five percent, whichever is larger, would be used as the frequency for that allele. The figures for each locus would then be multiplied to obtain the frequency for the profile of the defendant just as is done under the current method. Because the application of the ceiling principle was contingent on collection of ethnic group data

from the 15 to 20 groups, the Committee made an interim recommendation for estimates of frequencies based on a "modified ceiling approach" applied to existing population data. Under this approach, the probability of a random match should be estimated by applying the multiplication rule to the highest of the 95% upper confidence limit figures calculated from at least three major races or 10%, whichever is larger, for each allele.

The NRC Report was based upon an assumption regarding population substructure which has been shown to be invalid by respected members of the scientific community. The Report called for studies upon the effects of population substructures on DNA testing. These studies have been accomplished with regard to many, though not all, subpopulations as described above. The results have uniformly established that population substructure does not significantly effect DNA testing and there is thus no need to employ the ceiling principle in forensic DNA calculations.

Two years after publication of the NRC Report, no serious effort is underway in the scientific community to follow up the NRC recommendation to sample fifteen to twenty homogenous ethnic groups. It is widely acknowledged that this study design is critically flawed and would be counterproductive. Devlin, B., Risch, N., Roeder, K., "Statistical Evaluation of DNA Fingerprinting: A Critique of the NRC's Report," Science, Vol. 259, p. 748, February 1993. Additionally, the NRC is now organizing a second gathering of experts to correct the errors and omissions of the first Report. It report is currently scheduled for publication in 1995.

The NRC ceiling approach urged by the First District Court in this case has not been generally accepted by the relevant scientific community. Support for this contention is found in the statistical evaluation of the NRC recommendations conducted by Dr. Bernard Devlin and others in which they stated "[w]e argue that these opinions are only a minority view and that there is indeed a consensus supporting the reliability of estimates of genotype probability. Forensic DNA testing has been adopted not only in the United States, but in Canada, Europe and elsewhere." The authors of this mathematical evaluation conclude, "we have serious concerns that the erroneous assumptions and conclusions in the NRC report are receiving undue weight in judicial decisions. It would be unfortunate if these errors were to influence decisions of the admissibility of a very powerful forensic tool." Id. at 837. See also: Alfous, P., "Geneticists Attack NRC Report As Scientifically Flawed," 259 Science pp. 755-756 (1994). Additionally, other experts assert that the ceiling principle does not produce the conservative results which it was proposed for. Cohen, J., "The Ceiling Principle is Not Always Conservative in Assigning Genotype Frequencies for Forensic DNA Testing," 51 Am.J.Hum.Genet. pp. 1165-1168 (1992); Slimowitz, J., and Cohen, J., "Violations of the Ceiling Principle: Exact Conditions and Statistical Evidence," 53 Am.J.Hum.Genet. 314-323 (1993). Dr. Bruce Weir, for example, stated that "[t]he concern of the NRC report that DNA profile frequencies be estimated conservatively" could be met by use of a calculation which is similar to that currently utilized by the FBI. Weir, B.S., "Forensic Population Genetics and the National Research Council (NRC)," 52 Am.J.Hum.Genet. 437-440 (1993).

Even if one were to assume for the sake of argument that the ruling of the District Court was correct as to the lack of general acceptance in the relevant scientific community of the FBI/FDLE databases at the time of the hearing and/or briefing in the lower court,⁷ that ruling would still require reversal at this point in time. One compelling reason to recede from a prior ruling on the same point of law is attributable to the fact that ruling was based upon a scientific or technological speculation which, when examined by state-of-the-art science, is shown to be invalid. In United States v. Pinninonna, 885 F. 2d 1529 (11th Cir. 1989)(en banc), the Court made observations pertaining to the field of polygraphy that apply equally to the admissibility of DNA evidence.

We neither expect nor hope that today's holding will be the final word within our circuit on this increasingly important issue. The advent of new and developing technologies calls for flexibility within the legal system so that the ultimate ends of justice may be served. It is unwise to hold fast to a familiar rule when the basis for that rule ceases to be persuasive. We believe that the science of polygraphy has progressed to a level of acceptance sufficient to allow the use of polygraph evidence in limited circumstances where the danger of unfair prejudice is minimized... As the field of polygraph testing continues to progress, it may become necessary to reexamine the rules regarding the admissibility of polygraph evidence. Id. at 1537.

Critical to this case is the timing of events underlying it. The trial court hearing, as previously stated, took place in January of 1992, at a time when the report of the NRC, though

⁷ As previously discussed, however, the State strongly disputes this point on the basis of the evidence presented to the trial court for its consideration, as well as, the case law and articles submitted to the District Court.

unpublished, were beginning to become known within the scientific communities. The Report itself, was published in April of 1992. At the time the District Court was called upon to decide the appeal before it, it was inundated with the backlash of opinion in the scientific community generated by the NRC Report, in the year and a half after the hearing took place. The majority of opinion initially followed publication of the report, in both the scientific community and the courts, apparently jumped on the NRC bandwagon without challenging the principles underlying the Report.

While the defendant below presented case law to the District Court, which it relied upon in its opinion, which found DNA evidence inadmissible because of a lack of general acceptance, these cases are of questionable probity for a number of reasons. Some involve the use of databases which have no relevance in this case. In State v. Bible, 858 P. 2d 1152 (Ariz. 1993), for example, the database at issue was that of Cellmark labs. Of pivotal importance to the court's decision were the fact that the state's expert conceded that the database was not in Hardy-Weinberg equilibrium. Significantly, the court made specific note of the fact that there was a large body of scientific thought which considered Cellmark's statistical calculations to be unreliable. Nothing in the evidence presented in this case establish that the flaws inherent in Cellmark's lab are also present in FDLE's techniques. To the contrary, both of the State's experts in this case testified that the databases were both widely relied upon in the scientific community and were generally accepted as such. The defendant's experts were unable to testify that the databases used

were, in fact, unreliable due to either their lack of knowledge as to its composition, or their failure to review all of the data. While Dr. Lieberman stated that she would "expect" that the Puerto Rican population was not in Hardy-Weinberg equilibrium, she could not state with certainty that this was so, since she had never done any analysis to ensure the accuracy of her claim. Similarly, she "believed" the FBI database was comprised of Texas and South Florida Hispanics, but conceded that she had no knowledge of the composition of that database. Her contention that the South Florida Hispanic population underrepresented Puerto Ricans was based upon U.S. census surveys which were ten years old. She also was apparently unaware that an expanded Florida Hispanic population which included all Hispanics in Florida was used in the third case. Other cases cited by the District Court fail for the same reason. In People v. Barney, 10 Cal. Rptr. 2d 731 (Cal. App. 1 Dist. 1992), and Commonwealth v. Curnin, 565 N. E. 2d 440 (Mass. 1991), the database used was also Cellmark. These cases thus are not comparable. Curnin is also distinguishable since, in that case, the state failed to present any expert testimony whatsoever and the defendant's expert asserted that the database relied upon was inadequate due to population substructuring. Nevertheless, the Curnin Court noted that

[i]t may even be that, by the time of the retrial of this case, the prosecution can support the admissibility of evidence of the probability of the alleles disclosed by the DNA test being found elsewhere in the relevant human population (and bolster its position that the DNA testing processes used by Cellmark are generally accepted by the relevant scientific community). Id. at 445.

The majority of the other cases relied upon by the lower court in this case fall within that group of cases in which DNA evidence was found inadmissible based upon the impact the NRC Report had in both the scientific community and judicial circles. See e.g.: United States v. Porter, 618 A. 2d 629 (D.C. App. 1992)(while the court noted that some experts, like Drs. Chakraborty and Weir challenged the NRC viewpoint, it summarily rejected their position without considering it, finding that the mere existence of a contrary view indicated lack of general acceptance); Commonwealth v. Lannigan, 596 N. E. 2d 311 (Mass. 1992)(the court made notable reference to the recently published NRC Report as the basis for its affirmance of the trial court's rejection of DNA evidence); State v. Vanderbogart, 616 A. 2d 483 (N.H. 1992)(the court based its ruling upon the NRC Report and defense expert testimony in support thereof finding that the method by which frequency calculations were done was not generally accepted); People v. Barney, supra.

Several crucial points must be acknowledged with regard to this body of law. First, and most important, is the fact that, as discussed above, the scientific viewpoint contained in these opinions is outdated. At least one court which ruled during this period of time went to great lengths to point out that its ruling was strictly limited to the confines of that case. "The literature is replete with hope that the laboratories will continue to develop their methods, publish their findings and thus gain general acceptance. We note that we only rule on the FBI's DNA analysis in the context of current scientific thought." State v. Anderson, 853 P. 2d 135, 147 (N.M. App. 1993), rev'd, ___ P. 2d ___ (N.M. August

25, 1994), WL 510380. On petition for certiorari to the New Mexico Supreme Court, however, the Court reversed the intermediate court's finding denying admission of the evidence.

Obviously, in view of the more recent opinions which have rejected the NRC Report and the opinions espoused therein, the result in this line of cases would be different had the hearings been conducted today.

Secondly, it is impossible to ignore the sense of resignation and lack of thorough independent analysis by most of the courts who ruled on DNA issues post-NRC. See e.g.: People v. Barney, supra; Commonwealth v. Lannigan, supra; People v. Wallace, 14 Cal. Rptr. 2d 721 (Cal. App. 1 Dist. 1993). Rather than engage in the time consuming and difficult task of reviewing current literature and testimony of experts, it appears that these courts have, by and large, focused their attention on the Lewontin and Hartl viewpoint⁸ which was assumed to be correct for the purpose of testing by the NCR, thereby abdicating their role in determining what is truly generally accepted by the scientific community at that time. While this may be the easiest route to travel, it is not necessarily the most judicious one. Perhaps most troubling about this, is that it presumes that if, in fact, the "raging debate" between experts exists, this, of necessity, precludes the admission of DNA evidence under Frye. As previously discussed, however, this is not the case. The Sixth Circuit Court of Appeal, in Bonds, supra., as

⁸ Lewontin, R. and Hartl, D., "Population Genetics in Forensic DNA Typing," 254 Science, pp. 1745-1750, (1991).

previously stated, has noted that controversy, even significant controversy, does not necessarily refute the existence of general acceptance. Moreover, to extrapolate from a dispute between a handful of scientists that the procedure is not generally accepted by the entire scientific community is too great a leap to make. As stated by the Court in Porter, supra. to find that the existence of a dispute precludes admissibility is fundamentally incorrect. Instead, it is incumbent upon the courts to delve into the matter to determine whether such a dispute is of such a nature and magnitude as to violate the precepts of Frye.

Even more curious are those opinions which interpret the NRC Report itself as negating the existence of general acceptance. See: Vanderbogart, supra. The NRC Report Merely assumed for the sake of discussion that the substructure theory had merit; it did not place an imprimatur on the notion of subpopulations.

The State would thus urge this Court to reverse the ruling of the First District Court of Appeal with regard to its finding that the State failed to meet its burden of proof that the methods employed by FDLE were not generally accepted by the relevant scientific community. In the event that this Court finds, as other appellate courts in this country have done,⁹ that such a determination is inappropriate based upon either the lack of a complete record, or because of the determination is appropriate only to the finder of fact, the State requests that the matter be

⁹ Commonwealth v. Crews, 640 A. 2d 395 (Pa.1994); State v. Houser, 490 N. W. 2d 168 (Neb. 1992); Ex Parte Perry, 586 So. 2d 242 (Ala. 1991); People v. Pizarro, 12 Cal. Rptr. 2d 436 (Cal. App. 1992).

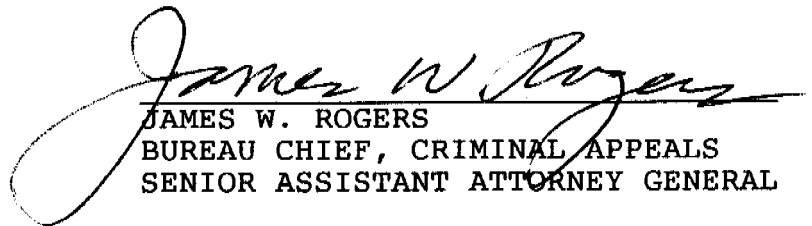
remanded to the trial court so that current scientific opinion may be presented and considered in that determination.

CONCLUSION


Based upon the foregoing argument, the Petitioner, the State of Florida, respectfully urges this Court to reverse the findings of the First District Court of Appeal.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a true copy of the foregoing MERITS BRIEF OF PETITIONER has been furnished by U.S. Mail to MR. WILLIAM J. SHEPPARD, Esquire, Sheppard and White, P.A., 215 Washington Street, Jacksonville, Florida 32202, this 27th day of October, 1994.

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