STATE V. ANDERSON, 1993-NMCA-014, 115 N.M. 433, 853 P.2d 135 (Ct. App. 1993)

CASE HISTORY ALERT: affected by 1994-NMSC-089

STATE of New Mexico, Plaintiff-Appellee,
vs.
Jay Allen ANDERSON, Defendant-Appellant

No. 12899

COURT OF APPEALS OF NEW MEXICO

1993-NMCA-014, 115 N.M. 433, 853 P.2d 135

January 28, 1993, Decided

APPEAL FROM THE DISTRICT COURT OF BERNALILLO COUNTY. ROSS SANCHEZ, District Judge

Petition for Writ of Certiorari Granted March 11, 1993

COUNSEL

Tom Udall, Atty. Gen., Margaret McLean, Asst. Atty. Gen., Santa Fe, for plaintiff-appellee.

Sammy J. Quintana, Chief Public Defender, Susan Roth, Asst. Appellate Defender, Dan Cron, Rothstein, Walther, Donatelli, Hughes, Dahlstrom & Cron, Santa Fe, William C. Thompson, University of California, Irvine, California, for defendant-appellant.

JUDGES

Chavez, Judge. Black and Flores, JJ., concur.

AUTHOR: CHAVEZ

OPINION

*{*434}* **OPINION**

{1} The opinion filed on December 14, 1992 is hereby withdrawn and this opinion is filed in its place. In this case we review the trial court's decision regarding the admissibility of some of the State's evidence that Defendant was the perpetrator of particular crimes. Specifically, that evidence was the result of forensic deoxyribonucleic acid analysis, known as DNA fingerprinting, matching, profiling, or evidence. It stated that Defendant's

DNA matched DNA from samples taken from the victim and that there was an extremely high probability that the match was not a coincidence. After the trial court admitted the evidence, Defendant pled no contest to one count each of kidnapping, second degree criminal sexual penetration, aggravated battery, and extortion, and two counts of first degree criminal sexual penetration. He reserved his right to appeal. In his docketing statement, he raised seven separate issues. He did not brief the sentencing issue, and thus has abandoned it. **See State v. Fish,** 102 N.M. 775, 701 P.2d 374 (Ct.App.1985). Because we do not find general scientific acceptance of the FBI database, we reverse the trial court's order admitting the DNA evidence and remand for further proceedings.

JURISDICTION

{2} Preliminarily, we dispose of the State's argument that we have no jurisdiction to consider Defendant's appeal because a jury never had the chance to consider the DNA evidence. The State posits that since a jury has never considered the evidence, there is no way we can tell whether any error would be harmless. The difficulty with the State's argument is that it does not recognize that the State made a bargain with Defendant. He pled nolo contendere to fewer charges than those in the indictment. If he were to lose this appeal, he would have no further right to trial. The State could have prosecuted on all charges, and did not have to agree to the plea. The State saves prosecutorial resources and avoids the possibility, no matter how slight the State thinks it is in retrospect, that a jury could acquit Defendant. This court considers a vast number of appeals in which a defendant pleads guilty or nolo contendere with reservation of a right to appeal an evidentiary ruling. We can discern no difference between such cases and this one. In agreeing to have Defendant plead nolo contendere, the State has waived its chance to argue harmless error. We have jurisdiction to consider this appeal.

THE THRESHOLD FOR ADMISSION OF SCIENTIFIC EVIDENCE

{3} There are many thoughtful opinions explaining what DNA is and how laboratories process it for forensic use. **See generally United States v. Yee,** 134 F.R.D. 161 (N.D.Ohio 1991); **People v. Axell,** 235 Cal. App.3d 836, 1 Cal.Rptr.2d 411 (1991); **Commonwealth v. Curnin,** 409 Mass. 218, 565 N.E.2d 440 (1991); **People v. Mohit,** 153 Misc.2d 22, 579 N.Y.S.2d 990 (Westchester County Ct.1992); **State v. Pierce,** 64 Ohio St.3d 490, *{*435}* 597 N.E.2d 107 (Ohio 1992). Rather than repeat these explanations, we refer the reader to these cases. The question is whether such evidence is generally accepted in the scientific community, and thus admissible in New Mexico.

{4} New Mexico is a " **Frye** " state, which is to say that we determine whether scientific evidence is admissible according to the standard announced in **Frye v. United States,** 293 F. 1013 (D.C.Cir.1923). **See State v. Lindemuth,** 56 N.M. 257, 243 P.2d 325 (1952). According to that standard, we admit scientific evidence if the principles behind it are "accorded general scientific recognition." **Id.** at 274, 243 P.2d at 336. This approach is the subject of some criticism. **See generally** 3 Jack B. Weinstein & Margaret A. Berger, **Weinstein's Evidence,** para. 702[03] (1991). However, the **Frye**

standard is still good law in New Mexico. **Fuyat v. Los Alamos Nat'l Lab.,** 112 N.M. 102, 811 P.2d 1313 (Ct.App.1991); **State ex rel. Human Servs. Dep't v. Coleman,** 104 N.M. 500, 723 P.2d 971 (Ct.App.1986); **State v. Blea,** 101 N.M. 323, 681 P.2d 1100 (1984). **But see State v. Dorsey,** 87 N.M. 323, 532 P.2d 912 (Ct.App.), **aff'd,** 88 N.M. 184, 539 P.2d 204 (1975); Leo M. Romero, **The Admissibility of Scientific Evidence Under the New Mexico and Federal Rules of Evidence,** 6 N.M.L.Rev. 187 (1976) (arguing that by adopting the federal rules of evidence New Mexico had abandoned the **Frye** test in favor of a more liberal relevancy test). Until our Supreme Court sees fit to change the standard, and finding no quarrel with it, we are bound by **Frye. See Alexander v. Delgado,** 84 N.M. 717, 507 P.2d 778 (1973).

{5} Our Supreme Court has stated that in order for a scientific principle to be accepted as reliable, it must be "well-recognized." **Blea,** 101 N.M. at 326, 681 P.2d at 1103. This is because "[a]t some point, a new scientific technique becomes reliable enough to be used in court." **Simon Neustadt Family Ctr., Inc. v. Bludworth,** 97 N.M. 500, 504, 641 P.2d 531, 535 (Ct.App.1982), **overruled on other grounds, Melnick v. State Farm Mut. Auto. Ins. Co.,** 106 N.M. 726, 749 P.2d 1105 (1988). Neither **Frye** nor its subsequent application by the courts of New Mexico provide much illumination on what this test means functionally. Romero, **supra,** at 190. "The percentage of those in the field who must accept the technique has never been clearly delineated." Paul C. Giannelli, **The Admissibility of Novel Scientific Evidence: Frye v. United States, a Half-Century Later,** 80 Colum.L.Rev. 1197, 1210-11 (1980) (footnote omitted). We turn therefore to the reason behind the **Frye** standard to determine just how much support there has to be for a scientific principle before evidence based on the principle is admissible.

{6} Scientific evidence has an air of credibility to it that lay evidence does not enjoy. Ronald N. Boyce, **Judicial Recognition of Scientific Evidence in Criminal Cases,** 8 Utah L.Rev. 313, 322 (1963-64). This is particularly true when a computer is used to isolate complicated and "unique" human characteristics. **See** Jayne L. Jakubaitis, Note, **'Genetically' Altered Admissibility: Legislative Notice of DNA Typing,** 39 Clev.St.L.Rev. 415, 418-19 (1991) ("DNA typing appears to be potent evidence as jurors have shown substantial reliance on it and defendants often plea bargain rather than face trial by DNA.") (footnotes omitted); Claudia Rayford-Williams & Andreas V. Smith, **It's All in the Genes: The Application of DNA Fingerprinting in the Courtroom,** 34 How.L.J. 139, 151 (1991). A lay jury can implicitly pass judgment on lay evidence, but must leave to faith much of what occurs in the "black box" of science because its processes are not susceptible to lay understanding. **See generally** William C. Thompson & Edward L. Schumann, **Interpretation of Statistical Evidence in Criminal Trials,** 11 Law & Hum. Behav. 167 (1987) (empirical data showing lay juror tendencies to misunderstand statistical evidence). Our Supreme Court noted this concept as a reason for the inadmissibility, under the **Frye** standard, of testimony given under the influence of sodium pentothal, a so-called truth serum. **Lindemuth,** 56 N.M. at 273-74, 243 P.2d at 335-36. Others have echoed the same concern with respect to DNA evidence. **See, e.g., Curnin,** 565 N.E.2d at 442-43 n. 7; Janet *{*436}* C. Hoeffel, Note, **The Dark Side of DNA Profiling: Unreliable Scientific Evidence Meets the**

Criminal Defendant, 42 Stan. L.Rev. 465 (1990) (included among criticisms of many other aspects of DNA evidence). If a scientific principle has gained general acceptance in the scientific community, there is some assurance that the jury will not embroil itself in the question of the validity of the principle. Further, the jury's inclination to be awed by the principle will not be as problematic if scientists generally accept it.

{7} In effect, then, the **Frye** process endorses the soundness of the scientific principle that is at the root of the evidence, and the jury is not required to pass on the scientific reliability of the process involved. **Coleman,** 104 N.M. at 503, 723 P.2d at 974. With this in mind, we consider options on what general acceptance in the scientific community ought to mean.

{8} One option is that articulated in the magistrate's report and recommendation that the district court adopted as its own in **Yee.** Studying closely the mechanics of the decisions in the federal sixth circuit court of appeals, the magistrate determined that the scientific community need not unanimously accept the scientific principle. Defendant in this case does not contend that unanimity is necessary either. However, the magistrate in **Yee** stated that there is no general acceptance "only where the evidence has been manifestly unsupported outside the proponent's own laboratory." **Yee,** 134 F.R.D. at 199 (Magistrate's Report and Recommendation). This liberal view stands the general acceptance threshold on its head. In a given case, if there is little evidence of resistance to acceptance in the scientific community, then perhaps a lone voice outside the proponent's own laboratory could be compelling. In another case, however, there may be abundant evidence that scientists do not accept a particular principle. A lone voice of acceptance outside the proponent's own laboratory, in the face of overriding disapproval, should not compel a ruling that the principle is generally accepted.

{9} The sixth circuit model appears to lower the generally accepted threshold. This lower threshold does not prevent a jury from considering scientific evidence that the scientific community, but for the principle's proponent and a few others, finds generally unacceptable. We are bound by **Lindemuth** to protect juries from evidence that the scientific community does not generally find acceptable. **See Alexander v. Delgado.**

{10} The approach in **Yee** does not serve the **Lindemuth** policies. Also, the approach does not appear to be in step with sound decisions assessing the state of scientific developments in other contexts. Therefore, we decline to follow **Yee.**

{11} The threshold that defendant urges upon us finds its origin in California. The courts in that state have expressed the threshold as being much higher than the sixth circuit's threshold. A scientific principle must have the support of the clear majority of scientists. **People v. Guerra,** 37 Cal.3d 385, 208 Cal.Rptr. 162, 690 P.2d 635 (1984) (en banc). **See also** Mary A. Williams, **Conviction by Chromosome,** 18 Student Law., Dec. 1989, at 26, 28 (1989). If there is a significant body of scientific thought opposing the principle, there is no clear majority. **Axell,** 1 Cal.Rptr.2d at 421. We agree that absent a clear majority of scientific support and in the face of a significant body of opposing scientific thought, a jury will struggle with issues of whether the scientific principle is legitimate. Or

worse, the jury will be awed by scientific evidence that has not received a consensus endorsement and attach too much weight to such evidence. **See Symposium on Science and the Rules of Evidence,** 99 F.R.D. 187 (William A. Thomas ed., 1983) (mistakes, if they are to be made, should be on the side of failure to admit reliable evidence rather than failure to exclude unreliable evidence). These are the evils that our Supreme Court sought to prevent in **Lindemuth. Guerra** and **Axell,** more in line with New Mexico law, are more persuasive to us. Indeed, the State in this case embraces the "clear majority" threshold in its answer brief. We hold that *{*437}* evidence must be accepted by a clear majority of the scientific community before we can consider it generally accepted or recognized.

STANDARD OF REVIEW

{12} The parties disagree over what the standard of review should be. The State argues for a standard which states that we cannot reverse a trial court's ruling absent an abuse of discretion by the trial court. This is a general proposition applicable to most reviews of evidentiary rulings. **See State v. Jett,** 111 N.M. 309, 805 P.2d 78 (1991). Other jurisdictions have applied an abuse of discretion standard to review trial court decisions on whether scientific evidence is properly admissible. **See, e.g., State v. Montalbo,** 73 Haw. 130, 828 P.2d 1274 (1992); **People v. Lipscomb,** 215 Ill. App.3d 413, 158 Ill.Dec. 952, 574 N.E.2d 1345, **cert. denied,** 141 Ill.2d 553, 162 Ill. Dec. 501, 580 N.E.2d 127 (1991); **Kelly v. State,** 792 S.W.2d 579 (Tex.Ct.App.1990) (applying relevancy standard, not **Frye** standard), **aff'd,** 824 S.W.2d 568 (Tex.Crim.App.1992) (en banc). Defendant, on the other hand, argues that our review is de novo. He cites to **State v. Alberico,** 116 N.M. 178, 861 P.2d 219 (App.1991), **cert. granted,** Sup.Ct. No. 20,282, N.M., P.2d (January 16, 1992), as support.

{13} We agree that **Alberico** controls. The issue in that case concerned the admissibility of testimony from a mental health provider to the effect that because an alleged victim suffered rape trauma syndrome, someone raped rather than engaged in consensual intercourse with the alleged victim. Our review of the admission of such testimony was by way of a de novo appellate determination of the scientific support for the principle at issue. **Id.; cf.** Giannelli, **supra,** at 1222 (footnote omitted) ("The scope of appellate review of a trial court's application of the **Frye** test is another issue that has received minimal analysis but has generated much confusion."). Regardless of the extent of the use of de novo review, there is much to say in its favor.

{14} The **Frye** test requires us to determine the level of acceptance of a particular procedure according to the science at the time. A ruling on that question should be the law until the scientific acceptance has significantly changed. Otherwise, every time such evidence is sought to be admitted, a trial court must undertake another **Frye** determination. This would waste judicial resources and prejudice impecunious criminal defendants. Moreover, the same evidence of acceptance by a global scientific community should apply to all cases at a particular juncture in the scientific progress on the subject. Yet under an abuse of discretion standard, we could affirm differing results on that same evidence. With de novo review, there is a centralized and final

determination of the state of the scientific acceptance of a particular principle at a given point in time. **See** Giannelli, **supra,** at 1222-23.

{15} There are two other facets of de novo review we should note. First, the trend is to review not only the testimony of experts at trial, but also the learned writings and judicial opinions on the subject. **See Coleman,** 104 N.M. at 502-03, 723 P.2d at 973-74; **see also Axell,** 1 Cal.Rptr.2d at 421-22; **Curnin,** 565 N.E.2d at 443. This makes sense because inclusion of learned writings and judicial opinions into the deliberation can allow a broader view of the acceptance of a scientific principle. Such expanded review also allows both sides of the question a more equal access to evidence rather than giving the advantage to the party that can afford to bring the best or most experts to trial. Finally, we do not review the level of acceptance of a particular result that a scientific principle creates. We do not try to sort out who is right or wrong. Instead, we review the level of acceptance of the scientific process. **See Guerra,** 690 P.2d at 656; **Axell,** 1 Cal. Rptr.2d at 421. In this regard, the party seeking admission of the evidence has the burden of proof of general scientific acceptance. **See Curnin,** 565 N.E.2d at 443. Once a particular scientific principle gains general acceptance or recognition, whether *{*438}* the particular test result is right or wrong is a question for the jury. **See Yee,** 134 F.R.D. at 196.

THE EVIDENCE OF GENERAL SCIENTIFIC ACCEPTANCE

a. Expert Testimony at Trial.

{16} The State presented three experts, one of whom was a rebuttal witness. The first was Stephen Daiger, Ph.D., a professor at the University of Texas. He is an expert in DNA laboratory procedures, analysis and typing, and population genetics. He generally testified about the method the FBI uses to extract DNA and ready it for inspection in a form appropriate for matching with other DNA samples. He explained that a person does initial screening to determine whether the samples ought to be included or excluded from further study. From what we can gather this appears to be a winnowing process by which the laboratory person excludes the most obvious nonmatches. Then a computer does further analysis to find closer matches. Dr. Daiger stated that within this preliminary process there are many controls to assure that the matches are valid.

{17} After the match, if any, is made, the FBI undertakes a statistical analysis to determine what the chances are that the match is a coincidence. That is, the laboratory calculates how likely it would be that two DNA samples of the subject's type (defendant) would match on the computer and not be from the same person. There was evidence that the result of such a statistical analysis on defendant yielded a one in 6.2 million chance. Dr. Daiger testified that the procedure he outlined erred, if at all, to the benefit of defendants and was generally accepted in the scientific community.

{18} The second witness for the State was Harold Deadman, Ph.D. His doctorate is in organic chemistry and he is a special agent for the FBI department that does DNA analysis. The trial court qualified him as an expert in DNA typing technology. He also

described the process of separating out a DNA sample, the visual matching, and then the computer matching. He explained techniques that the FBI uses to assure accurate results. On cross examination, he stated that there was a chance for error, but that error would be obvious and either invalidate the whole test or merely show that the subject sample did not match with any other sample. Finally, he stated that the process was very well-accepted in the scientific community and was very reliable, conservative, and tended to favor defendants.

{19} On rebuttal, the State called Bruce Budowle, Ph.D., an FBI director of research in DNA technology and author of learned writings on the FBI's DNA analytical process. **See, e.g.,** Bruce Budowle et al., **Fixed Bin Analysis for Statistical Evaluation of Continuous Distributions of Allelic Data from VNTR Loci for Use in Forensic Comparisons,** 48 Am.J.Hum.Genetics 841 (1991). The trial court qualified Dr. Budowle as an expert in human genetics, human population genetics, forensic application of DNA typing, and statistics. He stated that there was no evidence of any flaws in the statistics on which the FBI relied. He did not state that the FBI's statistical methods were generally accepted in the scientific community.

{20} Defendant called four witnesses who were critical of the FBI's DNA evidence techniques. One witness was Randall Libby, Ph.D., a research fellow at the University of Washington. The trial court qualified Dr. Libby as an expert in molecular biology and forensic DNA testing. He testified that the scientific community was not ready to accept the FBI's testing procedures without more extensive protocol safeguards. One shortcoming he mentioned was the absence of adequate proficiency testing.

{21} Another defense witness was Laurence D. Mueller, Ph.D., a professor at the University of California, Irvine. The trial court qualified him as an expert in evolutionary biology and population genetics. His main concern with the FBI analytical techniques is that the FBI has yet to validate a number of assumptions underlying their calculations. He stated that this concern was likely to be shared by other population geneticists. In an article that he has *{*439}* published on the subject, he saw the problems with assumptions in the calculations as having an effect on the statistical frequency of DNA print matches. **See** Laurence D. Mueller, **Population Genetics of Hypervariable Human DNA,** in **Forensic DNA Technology** (1991).

{22} Charles Taylor, Ph.D., a professor at the University of California, Los Angeles, was also a defense witness. He has expertise in population genetics and the application of statistics and probability theory to biology and genetics issues. The trial court qualified him as an expert in statistics and population genetics. Dr. Taylor's criticism of the FBI's methods was perhaps the sharpest of all the defense witnesses. He testified that the FBI's approach to statistical analysis is invalid and that the scientific community has yet to accept it. He stated that he was "quite certain" that the FBI's methods would not be acceptable to the scientific community. In detailing his concerns about the FBI statistical methods, he characterized them as "blatantly wrong" and having "very serious" problems.

{23} Finally, Defendant called Seymour Geisser, Ph.D., a professor at the University of Minnesota. He has expertise in statistical methodology related to the biomedical and life sciences. The trial court qualified Dr. Geisser as an expert in statistics, biostatistics, and probability theory. He did not think the DNA statistical probabilities in this case are valid. He testified that the FBI procedures for computing statistics in forensic cases generally are not acceptable to the scientific community. He focused his criticism on some assumptions the FBI has used for drawing statistical conclusions. **See also** Seymour Geisser, **Some Remarks on DNA Fingerprinting,** 3 Chance: New Directions for Stats. & Computing 8 (1990).

b. Rulings from Other Jurisdictions.

{24} It is clear that the weight of authority favors admission of DNA evidence. **See Axell,** 1 Cal.Rptr.2d at 423 n. 7 (citing numerous cases); **Hopkins v. State,** 579 N.E.2d 1297 (Ind.1991); **Smith v. Deppish,** 248 Kan. 217, 807 P.2d 144 (1991); **Commonwealth v. Rodgers,** 413 Pa.Super. 498, 605 A.2d 1228 (1992); Jakubaitis, **supra,** at 422-23; Lee Thaggard, Comment, **DNA Fingerprinting: Overview of the Impact of the Genetic Witness on the American System of Criminal Justice,** 61 Miss.L.J. 423, 440 (1991) (citing unreported Mississippi decisions admitting DNA evidence). At first blush, it appears attractive to side with this authority and rule similarly. However, close scrutiny of these decisions reveals their weakness as guiding, persuasive authority. First, in our canvass of the precedents, we find many decisions based on a record devoid of expert evidence from the party resisting admission of DNA evidence. **See, e.g., State v. Davis,** 814 S.W.2d 593 (Mo.1991) (en banc), **cert. denied,** U.S., 112 S. Ct. 911, 116 L. Ed. 2d 812 (1992); **Glover v. State,** 787 S.W.2d 544 (Tex.Ct.App.1990), **aff'd** 825 S.W.2d 127 (Tex.Crim.App.1992); **Spencer v. Commonwealth,** 238 Va. 275, 384 S.E.2d 775 (1989), **cert. denied,** 493 U.S. 1036, 110 S. Ct. 759, 107 L. Ed. 2d 775 (1990); **see also Curnin,** 565 N.E.2d at 442 n. 5 (citing cases). As we have suggested above, it appears that the effort to muster a case against admission of DNA evidence demands well-funded research. Thaggard, **supra,** at 429-30. We hesitate to follow cases that, at least in part, could be based on the complete absence of opposing scientific perspectives. **See People v. Pizarro,** 10 Cal.App.4th 57, 12 Cal.Rptr.2d 436 (1992) (remanding for **Frye** hearing because it was unacceptable to appellate court that only one expert, an FBI scientist, testified below).

{25} Second, almost all of the cases that have admitted DNA evidence have dealt with one of the two main commercial laboratories that do DNA analysis, Cellmark Diagnostics Corporation (Cellmark) and Lifecodes Corporation (Lifecodes). **See, e.g., Commonwealth v. Rodgers,** 605 A.2d at 1236 (admitting Lifecodes analysis); **Cobey v. State,** 80 Md.App. 31, 559 A.2d 391 (Ct.Spec.App.) (admitting Cellmark analysis, no expert evidence on defense), **cert. denied,** 317 Md. 542, 565 A.2d 670 (1989); **see also Curnin,** 565 N.E.2d at 442-43 (excluding Cellmark analysis, no expert evidence presented *{*440}* by prosecution to support Cellmark's conclusion). There are many similarities among Cellmark, Lifecodes, and FBI analytical procedures. However, there appear to be important differences as well. One significant difference is that the Cellmark and Lifecodes laboratories use different databases than the FBI. **See**

Caldwell v. State, 260 Ga. 278, 393 S.E.2d 436 (1990). The evidence in this case revealed further differences, the full importance of which the parties do not explain and which are difficult to understand. However, it is evident that the laboratories proceed differently. We will not say that a clear majority of the scientific community accepts the FBI's procedure because cases admit evidence that Cellmark and Lifecodes produced. **Cf. Pizarro,** 12 Cal.Rptr.2d at 449 (if new procedure at issue differs from similar procedure already passing **Frye** scrutiny, new procedure must undergo independent **Frye** scrutiny).

{26} Finally, within the cases that admit DNA evidence, there is a subclass of cases that admit DNA evidence under a standard different than the **Frye** standard. **See, e.g., United States v. Jakobetz,** 747 F. Supp. 250 (D.Vt.1990), **aff'd** 955 F.2d 786 (2d Cir.1992), **cert. denied** U.S., 113 S. Ct. 104, 121 L. Ed. 2d 63 (1992); **Andrews v. State,** 533 So.2d 841 (Fla.Dist.Ct.App.1988), **cert. denied,** 542 So.2d 1332 (Fla.1989); **Pierce,** 597 N.E.2d at 112. Known as the "relevancy" standard, this other standard is thought to be more permissive than the **Frye** standard. **Andrews,** 533 So.2d at 846. **See generally** Giannelli, **supra,** at 1232-45; Elizabeth M. Bezak, Note, **DNA Profiling Evidence: The Need for a Uniform and Workable Evidentiary Standard of Admissibility,** 26 Val.U.L.Rev. 595, 608-13 (1992). When it is the level of acceptance in the scientific community we are trying to gauge, cases that hold DNA evidence to be relevant regardless of the level of scientific acceptance are inapposite.

{27} This leaves us with five reported cases that applied the **Frye** standard to the FBI's DNA analysis. A federal court of appeals held that admission of the DNA evidence produced by the FBI was reversible error in **United States v. Two Bulls,** 918 F.2d 56 (8th Cir.1990), **vacated and reh'g en banc granted,** 925 F.2d 1127, **appeal dismissed,** 925 F.2d 1127 (9th Cir.1991) (after death of appellant). The case does not go so far as to say that the scientific community had not generally accepted the FBI's DNA analysis. However, the record showed that only one witness for the proponent of the evidence testified. This was not enough for a proper determination of the level of acceptance by the scientific community. Thus, the court remanded the matter to the trial court to take further evidence. **Id.** at 61. This case supports our view that a sparse record in a **Frye** hearing should not justify admission of such new and complex scientific evidence. Without a definitive decision on how the scientific community feels about this case, however, **Two Bulls** does not affect the weight of information relevant to the acceptance in the scientific community of the FBI's methods.

{28} Although it expressed some questions regarding the FBI procedure, the Supreme Court of Hawaii, using a modified **Frye** standard, affirmed the trial court's refusal to grant a motion in limine on the DNA testing performed by the FBI laboratory. **Montalbo,** 828 P.2d at 1283. The Hawaii court enumerated five factors which must be satisfied before expert scientific evidence can be admitted in that jurisdiction, then found that once these were satisfied, the jury could determine the reliability of the evidence. **Id.** at 1280. Using this procedure, the Hawaii Supreme Court held the district court had not abused its discretion in admitting this DNA evidence. **Id.** at 1283.

{29} The opinion in **United States v. Yee,** is very thorough and we accord due weight to its decision to admit the FBI's DNA evidence. Applying the same threshold here, we would affirm the trial court because there is substantial support outside the FBI's own laboratory for their methods. **Yee,** 134 F.R.D. at 165-66. We do not, however, believe the threshold for admissibility adopted by the **Yee** court is consistent with New Mexico law, as we explained above.

*{*441}* **{30}** In **Mohit,** the court found that the procedure used to match the defendant's DNA with a specimen from the victim was generally accepted within the scientific community and therefore met the **Frye** standard. **Mohit,** 579 N.Y.S.2d at 995. The court, however, rejected the statistical significance derived from the extrapolation of the FBI database. **Id.** at 998-99. Because we find the **Mohit** opinion focuses directly upon our concern in the present proceeding we quote extensively from Judge Silverman's opinion:

> The evidence shows that there is sharp disagreement within the scientific community on the manner in which probability estimates are derived. It would appear that while human geneticists, on the whole, would find the FBI estimates acceptable, a significant number of respected population geneticists would not. The impression this court is left with, based on the record before it, is that human geneticists, more involved in the practical applications of genetics in dealing with disease, are not as concerned as the population geneticists in being more precise in citing probability estimates. More than one prosecution witness, for example, saw little relevance in being off by a power of 10. If the number is still very high, say one million instead of 100 million, what difference does it make? To the population geneticist, the difference is theoretically important.
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> . . . .
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> Does it matter in a criminal case if a jury is told 1 in 67,000,000 or 1 in 100,000? In most cases, probably not. But in a case where there is no reliable evidence other than the DNA evidence, it might mean a great deal. The difference in numbers might suggest that in the metropolitan New York area there could be 50 or more people who have a matching DNA profile, instead of, in theory, only 1 in the entire country.

Id. The New York court recognized, we think correctly, that it is the statistical aspect of the FBI procedure which is changing most rapidly and is least accepted within the scientific community:

> The bottom line is that when speaking of probabilities in this context we are speaking of theories, not facts, in an area which is relatively new. There is still a great deal to be learned. As the size of databases grows over the years there is no question but that there will be significant changes in allele frequencies used to make computations. What the FBI reports as a 1 in 67,000,000 today, in a few years may be 1 in 670,000,000 or 1 in 6,700,000. It's hard to say. Further study

> on subgroups may reveal no significant differences or just the opposite. It may in time be generally accepted that no two people on earth will have the same DNA profile across 4 probes.

Id. at 999. The New York court held that the FBI comparison of the defendant's DNA and the specimens taken from the victim were admissible, but only if the most conservative statistics were presented. **Id.** This required the state's expert to testify that the probability of a match was 1 in 100,000 rather than 1 in 67,000,000. **Id.** While we think **Mohit** is right on target regarding the reliability of the FBI database, we cannot find widespread substantial scientific evidence to support acceptance of such totally disparate results in the present record.

{31} In **Commonwealth v. Lanigan,** 413 Mass. 154, 596 N.E.2d 311 (1992), the court also found the process by which the FBI estimated the frequency of defendant's DNA profile in the general population had not found general acceptance in the field of population genetics. The Supreme Judicial Court of Massachusetts reviewed both the evidence and recently published scientific data. The Massachusetts court rejected **Yee** and concluded:

> [T]he lively, and still very current, dispute described above regarding the role of population substructure constitutes something much more than a lack of unanimity. We cannot say that the processes by which Cellmark and the FBI estimated the frequency of the defendants' DNA profiles has found "general *{*442}* acceptance" in the field of population genetics.

Id. at 316.

{32} Defendant has provided us with copies of seven unreported trial court decisions regarding admission of the FBI's DNA evidence. Two of these cases did not apply the **Frye** standard. **See State v. Passino,** No. 185-1-90 Fcr (Vt.Dist.Ct. May 13, 1991); **State v. Wheeler,** No. C89-0901CR (Or.Cir.Ct.Mar. 8, 1990). We note, however, that even under the more relaxed relevancy standard, these courts refused to admit DNA evidence.

{33} The other five cases all applied the **Frye** test and refused to admit the evidence. One of the opinions contains a broad based rejection of the FBI's procedures. Recognizing the high level of prejudicial impact of the statistics that the FBI produces, that trial court stated, "Clearly there is not general agreement among the experts presented as a part of the record here." **People v. Despain,** No. 15589, slip op. at 7 (Cal. Super.Ct. Feb. 12, 1991). The remaining opinions contained focused rejections of specific aspects of the FBI's procedures. One trial court criticized the FBI's method of declaring a match between two samples. The court stated, "There is a profound, significant and honestly-held disagreement among [scientists] as to whether the protocol employed by the F.B.I. to declare a match of DNA fragments between a known and an unknown source has gained general acceptance in their scientific community." **People v. Halik,** No. VA 00843, slip op. at 39 (Cal.Super.Ct. Sept. 26, 1991). All the

remaining trial court opinions include specific criticisms of the way the FBI translates a match into a prediction of possible coincidence in the general population. One of those courts stated:

> In the final analysis the totality of the evidence yields the unmistakable conclusion that there is substantial disagreement within the scientific community as to the population genetics issues that are central to the F.B.I.'s method of calculating statistical probabilities. That disagreement is sincere and significant, and goes to the very basis of the F.B.I.'s procedures.

People v. Fleming, No. 90-CR-2716, slip op. at 35 (Ill.Cir.Ct. Mar. 12, 1991); **see also United States v. Porter,** No. F06277-89, 1991 WL 319015 (D.C.Super.Ct. Sept. 20, 1991); **State v. Hummert,** No. CR 90-05559 (Ariz.Super.Ct. Apr. 16, 1991).

{34} The State points out that the foregoing cases have no precedential value, implying that we should ignore them because they are trial court opinions from other states. In determining the admissibility of new scientific evidence, it is important to review both scientific literature as well as judicial decisions to determine whether the procedure "has been generally accepted as reliable and probative in both the scientific community and the courts." **Coleman,** 104 N.M. at 503, 723 P.2d at 974 (footnote omitted). Moreover, our review of these opinions reveals that they are thoughtful, well-reasoned efforts. The trial courts each took a hard look at the evidence of acceptance in the scientific community. They are therefore an indication of judicial acceptance of such evidence. On balance, it appears that the cases that have considered the FBI's methods under the **Frye** test and have carefully reviewed an extensive record have refused to admit the DNA evidence.

c. Learned Writings.

{35} There is a large body of scientific literature supportive of DNA evidence generally, and the FBI's methods specifically. This literature may be rendered down to the statement that "an innocent suspect has little to fear from DNA evidence, unless he or she has an evil twin." Neil J. Risch & B. Devlin, **On the Probability of Matching DNA Fingerprints,** 255 Sci. 717, 720 (1992). Corroborating this sentiment are further articles about specific aspects of DNA evidence. An incomplete list of those articles includes the following: Dwight E. Adams, **Validation of the FBI Procedure for DNA Analysis: A Summary,** 15 Crime Laboratory Dig. 106 (1988); Ranajit Chakraborty & Kenneth K. Kidd, **The Utility of DNA Typing in Forensic Work,** 254 Sci. 1735 *{*443}* (1991); Robin W. Cotton et al., **Research on DNA Typing Validated in the Literature,** 49 Am.J.Hum.Genetics 898 (1991). There are also secondary legal sources that strongly urge the courts to acquiesce to that portion of the scientific community that accepts DNA evidence. **See** Andre A. Moenssens, **DNA Evidence and Its Critics -- How Valid Are the Challenges?,** 31 Jurimetrics J. 87 (1990); Suzanne H. Stenson, Comment, **Admit It! DNA Fingerprinting Is Reliable,** 26 Hous.L.Rev. 677 (1989).

{36} As previously indicated, there is also a body of scientific literature which criticizes certain aspects of DNA profiling techniques. In addition to the Mueller and Geisser articles previously cited, **see** Eric S. Lander, **Invited Editorial: Research on DNA Typing Catching Up with Courtroom Application,** 48 Am.J.Hum.Genetics 819 (1991); William C. Thompson & Simon Ford, **DNA Typing,** 24 Trial, Sept. 1988, at 56, 56-64 (calling for additional validation of DNA profiling); **Forensic DNA Typing,** 255 Sci. 1050 (1992) (series of letters arguing pros and cons of use of DNA techniques). "Until some of these problems are cured and a consensus of scientists in the community agree that the techniques are generally accepted, a jurisdiction strictly following **Frye** may not admit DNA profiling evidence." Thaggard, **supra,** at 435. On the other hand, there is a substantial body of literature that questions the FBI's methods.

{37} What appears to be of particular concern to many scientists is the FBI's use of a limited database for comparison of the suspect's DNA sample with that of others. The FBI's own scientists stated, "At present, there are few data on the distribution of VNTR alleles for particular loci for various racial and ethnic groups. Therefore, **there is no evidence to support the assertion** that a sample population adequately represents the true population or other subpopulation groups." Bruce Budowle & Keith L. Monson, A Statistical Approach for VNTR Analysis 3 (unpublished manuscript) (emphasis added). These scientists assure the reader that the FBI employs a process called "binning" that compensates for the absence of knowledge of how the DNA of differing populations may appear. **Id.** at 4-8. Yet there is further literature that continues to focus on this difficulty in the FBI's methods.

{38} One scientist, otherwise supportive of DNA evidence, stated "Racial classification alone is probably too crude a categorization [for DNA samples]; finer distinctions are probably required, especially for hypervariable loci at which many alleles have low frequency." Eric S. Lander, **Population Genetic Considerations in the Forensic Use of DNA Fingerprinting 6** (1988 manuscript). Other scientists echo this concern. One concluded that "some astronomically small probabilities of matching by chance, which have been claimed in forensic applications of DNA fingerprinting, presently lack substantial empirical and theoretical support." Joel E. Cohen, **DNA Fingerprinting for Forensic Identification: Potential Effects on Data Interpretation of Subpopulation Heterogeneity and Band Number Variability,** 46 Am.J.Hum.Genetics 358, 367 (1989); **see also** R.C. Lewontin & Daniel L. Hartl, **Population Genetics in Forensic DNA Typing,** 254 Sci. 1745 (1991). Commenting on the efficacy of the binning process, another scientist stated generally that there was no way of assuring that it was accurate. Laurence D. Mueller, **Population Genetics of Hypervariable Human DNA,** in **Forensic DNA Technology** (1991). In fact, one study suggests that the different attempts at identifying particular features of a subpopulation's DNA profile are merely exploratory. S.J. Odelberg et al., **Characterization of Eight VNTR Loci by Agarose Gel Electrophoresis,** 5 Genomics 915, 921 (1989). This last study suggests that not only is the database too limited, there still remain difficulties in making it sound.

{39} While this case was pending on appeal, a group of scholars that are part of the National Academy of Sciences released a prepublication manuscript of a report on DNA

evidence. **See** Committee on DNA Technology in Forensic Science, National Research Council, **DNA Technology in Forensic Science** (forthcoming). The group *{*444}* of scholars included many highly regarded names in science, medicine, and law. The bulk of the report urges the continued development of DNA evidence for forensic use. However, the report does include some criticisms of current methods of DNA typing. Again, the authors focus on one of the main criticisms, the absence of reliable subpopulation databases. **Id.** at § 3.2. The report discusses the debate over the need for subpopulation databases, and concludes that they indeed are necessary. This report is indicative of the absence of general acceptance. There is not just one author trying to make a point, but rather a group of people that has reached a consensus in rejecting one aspect of the current methods of forensic use of DNA evidence.

APPLYING THE THRESHOLD TO THIS CASE

{40} We could go on extensively with our review of the literature, but bow to the fact that we cannot completely cover a science that develops as we write. **See generally** Gina Kolata, **U.S. Panel Seeking Restriction on Use of DNA in Courts,** N.Y. Times, April 14, 1992, at A1, A6 (announcing publication of National Academy of Sciences report).

{41} We do not hold that all DNA identification techniques fail to meet the required standard of general acceptance in the scientific community. Indeed, our legislature considers some DNA blood typing valid in parentage proceedings. **Compare** NMSA 1978, § 40-11-13(C) (Repl.Pamp.1989) **with** Unif. Parentage Act § 12(3), 9B U.L.A. 317 (1973). Rather, we hold that, based on the record before us, the State failed to meet its burden of proving the current FBI database and binning methodology is generally accepted among respected scientists. Other appellate courts have similarly refused to admit DNA identification where the record failed to convince them one or more of the specific procedures at issue were generally accepted within the scientific community. **See, e.g., Pizarro,** 12 Cal.Rptr.2d at 436 (FBI database not sufficient to support admission of DNA evidence); **State v. Schwartz,** 447 N.W.2d 422 (Minn.1989) (DNA identification generally accepted but no showing laboratory complied with accepted quality control guidelines); **People v. Castro,** 144 Misc.2d 956, 545 N.Y.S.2d 985 (N.Y.Sup.Ct.1989) (DNA identification generally admissible but testing laboratory failed to use generally accepted scientific techniques).

{42} It is the FBI derivation of the population frequency statistics we find lacks general scientific acceptance based on the record before us. Not only would the improbability of a coincidental match, one in 6.2 million, have the potential to appear overly impressive to a jury, the respected scientists produced by the defense raised very serious doubt as to the acceptability of the statistical foundation for any such number based on the FBI procedure. Dr. Laurence D. Mueller, an associate professor at the University of California, Irvine, was qualified as an expert in evolutionary biology and population genetics. Dr. Mueller, who completed four years of post-doctoral work in the field of population genetics at Stanford University, testified that the FBI's procedure for computing statistics relies on unproven assumptions that were not generally accepted in the scientific community. Dr. Charles Taylor, a professor of biology at UCLA, was

qualified as an expert in statistics and population genetics. Dr. Taylor, who is a specialist in population genetics and the application of statistics and probability theory to problems in biology and genetics, testified that the FBI's approach to computing statistics was neither valid nor accepted by the scientific community. Dr. Seymour Geisser, the director of the School of Statistics at the University of Minnesota, was qualified as an expert in the fields of statistics, biostatistics and probability theory. Dr. Geisser also testified that the FBI approach to computing the frequency of DNA prints is seriously flawed on several grounds and was not generally accepted in the scientific community.

{43} We find such testimony as to the lack of statistical reliability, by such well-recognized scientists, troubling because, as the magistrate observed in **Yee,** "Without the *{*445}* probability assessment, the jury does not know what to make of the fact that the patterns match: the jury does not know whether the patterns are as common as pictures with two eyes, or as unique as the Mona Lisa." **Yee,** 134 F.R.D. at 181.

{44} The State persists, however, by arguing that the accuracy of the DNA probability calculations goes to the weight of the evidence for the jury's consideration. **See State v. Chavez,** 100 N.M. 730, 676 P.2d 257 (Ct.App.1983). We disagree. As the **Pizarro** court recently pointed out, the database chosen by the FBI process (e.g., Black, Hispanic, etc.) depends upon the ethnicity of the defendant and not necessarily the ethnicity of the perpetrator of the crime. It is misleading, therefore, to inform the jury that the odds are 6.2 million to one that someone other than defendant perpetrated the crime, when those odds depend entirely on the fact that defendant is a non-Hispanic Caucasian. If, in fact, the crime was committed by someone of a different racial or ethnic database, then the appropriate subgroup, and thus the odds, would change, perhaps dramatically.

{45} The literature is replete with hope that the laboratories will continue to develop their methods, publish their findings, and thus gain general scientific acceptance. We note that we only rule on the FBI's DNA analysis in the context of current scientific thought. Mindful of the actionforcing nature of decisions that reject DNA evidence, we quote the following: "Research teams in Britain and the United States are continuing their studies and remain confident that their accumulated data will show the probability of chance matches to be very low. Until such data is available, however, sweeping generalizations about the technique's accuracy seem premature." (footnote omitted) Dan L. Burk, **DNA Fingerprinting: Possibilities and Pitfalls of a New Technique,** 28 Jurimetrics J. 455, 466 (1988); **see also** John Brookfield, **Law and Probabilities,** 355 Nature 207 (1992) (offering a way to gather accurate data for representation of subgroups, but stating that this will delay the acceptance of DNA evidence).

{46} Based on the testimony in this record regarding the lack of current scientific acceptance of the FBI database, we reverse the trial court's order admitting the FBI's DNA evidence and remand for such further proceedings, consistent with this opinion, as the trial court finds appropriate. Because of this disposition, we do not consider Defendant's arguments regarding his motions for reconsideration and rehearing. Additionally, we deny Defendant's request for oral argument.

{47} IT IS SO ORDERED.