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A New Era for Science and the Law: The Face of Scientific Evidence in the Federal Courts after Daubert v. Merrell Dow Pharmaceuticals, Inc.

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NOTES AND COMMENTS

A NEW ERA FOR SCIENCE AND THE LAW: THE FACE OF SCIENTIFIC EVIDENCE IN THE FEDERAL COURTS AFTER DAUBERT v. MERRELL DOW PHARMACEUTICALS, INC.

I. INTRODUCTION

The Supreme Court's recent decision in Daubert v. Merrell Dow Pharmaceuticals. Inc. has clarified the standard of admissibility in federal court for scientific evidence.¹ It has also opened the door for a new relationship between science and the law in the form of expert testimony. When faced with novel scientific evidence, courts have principally relied upon two standards of admissibility, the Frve test and a relevancy approach.² The Frye test, based on the decision in Frye v. United States, required that a scientific technique be sufficiently established in a particular field to have gained general acceptance.³ Although the Frye standard was followed by a majority of federal and state courts which considered the issue of novel scientific evidence, Frye was greatly criticized by commentators.⁴ After the adoption of the Federal Rules of Evidence, an increasing number of courts rejected Frye in favor of the more liberal relevancy and helpfulness standard based on Rule 702. However, because the issue was not explicitly addressed in the Federal Rules or the Advisory Committee Notes, courts have been split over whether Rule 702 incorporated Frve, leaving it intact, or whether Frve was superseded by the adoption of the rule.⁵ For many types of well-established scientific evidence the differing standards created no problem. However, for

^{1.} Daubert v. Merrell Dow Pharm., Inc., 113 S. Ct. 2786 (1993).

^{2. 1} PAUL C. GIANELLI & EDWARD J. IMWINKELRIED, SCIENTIFIC EVIDENCE § 1-5 (2d ed. 1986).

^{3.} Frye v. United States, 293 F. 1013 (1923).

^{4.} Daubert, 113 S. Ct. at 2792-93.

^{5.} Id. at 2792-94.

unconventional scientific evidence, Frye created a cultural lag between admissibility under a relevancy approach and general acceptance by the scientific community.⁶

In *Daubert*, the court rejected the conservative *Frye* test, ruling that the Federal Rules superseded the common law in this area.⁷ Looking to the plain language of Rule 702 which deals squarely with the contested issue, the court found no clear indication that the rule intended to incorporate a general acceptance standard like that required for *Frye* as the absolute prerequisite for admissibility of scientific evidence.⁸ Furthermore, the rigid general acceptance approach was found to be incompatible with the liberal thrust of the Federal Rules.⁹ However, the court did not merely replace *Frye* with the unlimited admission of all relevant scientific evidence. Inherent in the Rules are limitations which require the trial court to make a preliminary finding as to the reliability and helpfulness of the proffered scientific evidence.¹⁰ The opinion goes further to define the nature and scope of these limitations.¹¹

The guidelines set out in *Daubert* may alter the use of scientific evidence even in those circuits which do not currently apply the *Frye* test. Furthermore, unlike *Frye*, the limitations in *Daubert* apply not only to "novel" scientific evidence but may also place requirements on more well-established forms of evidence.¹² This note, in Parts II and III, will outline the *Daubert* decision, and examine the state of law existing prior to *Daubert* as well as some major criticisms of the *Frye* test. Part IV will analyze the court's reasoning and consider the limitations the court places on the admissibility of scientific evidence. Finally, Part V will explore the implications which *Daubert* holds for the future of scientific evidence in federal courts.

^{6. 1} GIANELLI & IMWINKELRIED, supra note 2, § 1-5(F).

^{7.} Daubert, 113 S. Ct. at 2793-94.

^{8.} Id. at 2794.

^{9.} Id.

^{10.} See id. at 2795-97.

^{11.} Id. at 2795-98.

^{12.} Id. at 2796 n.11. The court stated that "[a]lthough the *Frye* decision itself focused exclusively on 'novel' scientific techniques, we do not read the requirements of Rule 702 to apply specially or exclusively to unconventional evidence." *Id.*

II. STATEMENT OF THE CASE

A. The Facts and History in the Lower Courts

Jason Daubert and Eric Schuller are children born with serious limb reduction birth defects.¹³ They alleged that these birth defects were the result of their mothers' ingestion of the prescription drug Bendectin during pregnancy.¹⁴ Bendectin, marketed by Merrell Dow Pharmaceuticals, was prescribed solely as a treatment for nausea and vomiting during pregnancy.¹⁵ After extensive discovery, Merrell Dow moved for summary judgment on the ground that the plaintiffs could not present any admissible evidence that Bendectin causes birth defects in humans.¹⁶ In support of its motion for summary judgment, Merrell Dow submitted an affidavit from a well credentialed expert on birth defect epidemiology stating that he had reviewed all published literature on Bendectin and birth defects, and no published study found the drug capable of being a human teratogen (substance which can cause birth defects).¹⁷ On the basis of that review the expert concluded that Bendectin was not a risk factor for human birth defects.18

Plaintiffs responded to the motion with testimony of eight other experts who concluded that Bendectin can cause birth defects.¹⁹ These conclusions were based on *in vitro* (test tube) and *in vivo* (live) animal studies, analysis of the chemical structure of Bendectin, and "reanalysis" of previously published epidemiological studies.²⁰ The District Court granted summary judgment for Merrell Dow stating

16. Daubert, 113 S. Ct. at 2791.

17. Id. Dr. Steven H. Lamm, Merrell Dow's expert, is a physician and epidemiologist with graduate degrees in medicine from the University of Southern California. He has published numerous articles on epidemiology and has been a consultant to the National Center for Health Statistics. Id. at 2791 n.1.

18. Id. at 2791.

19. Id. Plaintiffs' experts consisted of Dr. Adrian Gross, Dr. Stuart Newman, Dr. Alan K. Done, Dr. Shanna Swan, Dr. Jay Glasser, Dr. Wayne Snodgrass, Dr. Johannes Thiersch and Dr. John Palmer. All were well credentialed. For example, Dr. Stuart Newman has graduate degrees in chemistry from Columbia University and the University of Chicago. He is a professor at New York Medical College and has studied the effects of chemicals on limb development for over a decade. Their testimony was submitted in the form of affidavits, deposition transcripts, and transcripts from previous trials. Most had testified in other Bendectin cases. All would testify that it was their opinion that Bendectin was capable of causing human birth defects. Daubert, 727 F. Supp. at 573-74.

20. Daubert, 113 S. Ct. at 2791.

^{13.} Id. at 2791; Daubert v. Merrell Dow Pharm., Inc., 951 F.2d 1128, 1129 (9th Cir. 1991), aff'd, 113 S. Ct. 2786 (1993).

^{14.} Daubert, 113 S. Ct. at 2791.

^{15.} Id.; Daubert v. Merrell Dow Pharm., Inc., 727 F. Supp. 570, 571 (S.D. Cal. 1989).

that epidemiological studies are the most reliable evidence of causation and that expert opinion not based on this type of study is inadmissible.²¹ The court also found that the study based on recalculation was unpublished, not subjected to peer review, and did not sufficiently indicate an association between Bendectin and birth defects to create a genuine issue for a jury.²²

The Ninth Circuit Court of Appeals, reviewing the issue de novo, affirmed the judgment.²³ The appellate court relied on the *Frye* standard, requiring scientific evidence to be generally accepted as reliable by the scientific community.²⁴ Additionally, the court was persuaded by Bendectin cases from other circuits which had also refused similar scientific evidence.²⁵ Based on this information, the court summarily dismissed the *in vitro* and *in vivo* studies, and the chemical analysis because they required verification by further epidemiological studies.²⁶ The reanalysis of previously published epidemiological data, while a generally accepted scientific technique, was also rejected because the study relied on was neither published nor peer reviewed and was prepared solely for use in litigation.²⁷

B. The Issue

The Supreme Court granted certiorari in order to clarify the proper standard in federal courts for the admission of scientific evidence.²⁸ The majority of federal courts, including the Ninth Circuit, relied upon the general acceptance standard formulated in *Frye v*. *United States.*²⁹ This standard requires that novel scientific evidence be sufficiently established to have gained general acceptance in a particular field.³⁰ Other circuits, however, had ruled that *Frye* was superseded by the Federal Rules of Evidence, in particular Rule 702, which merely requires that scientific evidence assist the trier of fact, a help-fulness standard.³¹ Because *Frye* is more conservative in its approach

^{21.} Daubert, 727 F. Supp. at 575-76.

^{22.} Id.

^{23.} Daubert v. Merrell Dow Pharmaceuticals, Inc., 951 F.2d 1128, 1130-31 (9th Cir. 1991).

^{24.} Id. at 1130.

^{25.} Id. at 1129-31.

^{26.} Id.

^{27.} Id. at 1130-31.

^{28.} Daubert, 113 S. Ct. at 2792.

^{29.} Id. at 2792-93.

^{30.} Id.

^{31. 1} GIANELLI & IMWINKELRIED, supra note 2, § 1-6.

in admitting scientific evidence, this division in the courts could affect the substantive rights of litigants in conflicting circuits.³²

III. THE LAW PRIOR TO DAUBERT

A. The Frye Test — General Acceptance in the Scientific Community

Since its formulation, the *Frye* test for admissibility of novel scientific evidence has been the dominant standard in courts which have considered the issue.³³ Originated in *Frye v. United States*, a short, citation-free opinion concerning the admissibility of the evidence obtained from a systolic blood pressure test, *Frye* requires the proponent of evidence from a novel scientific technique to establish that the technique has gained general acceptance in the scientific community.³⁴ In now famous words the court wrote:

Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define. Somewhere in this twilight zone the evidential force of the principle must be recognized, and while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field which it belongs.³⁵

The *Frye* test has been applied to many forensic techniques, including polygraph tests, DNA profiling, various intoxication tests, bite mark comparisons, and blood analysis.³⁶ In addition, other types of expert testimony which rely on a scientific background, such as testimony on rape trauma syndrome,³⁷ child sexual abuse,³⁸ and dating of

36. 1 GIANELLI & IMWINKELRIED, supra note 2, § 1-5.

37. Id. § 1-5, at 11 & n.68.

38. See generally Linda E. Carter, Admissibility of Expert Testimony in Child Sexual Abuse Cases in California: Retire Kelly-Frye and Return to a Traditional Analysis, 22 Loy. L.A. L. Rev. 1103 (1989).

^{32.} Daubert, 113 S. Ct. at 2794 n.6. Because the court held that the Frye test was superseded by the Federal Rules, it did not need to address the issue of whether, in a diversity case, application of Frye affected the parties' substantive rights in violation of Erie R. Co. v. Tompkins, 304 U.S. 64 (1938). Id.

^{33.} Id. at 2792.

^{34.} Frye v. United States, 293 F. 1013, 1014 (D.C. Cir. 1923).

^{35.} Id. This oftquoted passage is sometimes referred to as infamous. "Shepard's Federal Citations lists over one thousand citations to Frye in state and federal courts." Edward R. Becker & Aviva Orenstein, The Federal Rules of Evidence After Sixteen Years - The Effect of "Plain Meaning" Jurisprudence, the Need for an Advisory Committee on the Rules of Evidence, and Suggestions for Selective Revision of the Rules, 60 GEO. WASH. L. REV. 857, 877 (1992).

photographs based on astronomical data³⁹ have also been held to a general acceptance standard.

There are a variety of justifications for a general acceptance test for novel scientific evidence. Principal among them is that application of the test tends to insure reliability of scientific evidence.⁴⁰ The test guarantees protection against the possible prejudicial effects of the admission of specious or unreliable scientific evidence.⁴¹ Frye permits scientists within a field, who have the greatest knowledge of a technique, to study it and approve its scientific status.⁴² A general acceptance test also reportedly guarantees that there will be a group of experts in a particular technique to critically examine its reliability and application in a certain case.⁴³ Proponents of *Frye* also argue that it promotes uniformity of decision.⁴⁴ Fears that scientific testimony will assume a position of mythic infallibility or special reliability and trustworthiness with a jury or that trials will turn into battles of the experts have been cited in decisions to apply Frye.⁴⁵ But perhaps the basic underlying reason Frye has persisted is its flexibility and ease in application.46

Most courts find that the application of the general acceptance or *Frye* test requires a two-step analysis.⁴⁷ The first step involves identification of the appropriate field.⁴⁸ The second step is determining whether the scientific principle has been generally accepted within that field.⁴⁹ Some courts also require a third step evaluating whether the testing laboratory followed the generally accepted procedures.⁵⁰ This last has been called Frye Plus.⁵¹

- 40. 1 GIANELLI & IMWINKELRIED, supra note 2, § 1-5(A).
- 41. See, e.g., United States v. Downing, 753 F.2d 1224, 1235 (3d Cir. 1985).
- 42. United States v. Addison, 498 F.2d 741, 743-44 (D.C. Cir. 1974).

- 45. Reed v. State, 391 A.2d 364, 371-72 (Md. 1978).
- 46. See generally 1 GIANELLI & IMWINKELRIED, supra note 2, § 1-5(B)(1)-(3).
- 47. Id. § 1-5(B).
- 48. Id. § 1-5(B)(1).
- 49. Id. § 1-5(B)(2)-(3).

^{39.} United States v. Tranowski, 659 F.2d 750, 757 (7th Cir. 1981) (holding testimony of astronomer in perjury trial that photo could not have been taken on a certain date must be generally accepted by scientific community).

^{43.} Id. at 744.

^{44. 1} GIANELLI & IMWINKELRIED, supra note 2, § 1-5(A).

^{50.} United States v. Two Bulls, 918 F.2d 56, 59 (8th Cir. 1990), vacated, 925 F.2d 1127 (8th Cir. 1991) (vacating after death of defendant); People v. Castro, 545 N.Y.S.2d 985 (N.Y. Sup. Ct. 1989).

^{51. 1} GIANELLI & IMWINKELRIED, supra note 2, § 1-5(G).

As many forensic techniques do not fall within a single field of scientific knowledge, selecting the proper field may influence the outcome of the general acceptance test.⁵² One court concluded that the appropriate field from which general acceptance should be determined is those who would be reasonably expected to be familiar with the test's use.⁵³ However, judicial selection of a particular field or sub-field has been criticized as a way of manipulating the outcome of the *Frye* test, or at the very least, undermining its essential rationale.⁵⁴

Once the court determines the appropriate field, it must assess whether the technique is generally accepted.⁵⁵ What percentage of acceptance constitutes "generally accepted" has never been clearly delineated.⁵⁶ It is clear that the acceptance of one or even several experts is insufficient to establish general acceptance.⁵⁷ The California Supreme Court has given the clearest indication of the degree of acceptance required.⁵⁸ That court required that a technique be supported by a clear majority of the scientific community.⁵⁹ Standards such as "widespread, prevalent and extensive"⁶⁰ or a "substantial segment of the scientific community"⁶¹ have been used. Other questions such as whether a proponent of evidence must establish the general acceptance of both the scientific technique and the underlying theory, or how many and what type of experts are required to show general acceptance also remain unanswered.⁶²

The merits and criticisms of the *Frye* test have been debated in the courts and by commentators.⁶³ Basic debates have centered around two concerns; vagueness in the application of the test, and *Frye*'s essentially conservative character.⁶⁴ Because *Frye* applies only to *novel* scientific evidence, courts may apply it selectively.⁶⁵ Furthermore, as noted previously, uncertainties about determining the appropriate scientific field and the level of acceptance required create

58. Id. § 1-5(B)(3).

- 60. United States v. Zeiger, 350 F. Supp. 685, 688 (D.D.C. 1972).
- 61. Reed v. State, 391 A.2d 364, 377 (Md. 1978).
- 62. 1 GIANELLI & IMWINKELRIED, supra note 2, § 1-5(B)(3).
- 63. Daubert v. Merrell Dow Pharm., Inc., 113 S. Ct. 2786, 2793 (1993).
- 64. United States v. Downing, 753 F.2d 1224, 1236 (3rd Cir. 1985).
- 65. Becker & Orenstein, supra note 35, at 878.

^{52.} Id. at 14. See also United States v. Williams, 583 F.2d 1194, 1198 (2d Cir. 1978).

^{53.} People v. Williams, 331 P.2d 251 (Cal. App. Dep't Super. Ct. 1958).

^{54.} Becker & Orenstein, supra note 35, at 878.

^{55. 1} GIANELLI & IMWINKELRIED, supra note 2, § 1-5(B)(2)-(3).

^{56.} Id. § 1-5(B)(2).

^{57.} Id. § 1-5.

^{59.} People v. Guerra, 690 P.2d 635, 656 (Cal. 1984).

difficulties in implementing the test uniformly.⁶⁶ Because *Frye* requires a court to wait until a valid scientific technique becomes generally accepted, it creates a cultural lag which may exclude otherwise reliable and probative evidence from consideration by the jury.⁶⁷ This process impedes the essential truth-seeking function of litigation.⁶⁸ Finally, the general acceptance test relies heavily on precedent without subsequent review of the validity of a scientific technique once it is no longer deemed novel.⁶⁹ A test for scientific evidence which unquestionably accepts an outdated technique while closely scrutinizing new or current technology is at odds with the basic nature of science which always searches for new, temporary theories to explain phenomena.⁷⁰

B. Relevancy, Helpfulness, and the Federal Rules of Evidence

With the adoption of the Federal Rules of Evidence it was unclear whether *Frye* was superseded by the standards set forth in the rules, or incorporated into them.⁷¹ The issue was not addressed in the rules themselves, the Advisory Committee Notes, or in the legislative history.⁷² Therefore, a number of courts continued to apply the *Frye* test, while others rejected it in favor of a standard based on Rules 401, 402, 403, and 702.⁷³ These rules provide the framework for an admissibility standard based on the relevance and helpfulness of the evidence.

70. Daubert v. Merrell Dow Pharm., Inc., 113 S. Ct. 2786, 2795 (1993).

71. For a catalogue of federal courts recognizing *Frye*, see 1 GIANELLI & IMWINKELRIED, supra note 2, \S 1-5, at 9 n.54. For a catalogue of state court cases, see *id*. \S 1-5, at 9-10 n.55.

72. Daubert, 113 S. Ct. at 2794. See also Becker & Orenstein, supra note 35, at 877.

73. 1 GIANELLI & IMWINKELRIED, supra note 2, § 1-5(F), at 23. Compare United States v. Downing, 753 F.2d 1224 (3d Cir. 1985) with United States v. Tranowski, 659 F.2d 750 (7th Cir. 1981).

^{66.} Id. See also Downing, 753 F.2d at 1236; United States v. Williams, 583 F.2d 1194, 1198 (2d Cir. 1978) (noting impact on admissibility of applying Frye test).

^{67. 1} GIANELLI & IMWINKELRIED, supra note 2, § 1-5(E).

^{68.} Downing, 753 F.2d at 1236.

^{69.} See Daubert, 951 F.2d at 1130-31 (relying on other Bendectin cases in determining admissibility of evidence). Compare Richardson v. Richardson-Merrell, Inc., 857 F.2d 823 (D.C. Cir. 1988)(finding chemical analysis, in vitro, and in vivo evidence insufficient to show causation); Brock v. Merrell Dow Pharm., 874 F.2d 307 (5th Cir. 1989), cert. denied, 494 U.S. 1046 (1990)(holding reanalysis of prior epidemiological study insufficient to support jury verdict); Lynch v. Merrell-National Lab., 830 F.2d 1190 (1st Cir. 1987)(relying on agent orange litigation to find reanalysis evidence insufficient) with Oxendine v. Merrell Dow Pharm., Inc., 506 A.2d 1100 (D.C. App. 1986), cert. denied, 493 U.S. 1074 (1990)(holding that chemical analysis, in vivo, in vitro, and reanalysis evidence was sufficient to support jury verdict).

Generally, all evidence, to be admissible, must be relevant.⁷⁴ The Rule states that "[e]vidence which is not relevant is inadmissible."⁷⁵ Rule 401 defines relevancy as having "any tendency" to make the existence of a material fact more or less probable.⁷⁶ Expert testimony is further limited by Rule 702 which requires that scientific knowledge must assist the trier of fact understand the evidence or determine a fact in issue, a helpfulness standard.⁷⁷ Finally, all admissible evidence is subject to exclusion under Rule 403 if its probative value is substantially outweighed by the danger of unfair prejudice, confusion, misleading the jury, or wasting time.⁷⁸

Under these rules, the key to the relevance of scientific evidence is its reliability.⁷⁹ Unreliable evidence has no probative value and is therefore irrelevant and inadmissible.⁸⁰ Most trial judges do not possess the scientific background necessary to determine the reliability of a scientific technique, and therefore must depend on the testimony of experts to determine a technique's probative value.⁸¹ Unlike *Frye*, under the relevancy approach the testimony of one expert may be sufficient to establish reliability.⁸² The level of acceptance of a technique in the scientific community is a factor to which the court may look to determine the relevance, but it is not necessarily determinative.⁸³ Other factors can include the qualifications and stature of the expert, novelty of the theory or process, its rate of error, and the existence of specialized literature.⁸⁴ Courts which apply this approach generally envision a flexible set of criteria in determining reliability rather than the strict approach in *Frye*.⁸⁵

^{74.} Rule 402 states: "All relevant evidence is admissible, except as otherwise provided by the Constitution of the United States, by Act of Congress, by these rules, or by other rules prescribed by the Supreme Court pursuant to statutory authority." FED. R. EVID. 402.

^{75.} Id.

^{76.} Fed. R. Evid. 401.

^{77.} The Rule provides: "If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in form of an opinion or otherwise." FED. R. EVID. 702.

^{78.} Rule 403 allows: "Although relevant, evidence may be excluded if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury, or by considerations of undue delay, waste of time, or needless presentation of cumulative evidence." FED. R. EVID. 403.

^{79. 1} GIANELLI & IMWINKELRIED, supra note 2, § 1-6(A).

SO. See id.

^{81.} Id.

^{82.} Id.

^{83.} United States v. Downing, 753 F.2d 1224, 1238 (3d Cir. 1985).

^{84.} Id. at 1238-39.

^{85.} Id. at 1238.

TULSA LAW JOURNAL

Once a court has determined that scientific evidence is sufficiently reliable, it must then weigh the probative value against any danger that the evidence will confuse or mislead the jury, be a waste of time, or present an unfair prejudice.⁸⁶ It may seem counterintuitive to suggest that otherwise reliable evidence should be excluded on the premise that it could confuse a jury, but some scientific evidence may have assumed, in the mind of the lay jury, a position of infallibility.⁸⁷ Other instances where a jury is not presented with the data upon which the experts base their opinions also have the potential to confuse or mislead.⁸⁸ In these cases, the jury must either accept the expert's conclusions or totally disregard them, while being unable to assess the weight of the evidence. If these dangers substantially outweigh the probative value of the evidence it should be excluded.⁸⁹ Another problem which must be addressed under Rule 403 is duplicative evidence which would substantially waste the court's time. Overstated opinions from experts or statistical conclusions given in astronomical numbers which could lead to unfair prejudice can also be excluded.⁹⁰ In both of these instances, the court may exclude a portion of the evidence while admitting the rest, or fashion an instruction which alerts the jury to potential dangers of misuse.⁹¹

The Third Circuit, in *United States v. Downing*, added an additional requirement prior to admission of scientific evidence, essentially one of "fit."⁹² The proffered scientific evidence must be sufficiently tied to the facts of the case to aid the jury in resolving the dispute.⁹³ If the expert testimony does not relate sufficiently to the facts of the case it is not relevant or helpful.⁹⁴ This is actually just an extension of the relevance requirement already applicable in Rule 402.

^{86. 1} GIANELLI & IMWINKELRIED, supra note 2, § 1-6(B); Downing, 753 F.2d at 1239.

^{87.} Downing, 753 F.2d at 1239. See also United States v. Addison, 498 F.2d 741, 744 (D.C. Cir. 1974).

^{88.} United States v. Downing, 753 F.2d 1224, 1239 (3rd Cir. 1985).

^{89.} Id.

^{90.} See United States v. Two Bulls, 918 F.2d 56, 61 (8th Cir. 1990), reh'g vacated and appeal dismissed, 925 F.2d 1127 (1991) (8th Cir. 1991) (vacating after death of defendant).

^{91.} Expert testimony on a DNA profile may be admissible provided it meets the standard, but statistics which indicate the probability of a match may nevertheless be excluded altogether or modified to a much lower figure or phrase such as "very highly probable" where prejudicial effect substantially outweighs probative force. See Two Bulls, 918 F.2d at 61-2.

^{92.} United States v. Downing, 753 F.2d 1224, 1242-43 (3rd Cir. 1985).

^{93.} Id. at 1242.

^{94.} See id. at 1243.

Evidence can be reliable and helpful under this standard without having gained the general acceptance of the scientific community.⁹⁵ In some cases, a technique's lack of general acceptance will prove determinative of its unreliability, but even techniques which are not generally accepted may be, nevertheless, valid.⁹⁶ Conversely, a technique which is generally accepted may be unreliable.⁹⁷ Therefore, the standard set forth in the Federal Rules is inconsistent with *Frye*.⁹⁸ It is in light of these sharp divisions between the courts that the Supreme Court reviewed *Daubert*.⁹⁹

IV. THE DAUBERT DECISION

In Daubert v. Merrell Dow Pharmaceuticals, Inc., the Court rejected arguments that the Federal Rules of Evidence incorporated the *Frye* test, leaving common law intact.¹⁰⁰ Instead, it found that *Frye's* austere standard was inconsistent with the policy of liberal admissibility of expert testimony in the Federal Rules.¹⁰¹ Additionally, because the rules themselves provided no specific limits on the admissibility of scientific evidence, the Court attempted to define the nature and scope of that admissibility.¹⁰²

A. Frye was Displaced by the Federal Rules of Evidence

As noted above, neither the Federal Rules of Evidence, the Advisory Committee Notes, nor their legislative history addressed the issue of whether the *Frye* test was superseded by the adoption of the Rules.¹⁰³ Interpreting the legislatively enacted Rules as it would any other statute, the Court first looked to the language of the rules themselves.¹⁰⁴ The liberal admissibility policy set forth in Rule 402 supplies the foundation for all other rules.¹⁰⁵ Under this rule, all relevant evidence is admissible unless otherwise provided.¹⁰⁶

^{95. 1} GIANELLI & IMWINKELRIED, supra note 2, § 1-5(F).

^{96.} United States v. Downing, 753 F.2d 1224, 1238 (3d Cir. 1985).

^{97.} Id. at 1236-37 n.14.

^{98.} Daubert v. Merrell Dow Pharm., Inc., 113 S. Ct. 2786, 2794 (1993).

^{99.} Id. at 2792.

^{100.} Id. at 2793-94.

^{101.} Id. at 2794.

^{102.} Daubert v. Merrell Dow Pharm., Inc., 113 S. Ct. 2786, 2794-96 (1993).

^{103.} Id. at 2794.

^{104.} Id. at 2793-94.

^{105.} Id.

^{106.} Fed. R. Evid. 402.

The *Frye* decision predated the Federal Rules by half a century.¹⁰⁷ Therefore, the Court considered the issue of whether the background of common law continues the exist under the Rules. Relying on its earlier decision in *United States v. Abel*, the Court stated that "the Rules occupy the field."¹⁰⁸ In theory, no common law exists under the Federal Rules.¹⁰⁹ However, in reality common law precepts continue to exist under the Rules but in a different form.¹¹⁰ Where the common law is consistent with the policies of the Rules, it continues to exist as guidance in their exercise.¹¹¹

In *Abel*, the Supreme Court found that the common law availability to cross examine witnesses for bias was entirely consistent with the liberal admissibility policy of the Rules.¹¹² Additionally, before the Rules were promulgated unanimity existed on the issue in the courts.¹¹³ Therefore, the Supreme Court reasoned that it was unlikely that the drafters of the Rules intended to entirely scuttle existing common law in this area.¹¹⁴ Consequently, in this case the common law survived their adoption.¹¹⁵ Conversely, in *Bourjaily*, the Court found that the existing common law "bootstrapping rule," requiring independent evidence of a conspiracy prior to admission of the hearsay statements of a co-conspirator, was inconsistent with the clear intention of the Rule, and therefore, the common law requirement was superseded and the Rule alone prevailed.¹¹⁶

In the case of scientific evidence Rule 702 deals specifically with the issue of expert testimony.¹¹⁷ The Rule merely provides that if scientific knowledge will assist the trier of fact in understanding the evidence or determining a fact in issue, an expert may testify thereto.¹¹⁸ Nowhere is there a requirement that the evidence be generally accepted by the scientific community before it is admissible.¹¹⁹ Furthermore, the Court found that the "rigid general acceptance requirement of *Frye*" is at odds with the liberal thrust of the Federal Rules.¹²⁰ The

- 110. Id.
- 111. Id.

- 114. Id.
- 115. Id.

- 117. FED. R. EVID. 702.
- 118. Id.

120. Id.

^{107.} Daubert v. Merrell Dow Pharm., Inc., 113 S. Ct. 2786, 2794 (1993).

^{108.} Id.

^{109.} Id.

^{112.} United States v. Abel, 469 U.S. 45, 51 (1984).

^{113.} Id. at 50.

^{116.} Bourjaily v. United States, 483 U.S. 171, 178-79 (1987).

^{119.} Daubert v. Merrell Dow Pharm., Inc., 113 S. Ct. 2786, 2794 (1993).

Rules offer a relaxed approach to the traditional barriers to the admission of expert testimony.¹²¹ It is against this permissive backdrop of admissibility and the specific language of Rule 702 that the Court found that *Frye* was inconsistent with the Rules and should not be applied in federal courts.¹²²

B. Guidelines for Admissibility of Scientific Evidence

1. Definitional Limitations

The Court found that the language of Rule 702 clearly contemplated limits on the subjects and theories to which an expert may testify.¹²³ The subject of the expert's testimony must be "scientific . . . knowledge."¹²⁴ "[S]cientific" refers to a "grounding in the methods and procedures of science."¹²⁵ It represents a process of proposing and testing hypotheses subject to further testing and refinement.¹²⁶ "[K]nowledge" applies to "any body of known facts or any body of ideas inferred from such facts or accepted as truths on good grounds."127 Subjective belief or unsupported speculation does not constitute knowledge within the meaning of the Rule.¹²⁸ However, the Court does not require that the subject of scientific testimony be known to a certainty.¹²⁹ Such a requirement would be unreasonable because there are arguably no such certainties in science.¹³⁰ Scientists do not assert that they know what is truth.¹³¹ Rather, the process of science revolves around continually changing hypotheses with the knowledge that today's explanation may be revised tomorrow.¹³²

127. Id.

128. Id.

129. Daubert v. Merrell Dow Pharm., Inc., 113 S. Ct. 2786, 2795 (1993).

130. Id.

^{121.} Id.

^{122.} Id.

^{123.} Id. at 2795.

^{124.} Daubert v. Merrell Dow Pharm., Inc., 113 S. Ct. 2786, 2795 (1993). "Rule 702 also applies to 'technical, or other specialized knowledge.' Our discussion is limited to the scientific context because that is the nature of the expertise offered here." *Id.* at 2795 n.8.

^{125.} Id. at 2795.

^{126.} Id.

^{131.} Id. "Indeed, scientists do not assert that they know what is immutably 'true' - they are committed to searching for new, temporary theories to explain, as best they can, phenomena." Id.

^{132.} Id. "Science is not an encyclopedic body of knowledge about the universe. Instead, it represents a *process* for proposing and refining theoretical explanations about the world that are subject to further testing and refinement." Id. (emphasis in original).

Therefore, any proffered evidence must be derived from scientific methods.¹³³ It must also be supported by appropriate validation.¹³⁴ The requirement that the experts proffered testimony relate to "scientific knowledge" creates the standard of evidentiary reliability within the Rule.¹³⁵

2. Helpfulness

Additionally, Rule 702 requires that evidence or testimony "assist the trier of fact to understand the evidence or to determine a fact in issue."¹³⁶ This requirement reflects that scientic evidence must be helpful to be admissible.¹³⁷ Expert testimony which is not probative of an issue is not relevant, and therefore inadmissible.¹³⁸ This relevance prerequisite is comparable to the requirement of "fit" in *Downing.*¹³⁹ Scientific evidence which is admissible for one purpose may not be admissible for another.¹⁴⁰ As an example the Court referred to the study of the phases of the moon. This type of evidence may be admissible where an issue was one of whether a particular night was dark. However, evidence of phases of the moon would be inadmissible, absent a credible link, to show that an individual behaved irrationally on a certain night.¹⁴¹ The court stated the Rule 702 "requires a valid scientific connection to the pertinent inquiry as a precondition to admissibility."¹⁴²

C. The Role of the Trial Judge Under Rule 702

Before admitting scientific evidence, the Court stated that the trial judge must make a preliminary determination under Rule 104(a) that evidence meets the standard set forth.¹⁴³ Unlike *Frye* or earlier

138. See FED. R. EVID. 403.

^{133.} Id.

^{134.} Daubert v. Merrell Dow Pharm., Inc., 113 S. Ct. 2786, 2795 (1993).

^{135.} Id. Evidentiary reliability referred to in Daubert can be distinguished from "validity" or "reliability" as used in the sciences. Generally validity means the extent to which the "principle support[s] what it purports to show." Scientific reliability requires that the application of the principle produces consistent results. The court uses reliability to mean evidentiary reliability, which it deems to be based on scientific validity. Id. at 2795 n.9. See also 1 GIANELLI & IM-WINKELRIED, supra note 2, § 1-1, at 1 n.1.

^{136.} FED. R. EVID. 702.

^{137.} Daubert, 113 S. Ct. at 2795.

^{139.} See United States v. Downing, 753 F.2d 1224, 1242-43 (3d Cir. 1985).

^{140.} Daubert, 113 S. Ct. at 2796.

^{141.} Id.

^{142.} Id.

^{143.} Id. "Preliminary questions concerning the qualification of a person to be a witness,... or the admissibility of evidence shall be determined by the court...." FED. R. EVID. 104(a).

versions of the relevancy test, the Supreme Court does not read Rule 702 as applicable only to *novel* scientific evidence.¹⁴⁴ Therefore, even well established techniques are subject to challenge and review under the ruling in *Daubert*.¹⁴⁵ An exception exists where the theory is so well established that it has attained the status of "scientific law."¹⁴⁶ Theories such as the laws of thermodynamics are the proper subjects of judicial notice under Rule 201.147

The inquiry of the trial court is flexible, focusing on the scientific validity of the theory or technique which will yield the evidentiary relevance and reliability requisite in the Rule.¹⁴⁸ Judges are admonished to focus only on the principles and methodology used, not the conclusions generated.¹⁴⁹ Expert opinion based on scientific evidence can be sound even if in disagreement with the testimony of another expert or the judge's own opinion.¹⁵⁰ As guidance the Court offered several factors which trial judges may consider in determining the reliability of the evidence proffered.¹⁵¹ These factors, rather than representing a definitive list of considerations, were intended as general observations on the type of appropriate inquiries.¹⁵²

1. Testability

Scientific methodology is based on generating and testing hypotheses to see if they can be falsified.¹⁵³ The process consists of proposing and refining theoretical explanations subject to further testing and refinement.¹⁵⁴ Science does not rely on faith or opinion. It is this methodology that distinguishes science from other forms of inquiry.¹⁵⁵ Therefore, a key question to be answered in determining whether evidence constitutes "scientific knowledge" is whether the theory or process can be or has been tested.¹⁵⁶

^{144.} Daubert v. Merrell Dow Pharm., Inc., 113 S. Ct. 2786, 2796 n.11 (1993).

^{145.} Id.

^{146.} Id.

^{147.} Id. The Rule allows judicial notice of facts which are "capable of accurate and ready determination by resort to sources whose accuracy cannot reasonably be questioned." FED. R. Evid. 201(b).

^{148.} Daubert v. Merrell Dow Pharm., Inc., 113 S. Ct. 2786, 2797 (1993).

^{149.} Id.

^{150.} Jack B. Weinstein, Rule 702 of the Federal Rules of Evidence is Sound; It Should Not Be Amended, 138 F.R.D. 631, 641 (1991).

^{151.} Daubert, 113 S. Ct. at 2795-97 & 2795 n.7.

^{152.} Id. at 2796.

^{153.} Id.

^{154.} Id. 155. Daubert v. Merrell Dow Pharm., Inc., 113 S. Ct. 2786, 2796 (1993).

^{156.} Id.

2. Peer Review and Publication

Publication is one element of peer review, an important part of the scientific process.¹⁵⁷ Submission to the scientific community for review is a component of good science.¹⁵⁸ This critical scientific scrutiny increases the likelihood that substantive flaws in the research will be detected.¹⁵⁹ However, propositions which are relatively recent or of limited and specialized interest may not be published. This lack of publication does not necessarily indicate unreliability of the theory or methods.¹⁶⁰ Therefore, while publication in a peer reviewed journal is relevant to the evidentiary reliability, it is not determinative of admissibility.¹⁶¹

3. Error Rate

The rate of error of a scientific technique may also be an important factor in determining its reliability.¹⁶² Whether the error rate is known, the type of error possible, and the existence of standards which control the technique's operation may have bearing not only on the admissibility of the evidence but also its weight at trial.¹⁶³ A technique which has a large error rate may be so unreliable as to be inadmissible.¹⁶⁴ Similarly, the lack of controls which guarantee that the technique was properly administered can also affect reliability.¹⁶⁵ Therefore, the judge should consider a technique's known or potential error rate prior to admission.¹⁶⁶

4. General Acceptance by the Scientific Community

Although the *Frye* test for general acceptance by the scientific community was superseded by the Federal Rules as the sole criteria for determining admissibility of scientific evidence, it may continue to be an appropriate factor in determining reliability.¹⁶⁷ Inquiry into a technique's degree of acceptance within its relevant scientific community is no longer explicitly required to establish admissibility, but it is

^{157.} Id. at 2797. 158. Id. 159. Id.

^{160.} Daubert v. Merrell Dow Pharm., Inc., 113 S. Ct. 2786, 2797 (1993).

^{161.} Id.

^{162.} Id.

^{163.} Id.

^{164.} United States v. Downing, 753 F.2d 1224, 1239 (3d Cir. 1985).

^{165.} See United States v. Williams, 583 F.2d 1194, 1198 (2d Cir. 1978).

^{166.} Daubert v. Merrell Dow Pharm., Inc., 113 S. Ct. 2786, 2797 (1993).

^{167.} Id.

permitted.¹⁶⁸ The degree of acceptance can be an important element of reliability. A known technique which does not have substantial support may in fact be unreliable and should properly be viewed with skepticism.¹⁶⁹

D. Limitations Present in Other Rules of Evidence

Outside of the factors necessary to satisfy Rule 702 prior to admissibility, other evidentiary rules further safeguard the integrity of scientific evidence. The Court recommends that a judge keep these in mind when assessing the admissibility of scientific evidence.¹⁷⁰ Rule 703 allows experts to base their testimony and opinions on evidence which may otherwise be inadmissible.¹⁷¹ However, the rule requires that those facts and data must be of the type reasonably relied upon by experts in the field.¹⁷² If the court is presented with conflicting or confusing testimony as to either the reliability of the proffered evidence or for any other reason, Rule 706 allows the court to appoint an expert of its own.¹⁷³ The Advisory Committee Notes to this rule state that the court's inherent power to appoint an expert of its own choosing is virtually unquestioned.¹⁷⁴ The possibility that the court may appoint its own expert may also have a sobering effect on the parties and their experts, making court appointment itself often unnecessary.¹⁷⁵

Perhaps the most significant limitation on the admissibility of scientific evidence, apart from Rule 702, is the considerations in Rule 403. This rule, applicable to all types of evidence, allows the court to exclude relevant evidence on the basis of unfair prejudice, confusion of the issues, misleading the jury, or waste of time.¹⁷⁶ If the probative value of the evidence is substantially outweighed by these dangers, the court may exclude otherwise admissible evidence.¹⁷⁷

Expert testimony is not limited in scope to personal knowledge like that of lay witnesses.¹⁷⁸ The Rules allow experts to testify in the

Id.
 Id.
 Id.
 Daubert, 113 S. Ct. at 2797-98.
 FED. R. EVID. 703.
 Id.
 FED. R. EVID. 706.
 FED. R. EVID. 706.
 Id.
 FED. R. EVID. 403.
 FED. R. EVID. 403.
 See Daubert v. Merrell Dow Pharm. Inc. 113 S. Ct. 178.

178. FED. R. EVID. 701-703. See Daubert v. Merrell Dow Pharm., Inc., 113 S. Ct. 2786, 2796 (1993).

form of opinion or on the ultimate issue of fact.¹⁷⁹ Therefore, testimony by experts can have a greater ability to mislead or prejudice a jury and requires a higher level of scrutiny than that to which lay witnesses are subject.¹⁸⁰ In *Daubert* the Court cited Judge Weinstein in stating that "[b]ecause of this risk, the judge . . . exercises more control over experts than over lay witnesses."¹⁸¹ Consequently, Rule 403 represents an important safeguard to prevent the admission of inappropriate scientific evidence.

E. Other Safeguards

Twenty-two amicus briefs were filed in connection with Daubert.¹⁸² Some expressed concerns about the impact the decision would have on the future of the relationship between science and the law. The Court found that the apprehension that abandonment of the general acceptance standard will result in an evidentiary "free-for-all" is overly pessimistic and better resolved by the traditional mechanisms of the adversarial system than with exclusionary rules.¹⁸³ "Vigorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking shaky but admissible evidence."¹⁸⁴ The Court advised trial judges to make use of the mechanisms of directed verdict and summary judgment to deal with evidence insufficient to support a jury verdict.¹⁸⁵ The use of these conventional devices, rather than wholesale exclusion of evidence is more consistent with the transcending policy of the Federal Rules which supports liberal admissibility.186

In addition, the Court also addressed fears that the gate-keeping responsibility accorded the trial judge under this decision will stifle the search for the truth.¹⁸⁷ While both scientific and legal inquiries require open debate, the search for truth in the courtroom is different

187. Id.

^{179. &}quot;[T]estimony in the form of an opinion or inference otherwise admissible is not objectionable because it embraces an ultimate issue to be decided by the trier of fact." FED. R. EVID. 704.

^{180.} Daubert v. Merrell Dow Pharm., Inc., 113 S. Ct. 2786, 2798 (1993); Weinstein, supra note 150, at 632.

^{181.} Daubert, 113 S. Ct. at 2798.

^{182.} Id. at 2799 (J. Rehnquist concurring in part, dissenting in part).

^{183.} Id. at 2798.

^{184.} Id.

^{185.} Daubert v. Merrell Dow Pharm., Inc., 113 S. Ct. 2786, 2798 (1993).

^{186.} Id.

from that in the laboratory.¹⁸⁸ In science, theories are continually revised and altered.¹⁸⁹ Scientists suggest wide-ranging hypotheses with the knowledge that incorrect ones will be so identified.¹⁹⁰ This process of hypothesis, testing, and conformation, modification, or refutation is essential to science.¹⁹¹ However, legal judgment is binding, at least with respect to an instant case, and is not subject to later revision.¹⁹² Courts must search for a quick and final truth. The Court recognized that any gate-keeping role, no matter how flexible, is likely to result in some valid insights and innovations being excluded.¹⁹³ However, the Court found that the possibility of exclusion was part of the balance which must be struck between the disciplines of science and the law.194

F. The Dissent

Chief Justice Rehnquist concurred with the part of the opinion which concluded that the Frye test did not survive the enactment of the Federal Rules of Evidence.¹⁹⁵ However, joined by Justice Stevens, he dissented from the portion of the opinion which offered guidelines to the lower courts on the implementation of Rule 702 in the absence of Frye.¹⁹⁶ These observations were not applied to deciding the case at hand and were therefore "not only general, but vague and abstract."197 Chief Justice Rehnquist warned that dicta of the Supreme Court carries great weight in the lower courts and the unusual subject matter of this case warrants great caution in determining more than is necessary to decide the case.¹⁹⁸ In addition to the general disagreement over the prudence of offering guidelines to aid the lower courts, the dissent opposed some of the observations themselves.¹⁹⁹ Specifically, there was no mention in the rule of a requirement of *reliability* of scientific evidence which had been relied upon by the Court.200

188. Id. 189. Id.

- 191. See id. at 2796.
- 192. Id. at 2798.
- 193. Id.

- 195. Id.
- Id. (Rehnquist, C.J. dissenting).
 Id.
 Id.
 Id.

200. Ĭd.

^{190.} Daubert v. Merrell Dow Pharm., Inc., 113 S. Ct. 2786, 2798 (1993).

^{194.} Daubert v. Merrell Dow Pharm., Inc., 113 S. Ct. 2786, 2799 (1993).

^{199.} Daubert v. Merrell Dow Pharm., Inc., 113 S. Ct. 2786, 2800 (1993) (Rehnquist, C.J. dissenting).

TULSA LAW JOURNAL

The dissent was also concerned that the guidelines given by the Court as an aid in interpretation of its decision will simply raise more questions.²⁰¹ Definitional questions such as what constitutes "scientific . . . knowledge," "appropriate validation," "evidentiary reliability," or "scientific validity" will all present problems for the lower courts when assessing admissibility.²⁰² Finally, the dissent raised other questions about the interpretation of Rule 702. Do the guidelines for admissibility of scientific knowledge also apply to technical or other specialized knowledge mentioned in the Rule?²⁰³ What is the difference between scientific and technical knowledge?²⁰⁴ Did the authors of the Rule intend it to be broken down into subspecies of expert opinion, each with its own admissibility criteria?²⁰⁵ These questions remain unanswered. The dissent believed that Rule 702 clearly gives judges some gate-keeping responsibilities when faced with scientific evidence but would have declined to offer overall limitations such as those contained in the opinion itself.²⁰⁶

V. THE FUTURE OF SCIENTIFIC EVIDENCE AFTER DAUBERT

The Daubert decision has the potential to open up a new view of the role of scientific evidence in the courts, allowing the use of experts in the courtroom to more closely mirror the scientific debate which takes place in the laboratory. This shift could result in a greater ability for truth-seeking in the adversarial process. On the other hand, there are dangers inherent in this expansion of the admissibility without corresponding safeguards. The opinion in Daubert offers judges the means to prevent a free-for-all, but if trial courts do not carefully exercise their gate-keeping role to exclude overwhelming, unreliable, or repetitive evidence, trials could degenerate to a litany of expert testimony which, rather than assisting the jury to determine a material fact, merely confuses or overwhelms them. As a result of the decision to supersede the Frye test, support for proposed reform amendment to Rule 702 applying a more restrictive standard could be strengthened.

^{201.} Id.

^{202.} Id.

^{203.} Id. But see id. at 2795 n.8.

^{204.} Daubert v. Merrell Dow Pharm., Inc., 113 S. Ct. 2786, 2800 (1993) (Rehnquist, C.J. dissenting).

^{205.} Id.

^{206.} Id. at 2795 n.7 & 2800.

The role of science in the courts can only be benefitted by more open debate about the validity and reliability of the expert testimony offered. Scientific "truth" is in actuality a set of hypotheses which are continually being revised.²⁰⁷ There may be theories which are so well accepted that they have attained the status of scientific law, but the majority of science is in a continual state of flux. Research done tomorrow may invalidate the "truth" accepted today. With *Daubert*, the legal system has attempted to integrate this view of the scientific process into its own use of experts.²⁰⁸ While it is true that the law and science have different truth-seeking goals, the limitations in the legal system do not preclude an approach to science which more closely mirrors the process involved in reaching scientific hypotheses.²⁰⁹

Under the conservative general acceptance standard, courts operated to admit current scientific theories and techniques but could exclude much of the criticism or revision of that evidence because it had not yet been generally accepted.²¹⁰ Thpractice created a cultural lag in the period between which new research invalidates an earlier accepted theory and the new theory's general acceptance by the scientific community.²¹¹ Therefore, juries may be presented with an outdated but accepted scientific theory but excluded from considering the most recent theory or research which counters that earlier evidence.²¹² Because *Daubert* applies to both novel and generally accepted evidence, however, older theories are also subject to review on

211. 1 GIANELLI & IMWINKELRIED, supra note 2, § 1-5(F).

212. The Daubert case itself may be an example of this phenomenon. While it has yet to be determined whether the *in vivo*, *in vitro*, animal studies, chemical analysis, or reanalysis evidence will be admissible upon remand, it is possible that application of the relevancy standard will alter the admissibility of the evidence. If some or all of the evidence is admissible on remand, the jury will have a greater ability to weigh the probative value of the epidemiological studies when allowed to assess also the contradicting evidence. Even if the data from the suspect studies is itself inadmissible, the court should allow the experts to testify if the studies are of the type reasonably relied upon by experts in the field on the basis of FED. R. EVID. 703. The Rule allows experts to base their opinion testimony on facts or data which is inadmissible but of the type reasonably relied upon by experts in the field. Similarly, in Oxendine v. Merrell Dow Pharm., Inc., 506 A.2d 1100, 1104 (D.C. App. 1986), the Court allowed admission of evidence from *in vivo*, *in vitro* studies, chemical analysis, and recalculation that Bendectin can cause birth defects.

^{207.} See id. at 2795.

^{208.} See id. at 2795-96.

^{209.} Daubert v. Merrell Dow Pharm., Inc., 113 S. Ct. 2786, 2798 (1993).

^{210.} See generally Weinstein, supra note 150, at 632. Admissibility is an issue of great debate, particularly in toxic tort cases such as Bendectin and "chemical AIDS," as well as the use of testimony from experts who interviewed allegedly sexually abused children with the aid of anatomically correct dolls. There are both proponents and opponents of these types of evidence, but the debate in the law only mirrors that which is now taking place in the respective scientific realms. While courts should not interfere in these controversies, some introduction of the debate into the trial process will allow the jury to better assess the weight to give the scientific evidence.

the same basis as new theories.²¹³ Therefore, expert testimony must keep abreast of recent scientific advances. *Frye* further limited review of scientific debate by the court where there are competing theories. Because *Frye* required acceptance of something like "a clear majority" of the scientific community, where there are competing theories, none of which has the minimum level of acceptance, *Frye* operates to exclude all.²¹⁴ In contrast, *Daubert* allows the court to bring this scientific debate into the courtroom and allow the trier of fact to weigh the competing theories or evidence. This openness will strengthen the jury's role in fact finding and enhance its ability to assess the probative force of evidence necessary to make a legal decision.

The *Frye* test assumes that without assistance of the court, jurors cannot comprehend conflicting scientific evidence.²¹⁵ Fears that scientific evidence will assume a "posture of mythic infallibility in the eyes of a jury of laymen" have mainly been based on anecdotal evidence.²¹⁶ Empirical research on the jury's ability to understand scientific evidence does not support these fears.²¹⁷ Instead, it may be possible that admission of only one scientific theory without allowing the admission of other conflicting views, results in greater juror prejudice in favor of that evidence.²¹⁸ Critical cross-examination as to the weight of the scientific evidence and presentation of conflicting theories are appropriate and desirable safeguards to prevent juror over-reliance on scientific evidence.²¹⁹

But in order to prevent the admission of specious or unscientific evidence under the guise of expert testimony, *Daubert* will require a firm hand on the safeguards which already exist in the system. Trial judges should carefully use mechanisms for directed verdict and summary judgment where there is insufficient evidence to support a jury verdict.²²⁰ Preliminary questions of admissibility should focus closely on the reliability of the technique or process not on the conclusion it

^{213.} Daubert, 113 S. Ct. at 2796 n.11.

^{214.} See People v. Guerra, 690 P.2d 635, 656 (Cal. 1984).

^{215.} See Daubert v. Merrell Dow Pharm., Inc., 727 F.Supp. 570, 575-76 (S.D. Cal. 1989), aff'd, 951 F.2d 1128 (9th Cir. 1991), cert. granted, 113 S. Ct. 320 (1992), vacated, 113 S. Ct. 2786 (1993).

^{216.} United States v. Addison, 498 F.2d 741, 744 (D.C. Cir. 1974).

^{217.} See generally Edward J. Imwinkelried, The Standard for Admitting Scientific Evidence: A Critique From the Perspective of Juror Psychology, 28 VILL. L. REV. 544, 566-571 (1983). 218. Id.

^{219. 1} GIANELLI & IMWINKELRIED, supra note 2, § 1-6(D).

^{220.} Daubert v. Merrell Dow Pharm., Inc., 113 S. Ct. 2786, 2798 (1993).

generates.²²¹ Scientific evidence may be sound although its conclusion differs from other scientific conclusions or even the judge's own opinion. It is the role of the jury to determine the weight to give conflicting but relevant evidence.

Also, trial judges should rely less on precedent in decisions to admit or exclude particular evidence. Science does not rely on prior determinations when formulating new theories in the same way that legal precedent operates.²²² The court should view with skepticism claims of unopposed scientific "truth." While some well established techniques should have no difficulty meeting the standards of reliability requisite for admissibility, the mere fact that a process has been admitted in the past as reliable should not be dispositive for future admissibility.²²³

Where a technique or process is so reliable that its admissibility cannot be fairly questioned, the court should use judicial notice under Rule 201.²²⁴ Where relevant, judges should also insist on strong guarantees that the test relied upon has been properly conducted.²²⁵ Testimony based on an improperly administered test is unreliable and irrelevant despite the validity of the underlying theory or technique.²²⁶ Perhaps the most powerful tool to prevent the admissibility of confusing scientific evidence is Rule 403. Judicious use of exclusion for reasons of unfair prejudice, confusion or misleading of the jury, or waste of time is warranted.²²⁷

The liberal nature of the decision in *Daubert* may strengthen support for a proposed amendment to Rule 703 which would tighten its loose admissibility standard. The proposed amendment is facially more restrictive than the existing Rule and would make the use of expert testimony more difficult.²²⁸ Like the current rule under *Daubert*, the amendment would require that the court find the evidence to be reliable.²²⁹ But in addition to reliability, the information

^{221.} Weinstein, supra note 150, at 641.

^{222.} See Daubert, 113 S. Ct. at 2798.

^{223.} See id. at 2796 n.11.

^{224.} Id. See also United States v. Downing, 753 F.2d 1224, 1237 (3d Cir. 1985).

^{225.} Daubert v. Merrell Dow Pharm., Inc., 113 S. Ct. 2786, 2796 n.11 (1993). See also Downing, 753 F.2d at 1232 & 1232 n.10.

^{226.} See United States v. Two Bulls, 918 F.2d 56, 60-61 (8th Cir. 1990), vacated, 925 F.2d 1127 (8th Cir. 1991) (after death of defendant); People v. Castro, 545 N.Y.S.2d 985, 998-999 (N.Y. Sup. Ct. 1989).

^{227.} See Daubert, 113 S.Ct. at 2798.

^{228.} Weinstein, supra note 150, at 632-34.

^{229.} Id. at 636.

must *substantially* assist the trier of fact.²³⁰ The current rule requires only helpfulness.²³¹ Admission is presumed unless the issues under Rule 403 substantially overwhelm the probative value.²³² The amendment would also require disclosure of the expert's background and proposed testimony before he can testify.²³³ If the thrust of the Federal Rules of Evidence has, to this point, been liberal admissibility and a relaxation of the traditional barriers to expert testimony, the proposed amendment is a step back from that permissive backdrop. On some points, the amendment represents the standard already being applied by federal judges.²³⁴ Additionally, after the guidelines established in *Daubert*, there are already adequate safeguards present to prevent the admission of inappropriate or absurd scientific evidence.²³⁵

The *Daubert* decision may also have more far-reaching impact in state courts. Some states which have modeled their rules of evidence after the Federal Rules continue to apply the *Frye* test for admissibility of novel scientific evidence.²³⁶ In light of the decision in *Daubert*, an approach more consistent with the federal courts should be in order.²³⁷ Those states which continue to apply *Frye* will be out of step and use of expert testimony in these jurisdictions will continue to suffer from the problems inherent in the *Frye* standard.

VI. CONCLUSION

The decision in *Daubert* will have far-reaching impact on the use of expert scientific testimony in federal courts. Not only has it clarified the admissibility standard for this evidence, addressing the split in the circuits, but it may also have opened the door to a legal view of scientific theories and techniques which is more representative of the scientific process. The liberal admissibility of expert testimony, while not without dangers, will result in more truth-seeking in the courtroom. Jurors can now weigh conflicting theories without the artificial

^{230.} Id.

^{231.} Id.

^{232.} Id.

^{233.} Id. at 637.

^{234.} Id. at 639.

^{235.} See generally id. at 631-638; United States v. Downing, 753 F.2d 1224, 1238 n.18 (3d Cir. 1985).

^{236.} See generally 1 GIANELLI & IMWINKELRIED, supra note 2, at 9-10 n.55.

^{237.} But cf. State v. Alt, 504 N.W.2d 38, 45-46 (Minn. App.) (refusing to follow Daubert on state law grounds), review granted in part and remanded, 505 S.W.2d 72 (Minn. 1993).

"general acceptance" requirement preventing the admission of probative evidence. The standard in *Daubert* is not only more consistent with the thrust of the Federal Rules of Evidence but will also permit the kind of open debate in the courtroom on which the adversarial system was based.

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