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Procedural Paradigms for Applying the *Daubert* Test

Margaret A. Berger*

INTRODUCTION

At first glance, the Supreme Court's 1993 opinion in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*¹ looks like a quintessential opinion about evidence. It discards as incompatible with the Federal Rules of Evidence the venerable *Frye*² "general acceptance" test for the admissibility of scientific proof and outlines a different evidentiary standard more in keeping with the structure of the Rules. It would be simplistic and short-sighted, however, to pigeonhole *Daubert* simply as an opinion about evidence. Although *Daubert* interprets the Federal Rules of Evidence, reflects an evidentiary concern for accuracy in the courtroom, and will probably appear in every evidence casebook, its impact will in large measure be affected and mediated by the procedural settings in which scientific evidence is proffered.

In both civil and criminal cases, implementing the Supreme Court's message will require attention to numerous complex procedural problems that the Court did not address. The Court's opinion provides a framework for evaluating scientific proof, but it does not supply a blueprint to guide the judge who is discharging this task. This Article examines a number of different contexts in which courts may have to respond to scientific evidence. It identifies procedural and policy objectives that should inform a court's choice and procedural mechanisms that might better enable courts to apply the *Daubert* Court's reasoning. This Article thus simultaneously seeks to elucidate the meaning of *Daubert* and to examine values that may themselves define the contours of the decision.

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1. 113 S. Ct. 2786 (1993).

2. The test was first enunciated in *Frye v. United States*, 293 F. 1013, 1014 (D.C. Cir. 1923). See *infra* notes 16-17 and accompanying text.

Part I of this Article analyzes the *Daubert* opinion itself and explores the various questions a court faces when determining the admissibility of proffered scientific evidence.³ Part II considers various evidentiary issues that courts must resolve pursuant to *Daubert* and the procedural mechanisms and goals that may inform a court's decisions. The discussion focuses first on a criminal case in which the prosecution offers evidence derived from a novel forensic technique and then turns to civil litigation. This Article concludes that although the *Daubert* Court grounded its evidentiary analysis in Rule 702 of the Federal Rules of Evidence, which applies across the board to all civil and criminal actions and proceedings,⁴ distinctions between criminal prosecutions and civil trials justify placing different burdens on the parties with regard to preliminary determinations of the admissibility of scientific evidence. Whereas the prosecution should bear the burden of satisfying *Daubert* before novel scientific evidence is admitted in a criminal trial, placing a burden on the defendant in a civil case to demonstrate that a *Daubert* issue exists comports with the goals of *Daubert*, furthers the scheme of the new discovery rules, and advances efficiency concerns. This discussion also examines a variety of situations in civil litigation in which judicial determinations about procedural issues are likely to affect the availability of scientific evidence and considers possible solutions that accommodate evidentiary values as well as fairness and efficiency concerns.

I. THE DAUBERT OPINION

In *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, the plaintiffs claimed that Bendectin, a morning sickness remedy manu-

3. *Daubert* recognizes that even if the scientific evidence passes the admissibility hurdle, a judge may be able to dispose of a civil case on the ground that the evidence is insufficient. See discussion *infra* part II.B.4 (discussing motion for summary judgment). Although this Article only addresses the admissibility of evidence and not issues of sufficiency, sufficiency concerns may affect admissibility determinations. A court may sidestep an admissibility analysis when it is prepared to terminate the case on sufficiency grounds. See *Brock v. Merrell Dow Pharmaceuticals, Inc.*, 884 F.2d 167, 169-70 (5th Cir. 1989) (Higginbotham, J., dissenting from a refusal to rehear a panel decision granting judgment as a matter of law in a Bendectin case not on the merits but because the court failed to address admissibility issue), *cert. denied*, 494 U.S. 1046 (1990).

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

factured by the defendant, caused their congenital limb reduction defects.⁵ As a consequence of over two thousand similar suits brought in state and federal courts, Merrell Dow took Bendectin, which had been a best selling drug used by over thirty million women, off the market in 1983 even though it never lost its FDA approval.⁶ By the time *Daubert* reached the Supreme Court, lower courts had already resolved many of these cases in favor of the defendant, either by jury verdict or because the verdict for the plaintiff failed to survive post-trial motions or appeal.⁷

In the two lawsuits consolidated in *Daubert*, Merrell Dow denied that Bendectin had caused the minor plaintiffs' birth defects and moved for summary judgment.⁸ In support of its motion, the defendant submitted a two-page affidavit from an epidemiologist who had concluded, after reviewing the entire literature on Bendectin and human birth defects, that Bendectin "is not a risk factor for human birth defects in general, for limb reduction defects specifically, or for any other particular human birth defect."⁹ The plaintiffs countered with equally conclusory affidavits from eight experts in a variety of disciplines, supplemented with transcripts from depositions and from previous trials.¹⁰

The district court found the studies on which the plaintiffs relied insufficient to prove causation "in the face of the over-

5. See *Daubert*, 113 S. Ct. at 2791.

6. See *Turpin v. Merrell Dow Pharmaceuticals, Inc.*, 959 F.2d 1349, 1350 (6th Cir.), cert. denied, 113 S. Ct. 84 (1992).

7. The defendant has apparently never paid the one judgment for a plaintiff that survived post-trial motions. See Joseph Sanders, *The Bendectin Litigation: A Case Study in the Life Cycle of Mass Torts*, 43 HASTINGS L.J. 301, 379-80 (1992) (discussing *Oxendine v. Merrell Dow Pharmaceuticals, Inc.*, 506 A.2d 1100 (D.C. Cir. 1986)).

8. *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 727 F. Supp. 570, 571 (S.D. Cal. 1989), *aff'd*, 951 F.2d 1128 (9th Cir. 1991), and *rev'd*, 113 S. Ct. 2786 (1993). The plaintiffs originally filed suits in the California state court in 1984, and the defendant removed the suits to federal court on the basis of diversity of citizenship. *Daubert*, 113 S. Ct. at 2791.

9. Affidavit of Dr. Steven H. Lamm, Joint Appendix at 33, *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 113 S. Ct. 2786 (1993).

10. 727 F. Supp. at 573. The plaintiffs' experts based their opinions on a variety of data that scientists regularly utilize in testing new drugs: in vitro studies which examined the effect of Bendectin on live cells in test tubes; in vivo studies on animals which compared Bendectin-fed offspring with those not fed Bendectin; chemical structural analyses which compared Bendectin with other substances known to cause birth defects; and statistical reanalyses of the data from published epidemiological studies. *Id.* at 574-75.

whelming body of contradictory epidemiological evidence."¹¹ The district court then granted summary judgment, noting that plaintiffs' experts never disputed that all published epidemiological studies had failed to find a statistically significant link between Bendectin and birth defects.¹² The court held that the plaintiffs had not raised a material issue of fact by alleging that unpublished reanalyses of epidemiological data would show that Bendectin could have caused the plaintiffs' injuries.¹³ Although the district court mentioned Rules 703 and 403 of the Federal Rules of Evidence in passing, the court mainly focused on the insufficiency of the plaintiffs' evidence rather than its inadmissibility.¹⁴

The Ninth Circuit agreed with the result below, but relied primarily on the inadmissibility of the plaintiffs' expert testimony—though it failed to cite a single federal evidentiary rule.¹⁵ The court began by reaffirming its adherence to the "general acceptance" test which the Circuit Court of the District of Columbia had formulated seventy years earlier in *Frye v. United States*.¹⁶ The *Frye* standard focuses on whether "the thing from which the [expert testimony is deduced is] sufficiently established to have gained general acceptance in the particular field in which it belongs."¹⁷ The Ninth Circuit then explained that three other circuits had already found the plaintiffs' non-epide-

11. *Id.* at 573.

12. *Id.* at 575.

13. *Id.* at 575-76.

14. *Id.* at 572.

15. 951 F.2d 1128, 1130-31 (9th Cir. 1991). Judge Kozinski wrote the brief opinion, which Charles Fried characterized as a summary affirmance when arguing for respondent in the Supreme Court. *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, No. 92-102, official transcript at 39 ("a little breezy and a little summary.").

16. 293 F. 1013 (D.C. Cir. 1923). Although much criticized, a majority of state and federal courts, including the Ninth Circuit, have invoked the *Frye* standard when ruling on the admissibility of novel scientific evidence. *Daubert*, 113 S. Ct. at 2792-93.

17. *Frye*, 293 F. at 1014. A majority of the federal circuits and the states claimed to use the "general acceptance" test to determine the admissibility of scientific evidence. See *Daubert*, 113 S. Ct. at 2792 ("the 'general acceptance' test has been the dominant standard for determining admissibility") (citing ERIC D. GREEN & CHARLES R. NESSON, PROBLEMS, CASES, AND MATERIALS ON EVIDENCE 649 (1983)). Circuits used different formulae in articulating the "general acceptance" test. Whether any differences in result were attributable to these variations in the wording of the test is highly questionable, beyond the scope of this Article, and probably of no great significance given the outcome of *Daubert*. The Supreme Court cited to some of the extensive literature on *Frye*. *Daubert*, 113 S. Ct. at 2793 nn.3-5. A number of federal circuits had rejected *Frye* as incompatible with the Federal Rules of Evidence. See, e.g., *United*

miological evidence insufficient to prove causation. Finally, the court concluded that the plaintiffs' reanalyses of epidemiological studies could not meet *Frye* admissibility standards: "[T]hey were unpublished, not subjected to the normal peer review process and generated solely for use in litigation."¹⁸

The Supreme Court granted certiorari to consider the proper standard for the admission of expert scientific evidence.¹⁹ In a few short paragraphs, the Court swept the *Frye* "general acceptance" test out of the federal courts.²⁰ Applying a plain meaning approach to Rule 702 and to the Rules as a whole, the Court unanimously concluded that "general acceptance" is a "standard absent from and incompatible with the Federal Rules of Evidence."²¹

The Court could have ended its opinion at this point.²² Indeed, Chief Justice Rehnquist joined by Justice Stevens, while acknowledging "that Rule 702 confides to the judge some gatekeeping responsibility,"²³ would have left the further development of the law to future cases, and accordingly dissented from the balance of the opinion.²⁴ Despite their colleagues' protests, however, six justices joined Justice Blackmun in broadly sketching the federal judge's responsibilities when handling scientific expert testimony pursuant to the Federal Rules of Evidence.²⁵

The majority termed "general acceptance" an unacceptably "austere standard"²⁶ and deemed a jury capable of handling reli-

States v. Jakobetz, 955 F.2d 786, 794 (2d Cir.), cert. denied, 113 S. Ct. 104 (1992); United States v. Downing, 753 F.2d 1224, 1237 (3d Cir. 1985).

18. *Daubert*, 951 F.2d at 1131. The court noted that the Third Circuit in *DeLuca v. Merrell Dow Pharmaceuticals, Inc.* had left open the possibility that the plaintiffs' reanalyses might be admissible but declined to follow *DeLuca* because the Third Circuit had rejected *Frye*. *Id.* at 1130-31 n.2 (discussing *DeLuca v. Merrell Dow Pharmaceuticals, Inc.*, 911 F.2d 941 (3d Cir. 1991)).

19. *Daubert*, 113 S. Ct. at 2792.

20. *Id.* at 2793-94.

21. *Id.* at 2794.

22. The Supreme Court remanded the case because the lower courts had assumed the existence of a "general acceptance" standard in finding the plaintiffs' expert testimony inadmissible or insufficient. *Id.* at 2799.

23. *Id.* at 2800 (Rehnquist, C.J., concurring in part and dissenting in part).

24. These two Justices objected to their colleagues' additional "general observations" as "vague and abstract" and raising scientific questions "far afield from the expertise of judges." *Id.* at 2799 (Rehnquist, C.J., concurring in part and dissenting in part).

25. *Id.* at 2795-98. The majority explained that "[w]e believe the better course is to note the nature and source of the duty." *Id.* at 2795 n.7.

26. *Id.* at 2794.

able scientific evidence.²⁷ Yet, the Court also confirmed the trial judge's "gatekeeping" function pursuant to Rule 104(a)²⁸ to screen expert testimony that is not the product of scientific thinking.²⁹ The challenge of *Daubert* is to reconcile these twin objectives—to honor the Federal Rules' liberal admissibility standard for expert proof while blocking the entry of unreliable scientific evidence into the courtroom.

The Court situated a judge's gatekeeping obligation in Rule 702 which contains the words "scientific" and "knowledge."³⁰ It concluded that "'scientific' implies a grounding in the methods and procedures of science," whereas "the word 'knowledge' connotes more than subjective belief or unsupported speculation."³¹ By requiring judges to focus on the scientific principles and methodology underlying an expert's opinion, and "not on the conclusions that they generate,"³² the Supreme Court sought to ensure that "evidentiary reliability will be based upon scientific validity."³³

To determine whether the expert's testimony about scientific knowledge will assist the trier of fact in assessing a controverted issue, *Daubert* requires the judge to ask two questions: "whether the reasoning or methodology underlying the testimony is scientifically valid" and "whether that reasoning or methodology properly can be applied to the facts in issue."³⁴ The Court provided a checklist of factors that trial courts should consider to determine whether the opinion is methodologically sound, but cautioned that this list should not be considered definitive.³⁵ The first of these considerations is "falsifiability":

27. *Id.* at 2798.

28. Federal Rule of Evidence 104(a) provides as follows:

Preliminary questions concerning the qualification of a person to be a witness, the existence of a privilege, or the admissibility of evidence shall be determined by the court, subject to the provisions of subdivision (b). In making its determination it is not bound by the rules of evidence except those with respect to privileges.

FED. R. EVID. 104(a).

In *Bourjaily v. United States*, the Supreme Court interpreted Rule 104(a) to mean that the admissibility of evidence must be established by a preponderance of proof. 483 U.S. 171, 175-76 (1987).

29. *Daubert*, 113 S. Ct. at 2798-99.

30. *Id.* at 2795; see *supra* note 4 (quoting language of FED. R. EVID. 702).

31. *Daubert*, 113 S. Ct. at 2795. When an expert seeks to testify pursuant to Rule 702 about scientific knowledge, the inferences or assertions that the expert is making "must be derived by the scientific method." *Id.*

32. *Id.* at 2797.

33. *Id.* at 2795 n.9 (emphasis omitted).

34. *Id.* at 2796.

35. *Id.* at 2796-97.

that is, "whether a theory or technique . . . can be (and has been) tested."³⁶ The primacy of this factor and quotations in the opinion indicate that the Court perceived science as an empirical endeavor.³⁷ Courts should also determine "whether the theory or technique has been subjected to peer review and publication."³⁸ The Court rejected submission to peer review as dispositive, but recognized that "submission to the scrutiny of the scientific community is a component of 'good science.'"³⁹

In addition, courts should analyze "the known or potential rate of error . . . and the existence and maintenance of standards controlling the technique's operation."⁴⁰ Further, the *Daubert* Court noted that "general acceptance" in the scientific community still bears on the inquiry.⁴¹ The Court agreed with the Third Circuit that a technique that has garnered only minimal support within the scientific community "may properly be viewed with skepticism."⁴²

In order to answer the second question—is the theory applicable in this case—the trial court must also decide whether the expert's testimony "fits" the facts of the case.⁴³ This condition, as the Court recognized, is essentially one of relevance.⁴⁴ The "helpfulness" standard incorporated in Rule 702 means that the expert's opinion must relate to an issue that is actually in dispute and must provide a valid scientific connection to the pertinent inquiry.⁴⁵

36. *Id.* at 2796.

37. *Id.* at 2796-97 (quoting CARL G. HEMPEL, PHILOSOPHY OF NATURAL SCIENCE 49 (1966)) ("The statements constituting a scientific explanation must be capable of empirical test.").

38. *Id.* at 2797.

39. *Id.*

40. *Id.* (citations omitted).

41. *Id.*

42. *Id.* (quoting *United States v. Downing*, 753 F.2d 1224, 1238 (3d Cir. 1985)).

43. *Id.* at 2796. The use of the word "fit" to describe this concept was first used by Judge Becker in *Downing*. See *United States v. Downing*, 753 F.2d 1224, 1242 (3d Cir. 1985).

44. *Daubert*, 113 S. Ct. at 2795 (quoting JACK B. WEINSTEIN & MARGARET A. BERGER, 3 WEINSTEIN'S EVIDENCE ¶ 702[02], at 702-18) (1993)) ("Expert testimony which does not relate to any issue in the case is not relevant and, ergo, non-helpful.").

45. *Id.* at 2795-96. The Court offered an example of the expert whose scientific training about the phases of the moon enables him to establish whether it was dark on a particular night. *Id.* at 2796. If that is the issue, the expert's testimony fits. *Id.* Yet, evidence that the moon was full on the night in question does not assist the trier on the issue of whether an individual is likely to be irrational when the moon is full. *Id.*

The *Daubert* opinion contains some additional observations that bear on the trial court's powers and responsibilities vis-à-vis scientific evidence. Without discussion, the Court reminded judges of other applicable rules and mentioned Rules 703, 706, and 403.⁴⁶ The Court further noted that scientific testimony that passes the *Daubert* threshold for admissibility may still be insufficient, leaving a trial judge free to grant summary judgment or to direct a judgment pursuant to Rule 50(a).⁴⁷ Finally, the Court concluded by recognizing that the law's interest in ascertaining the truth differs from that of the scientific community.⁴⁸ Even though "[s]cientific conclusions are subject to perpetual revision," the need to "resolve disputes finally and quickly" in a courtroom "inevitably on occasion will prevent the jury from learning of authentic insights and innovations."⁴⁹

II. THE PROCEDURAL IMPLICATIONS OF *DAUBERT*

A. THE CRIMINAL CASE: THE NOVEL FORENSIC TECHNIQUE

1. Viewing *Daubert* in a Forensic Context

This discussion commences with criminal cases for a number of reasons. First, in a criminal case, the central objective of litigation is clear: the accurate determination of the defendant's guilt is the central concern which outweighs any other possible procedural objective.⁵⁰ The *Daubert* Court's effort to ensure evidentiary reliability with regard to scientific evidence would therefore appear most compelling in criminal prosecutions. Nevertheless, the accused may be more handicapped in challenging expert scientific proof proffered against him than

46. *Id.* at 2797-98.

47. *Id.* at 2798. The *Daubert* Court cited two Bendectin cases for this proposition, *Turpin v. Merrell Dow Pharmaceuticals, Inc.*, 959 F.2d 1349 (6th Cir. 1992) (summary judgment) and *Brock v. Merrell Dow Pharmaceuticals, Inc.*, 874 F.2d 307 (5th Cir. 1989) (judgment as a matter of law), *modified*, 884 F.2d 166 (5th Cir. 1989), and *cert. denied*, 494 U.S. 1046 (1990). *Id.*

48. *Id.*

49. *Id.*

50. This concern is manifested through a variety of constitutional, evidentiary, and procedural guarantees ranging from rights guaranteed by the Fifth and Sixth Amendments, the other crimes evidence rule embodied in Federal Rule of Evidence 404 that hinges on the presumption of innocence, and the beyond a reasonable doubt standard. See *In re Winship*, 397 U.S. 358, 364 (1970) (stating that "every individual going about his ordinary affairs [must] have confidence that his government cannot find him guilty of a criminal offense without convincing a proper fact finder of his guilt with utmost certainty").

the civil litigant because of less extensive discovery rights,⁵¹ fewer resources,⁵² and because the prosecution may have a somewhat vested interest if it participated in creating and applying the forensic technique in question.⁵³ Criminal cases are therefore of interest as a baseline from which to evaluate how courts should handle scientific evidence in civil cases. In a civil case, in which neither side needs special protection against errors of fact-finding, procedural mechanisms that are not available in a criminal case may be more consonant with the need for reliable evidence.⁵⁴

Further, the factors the *Daubert* Court discussed as bearing on reliability and relevancy emerge particularly clearly in a criminal case. The methodological problems on the Court's non-definitive list are easier to comprehend in terms of a forensic test to establish identity than in connection with scientific evidence typically proffered to prove causation in toxic tort cases such as *Daubert*. When faced with the admissibility of tests that purport to match two substances, it is relatively easy to at least grasp how concepts such as falsifiability and error rate relate in determining whether a test can be validated and what it proves.⁵⁵ Although the science underlying statistical issues may be extremely complex, the significance of a statistical problem in the particular case is not difficult to understand.⁵⁶ In toxic tort cases such as *Daubert*, understanding methodological and statistical issues with regard to epidemiological studies is considerably more difficult. Dealing with these issues first in the criminal context may illuminate the problems a court faces when acting as a gatekeeper in civil litigation.

Finally, it is only fitting to start by revisiting forensic evidence. The discredited *Frye* approach originated with this kind

51. Paul C. Gianelli, "Junk Science": *The Criminal Cases*, 84 J. CRIM. L. & CRIMINOLOGY 105, 126 (1993).

52. *Id.* at 124-26.

53. See *infra* note 95 and accompanying text.

54. *Speiser v. Randall*, 357 U.S. 513, 525-26 (1958) ("There is always in litigation a margin of error, representing error in factfinding, which both parties must take into account. Where one party has at stake an interest of transcending value—as a criminal defendant his liberty—this margin of error is reduced as to him by the process of placing on the other party the burden of producing a sufficiency of proof in the first instance, and of persuading the factfinder at the conclusion of the trial of his guilt beyond a reasonable doubt.")

55. See discussion *infra* parts II.A.2.b-c.

56. How to resolve statistical issues may be considerably more difficult. See discussion of the DNA debate *infra* at notes 75, 99 and accompanying text.

of proof and was invoked primarily in criminal cases.⁵⁷ *Daubert's* capacity to achieve better results than *Frye* should be tested by examining whether unreliable scientific opinions will now be barred. This discussion concludes that without assistance from trial courts, *Daubert* cannot adequately protect a defendant.

2. Pre-*Daubert* Problems with Forensic Proof

Because forensic proof is often the most devastating evidence offered against criminal defendants, it would seem that courts would stringently screen novel scientific evidence in criminal cases. Nevertheless, forensic tests and techniques have in the past made their way into the courtroom only to disappear after being discredited.⁵⁸ Moreover, commentators have directed scathing criticism at forensic identification "scientists" who regularly testify.⁵⁹

Pre-*Daubert* cases indicate that novel forensic evidence could gain admission despite three somewhat different failings. Each of these problems is briefly explored and then reanalyzed in terms of how the issue should be approached post-*Daubert*.

a. Lack of Validation

Considerable forensic evidence made its way into the courtroom without empirical validation of the underlying theory and/or its particular application. Courts never required some of the most venerable branches of forensic science—such as fingerprinting, ballistics, and handwriting—to demonstrate their ability to make unique identifications.⁶⁰ Voiceprint evidence

57. See Gianelli, *supra* note 51, at 111 (noting that courts did not apply *Frye* in a civil case until 1984).

58. See Paul C. Giannelli, *Scientific Evidence in Criminal Prosecutions*, 137 MIL. L. REV. 167, 174-76 (1992) (discussing the paraffin test, voiceprints, and hypnotically-refreshed evidence).

59. See, e.g., Randolph N. Jonakait, *Forensic Science: The Need for Regulation*, 4 HARV. J.L. & TECH. 109 (1991) (criticizing the poor quality that pervades forensic science); Michael J. Saks, *Implications of the Daubert Test for Forensic Identification Science*, 1 SHEPARD'S EXPERT & SCI. EVID. Q. 427 (1994) ("[M]ost of the forensic identification sciences cannot begin to meet the new *Daubert* criterion by which they will be tested, although they easily passed the old *Frye* standard. Identification science consists largely of speculation, impression, and intuition. It is a field of assertedly scientific endeavor that, ironically, cannot offer sufficient research data in its own behalf simply because its basic theoretical notions have been subjected to virtually no empirical testing.").

60. See Saks, *supra* note 59, at 429-33 (with the exception of DNA typing, "forensic identification science has had the courthouse door thrown wide open to it after virtually no scrutiny"). *Id.* at 433.

gradually faded from the courtroom only after a blue-ribbon panel, appointed by the National Academy of Sciences, concluded that the scientific results reported to date did not provide quantitative information that the accuracy of voice identifications improved when voice spectrograms are used.⁶¹ The "paraffin" test has been discredited,⁶² and the ability of handwriting examiners to reach accurate results has been questioned.⁶³

Furthermore, even when scientists empirically validated a forensic theory in a laboratory, they may not have verified the particular courtroom application of the theory the profferer is using. Thus, an expert may base her testimony on laboratory applications in which the test was used to answer different questions than those before the court.⁶⁴ For instance, just because a test can match two samples of blood drawn in the laboratory does not mean that the test is necessarily accurate if the blood is degraded or contaminated with other substances.⁶⁵ Often the

61. COMMITTEE ON EVALUATION OF SOUND SPECTROGRAMS, NATIONAL RESEARCH COUNCIL, ON THE THEORY AND PRACTICE OF VOICE IDENTIFICATION 10 (1979) (The technique "lacks a solid theoretical basis of answers to scientific questions concerning the foundations of voice identification. This disparity between practice and theory appears to be recognized by practitioners and scientists involved in the field of voice identification."). Despite the apparent disappearance of voice prints from the forensic scene, it is interesting to note that the Supreme Court cited two voiceprint cases, *United States v. Smith*, 869 F.2d 348 (7th Cir. 1989) and *United States v. Williams*, 583 F.2d 1194 (2d Cir. 1978), *cert. denied*, 439 U.S. 1117 (1979), with approval in *Daubert*, the first for considering the known or potential rate of error, and the second for considering the existence of professional standards. *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 113 S. Ct. 2786, 2797 (1993).

62. Paul C. Giannelli, *The Admissibility of Novel Scientific Evidence: Frye v. United States, a Half-Century Later*, 80 COLUM. L. REV. 1197, 1224-25 (1980).

63. See the forceful argument in D. Michael Risinger et al., *Exorcism of Ignorance as a Proxy for Rational Knowledge: The Lessons of Handwriting Identification Expertise*, 137 U. PA. L. REV. 731 (1989). But see Moshe Kam et al., *Proficiency of Professional Document Examiners in Writer Identification*, 39 J. FORENSIC SCI. 5, 7, 13 (1994) (conceding "a lamentable lack of empirical evidence" but reporting that FBI examiners performed considerably better on a test devised by the authors than college-educated nonexperts).

64. For example, a witness in 1988 may speak of DNA technology as having been established in the 1960s even though no thought was given to forensic applications until the 1980s. Possible limitations on finding matches, as when the DNA was graded or contaminated, were not explored until lawyers, academics, and law reviews began asking specific questions.

65. See PAUL C. GIANNELLI & EDWARD J. IMWINKELRIED, 1 SCIENTIFIC EVIDENCE 564-67 (2d ed. 1993) (reviewing judicial treatment of electrophoretic analysis of dried blood stains); see also Note, *The Admissibility of Electrophoretic Methods of Genetic Marker Bloodstain Typing Under Frye Standard*, 11 OKLA. CITY U. L. REV. 773 (1986) (concluding that the proficiency of blood typing examiners is a legitimate concern).

inability of a test to do what its proponents claim in a forensic setting becomes evident only when lawyers start inquiring into case specific conditions. Even though every person's DNA is unique (except for identical twins), a particular technique for comparing samples of DNA may be invalid.⁶⁶

The language and reasoning of *Daubert* stress the need for empirical verification of a technique's capacity to generate accurate conclusions about a controverted issue.⁶⁷ The emphasis on testing, falsification, and validation suggests that a court should require the prosecution to lay an adequate foundation about exactly what the new test can do.⁶⁸ Furthermore, a court must make sure that the conclusions the technique generates "fit" the specific facts of the particular case; otherwise there is no "valid scientific connection to the pertinent inquiry."⁶⁹

b. *Statistical Issues*

Prior to *Daubert*, courts admitted scientific evidence without noticing that, in some instances, the probative value of the evidence depends on background statistical information. If, for example, the samples of tape to which a defendant had access at his place of work match samples of tape used to manufacture a bomb sent through the mails from an unknown location, the probative value of that evidence is virtually non-existent if thousands of identical rolls of tape were distributed throughout the world.⁷⁰ The crucial scientific inquiry in these cases is not

66. See Sheila Jasanoff, *What Judges Should Know About the Sociology of Science*, 77 JUDICATURE 77, 79 (1993) (describing Maine sexual molestation case in which prosecution's experts identified a match between DNA samples, although bands had shifted, because they applied a percentage correction; defense counsel were able to show that the correction technique had never been validated).

67. The Court recognized that "a key question [is] . . . whether a theory or technique . . . can be (and has been) tested." *Daubert*, 113 S. Ct. at 2796. The Court's retention of a "general acceptance" factor on its non-definitive list, see *supra* text accompanying note 41, may mean that the courts will "grandfather in" established forensic disciplines without requiring further empirical scrutiny. Yet, it should be noted that the *Daubert* Court specifically declined to limit its analysis to novel scientific evidence, although it acknowledged that "well-established propositions are less likely to be challenged than those that are novel . . ." *Id.* at 2796 n.11.

68. See *supra* text accompanying notes 36-39.

69. *Daubert*, 113 S. Ct. at 2796.

70. See *United States v. Stifel*, 433 F.2d 431, 435-36 (6th Cir. 1970) (testifying expert claiming that fragments of tape on bomb packing matched samples of tape taken from defendant's place of work and both samples came from same manufacturer and same batch), *cert. denied*, 401 U.S. 994 (1971), *vacated*, 594 F. Supp. 1525, 1542-43 (N.D. Ohio 1984) (vacating conviction primarily because

only whether the technique is capable of producing matches, but also the probability that other matches exist.⁷¹

It is true of course that when a test can reliably match two samples, such as samples of a defendant's blood, hair, drugs, or bullets, with samples taken at the crime scene, the resulting evidence passes the basic Rule 401 relevancy test. A match does have a "tendency to make the existence of any fact that is of consequence to the determination of the action more probable . . . than it would be without the evidence."⁷² We allow eyewitnesses to testify that the person fleeing the scene wore a yellow jacket and permit proof that a defendant owned a yellow jacket without establishing the background rate of yellow jackets in the community. Jurors understand, however, that others than the accused own yellow jackets. When experts testify about samples matching in every respect, the jurors may be oblivious to the probability concerns if no background rate is offered,⁷³ or may be unduly prejudiced or confused if the probability of a match is confused with the probability of guilt,⁷⁴ or if a background rate is offered that does not have an adequate scientific foundation.⁷⁵

of Fifth Amendment *Brady* violations but also because evidentiary hearing demonstrated that sample from bomb packing did not differ from other samples of tape that came from different batches); *cf. Jent v. State*, 408 So. 2d 1024, 1029 (Fla. 1981) (per curiam) (allowing testimony about hair matching without any discussion of mathematical probability), *cert. denied*, 457 U.S. 1111 (1982).

71. See, e.g., ANDRE A. MOENSSENS ET AL., SCIENTIFIC EVIDENCE IN CRIMINAL CASES 541 (3d ed. 1986) (arguing that while courts have admitted neutron activation analysis to match bullets and to link the accused to a crime involving the use of a firearm, "the number of bullets manufactured with similar elemental characteristics by the same manufacturer may be so numerous as to make the likelihood of the accused's link to the evidence bullet statistically tenuous.").

72. Federal Rule of Evidence 401 provides as follows: "Relevant evidence" means evidence having any tendency to make the existence of any fact that is of consequence to the determination of the action more probable or less probable than it would be without the evidence." FED. R. EVID. 401.

73. See, for example, *Stifel*, 433 F.2d at 441 and *Stifel*, 594 F. Supp. at 1537.

74. See, e.g., *United States v. Massey*, 594 F.2d 676, 680 (8th Cir. 1979) (noting that prosecutor confused probability of match of hair with probability of guilt).

75. In 1988, in *Andrews v. State*, the first case in which the prosecution offered DNA evidence to prove guilt in a criminal trial, the expert testified that the probability that the DNA in question came from someone else was 1 in 839,914,540. 533 So. 2d 841, 843 (Fla. Dist. Ct. App. 1988). The defendant did not call an expert. In contrast, in a 1990 evidentiary hearing, the FBI initially stated the likelihood of a DNA match was 1 in 270,000 and then recalculated the odds to be 1 in 35,000. *United States v. Bonds*, 12 F.3d 540, 551 (6th Cir. 1993), *affg sub nom. United States v. Yee*, 134 F.R.D. 161 (N.D. Ohio 1991) (rejecting the defense's position of a 1 in 49 probability). Regardless of what one

The *Daubert* Court reminded judges that they have the power to exclude prejudicial or confusing evidence pursuant to Rule 403: "Expert evidence can be both powerful and quite misleading because of the difficulty in evaluating it. Because of this risk, the judge in weighing possible prejudice against probative force under Rule 403 of the present rules exercises more control over experts than over lay witnesses."⁷⁶

c. *Rates of Error and Proficiency Testing*

Pre-*Daubert* courts often ignored laboratory and technician error rates resulting from the subjectivity involved in interpreting particular forensic tests and overlooked the lack of proper laboratory procedures that can produce other kinds of errors.⁷⁷ Courts treated both of these sources of unreliability as going to the "weight" of the evidence rather than as part of a foundational inquiry.⁷⁸

It is not yet clear what *Daubert* requires the profferer to show as to the technicians' proficiency and the accuracy of their procedures.⁷⁹ The *Daubert* Court noted rate of error as a pertinent aspect of the underlying methodological examination.⁸⁰ The Court's mention of the existence of professional standards in connection with this discussion⁸¹ provides some indication

thinks the appropriate probabilities are in cases of DNA evidence, the magnitude of the difference between *Andrews* and *Yee* is striking.

76. *Daubert*, 113 S. Ct. at 2798 (quoting Jack B. Weinstein, *Rule 702 of the Federal Rules of Evidence Is Sound: It Should Not Be Amended*, 138 F.R.D. 631, 632 (1991)); see generally Lawrence H. Tribe, *Trial by Mathematics: Precision and Ritual in the Legal Process*, 84 HARV. L. REV. 1329 (1971) (considering the "accuracy, appropriateness, and possible dangers of utilizing mathematical methods in the legal process").

77. See Jonakait, *supra* note 59, at 137-48 (discussing lack of empirical base for and admissibility of forensic testing); NATIONAL RESEARCH COUNCIL, DNA TECHNOLOGY IN FORENSIC SCIENCE (1992) (Chapter 4 addresses proficiency concerns).

78. Edward J. Imwinkelried, *The Debate in the DNA Cases Over the Foundation for the Admission of Scientific Evidence: The Importance of Human Error as a Cause of Forensic Misanalysis*, 69 WASH. U. L.Q. 19, 21 & n.10 (1991).

79. The extent to which such rates can be developed for tests is also subject to debate. For example, it is unclear whether the lack of data is due to the unwillingness of forensic scientists to investigate error rates or because the nature of many forensic tests preclude such an inquiry. See Randolph N. Jonakait, *Real Science and Forensic Science*, 1 SHEPARD'S EXPERT & SCI. EVID. Q. 435, 443-48 (1994); John I. Thornton, *Courts of Law v. Courts of Science: A Forensic Scientist's Reaction to Daubert*, 1 SHEPARD'S EXPERT & SCI. EVID. Q. 475, 480-82 (1994).

80. *Daubert*, 113 S. Ct. at 2797.

81. See *id.*

that the Court was concerned with how laboratory personnel carried out the scientific test in question, and not merely with ascertaining whether the test could provide results within a tolerable degree of error when the laboratory is working properly. Because of *Daubert's* emphasis on evidentiary reliability, it is certainly theoretically arguable that the profferer should bear a threshold burden with regard to proficiency issues in criminal cases. Putting the burden on the prosecutor is particularly appropriate because an agency of the government that is prosecuting the defendant probably developed, funded, and tested the technique in question. Whether in fact it is feasible to develop proficiency testing has not yet been adequately explored.⁸²

3. Realizing the *Daubert* Court's Reliability Objective Within the Criminal System

Given the realities of the criminal justice system, trial courts will find difficulty in effectuating the *Daubert* Court's concern regarding the reliability of scientific evidence. If the past is any guide, novel forensic evidence will continue to materialize in cases in which a defendant has court-appointed counsel who may well know nothing about the new technique, not even perhaps that it is a new technique,⁸³ and does not have funds to obtain the services of an expert.⁸⁴ Studies show that courts have been quite reluctant to authorize funds for defense experts.⁸⁵

Under these circumstances, it is unlikely that the defense will be able to adequately explore the problems with forensic evidence discussed above even though the defendant is entitled to considerable disclosure with respect to scientific evidence. Rule 16(a)(1)(D) of the Federal Rules of Criminal Procedure allows the defendant upon request to obtain "any results or reports . . . of scientific tests or experiments" in the possession of the government "which are material to the preparation of the defense or are intended for use by the government as evidence in chief at

82. See Thornton, *supra* note 79, at 481 (pointing to the lack of any statistics on error rates in operational crime laboratories).

83. See *United States v. Bynum*, 3 F.3d 769, 773 (4th Cir. 1993) (stating that "after the trial, defense counsel read in the newspaper that Bynum's conviction was the first obtained under the new federal/state 'Sniffer' program," involving gas chromatography of cocaine), *cert. denied*, 114 S. Ct. 1105 (1994).

84. See, e.g., Giannelli, *supra* note 51, at 124-25; Peter J. Neufeld & Neville Colman, *When Science Takes the Witness Stand*, 262 SCI. AM. 46, 53 (May 1990).

85. Giannelli, *supra* note 51, at 124-25.

the trial."⁸⁶ Courts have generally limited this provision to tests performed in connection with the immediate proceedings.⁸⁷ In an unusual DNA decision, *United States v. Yee*,⁸⁸ a magistrate judge allowed the defendants to obtain materials pertaining to the validity of DNA testing, its statistical basis, and proficiency tests by interpreting Rule 16(a)(1)(C) extremely broadly.⁸⁹ Without expert assistance, however, the defense may not know what to seek pursuant to these provisions or how to interpret any information that it does receive.

As of December 1, 1993, which is post-*Daubert*, a defendant may also request the following information from the government:

At the defendant's request, the government shall disclose to the defendant a written summary of testimony the government intends to use under Rules 702, 703, or 705 of the Federal Rules of Evidence during its case in chief at trial. This summary must describe the witnesses' opinions, the bases and the reasons therefor, and the witnesses' qualifications.⁹⁰

Although the summary required by Rule 16 provides the defense with some notice, the requirement of setting forth "the bases and reasons for" the witnesses' opinions does not track the methodological factors set forth by the *Daubert* Court.⁹¹ In contrast to the detailed information that *Daubert* deemed essential, the disclosures in the summary are apt to be too conclusory to educate defense counsel or to provide them with effective ammunition for cross-examination. In the case of a novel technique, for instance, scientifically unsophisticated attorneys often fail to appreciate that the expert's conclusion rests on unestablished probabilities, and thus, information about statistical issues is unlikely to be forthcoming.⁹²

86. FED. R. CRIM. P. 16(a)(1)(D).

87. See *United States v. Orzechowski*, 547 F.2d 978, 983-85 (7th Cir.), cert. denied, 431 U.S. 906 (1977).

88. 129 F.R.D. 629 (N.D. Ohio 1990).

89. *Id.* at 632-35. Rule 16(a)(1)(C) allows the defendant on request to obtain "documents" in the government's possession "which are material to the preparation of the defendant's defense." *Id.*

90. FED. R. CRIM. P. 16(a)(1)(E) & (b)(1)(C)1. The rule "does not distinguish between those cases where the expert will be presenting testimony on novel scientific evidence." FED. R. CRIM. P. 16 advisory committee's note.

91. See *supra* notes 34-40 and accompanying text.

92. Cf. *United States v. Bynum*, 3 F.3d 769 (4th Cir. 1993), cert. denied, 114 S. Ct. 1105 (1994). In *Bynum*, the prosecution sought to link the alleged conspirators together by establishing that cocaine seized at different locations all came from the same batch. *Id.* at 772. The court upheld the trial judge's pre-*Daubert* admission of a cocaine analysis using gas chromatography, noting that the government's "proffer of evidence could hardly have better anticipated

Courts should adopt procedures that ensure the admission of more reliable forensic evidence. Considering the time needed to understand and investigate a new technique, courts should require prosecutors to give notice of their intention to offer "novel"⁹³ forensic evidence as soon as this decision is reached.

Courts might also consider appointing experts pursuant to Rule 706 of the Federal Rules of Evidence⁹⁴ to advise the court specifically about the methodological issues *Daubert* raises. The expert would not be asked to opine about the ultimate conclusions, such as whether the defendant's blood is a match for the blood found on the victim, but only about issues that are relevant to the judge's gatekeeping role.

With regard to the danger that an expert's opinion is based on a technique incapable of producing accurate results, an expert who knows how to set up validating tests might be far more helpful than an expert who has a stake in the technique in question.⁹⁵ The less related the expert is to the precise expertise giving rise to the new technique, the less likely the expert will have preconceived notions.

A court-appointed expert will not be useful, however, unless the expert understands the facts and issues that arise in the

Daubert." *Id.* at 773. The government explained the hypotheses underlying the forensic technique, listed the numerous publications indicating that the technique had been subjected to peer review, and concluded with a citation to authority that "gas chromatography enjoys general acceptance in the field of forensic chemistry." *Id.* The prosecution did not mention the significance of matches of samples nor did it offer evidence as to the extent to which the batches of cocaine differed from each other.

93. "Novel" in this context should mean that the federal circuit in which the district court is located has not yet rendered an opinion about the admissibility of this type of evidence. By the time the issue reaches the appellate court, therefore, it may have been explored by a number of district judges thereby increasing the possibility that the validity of the test will have been explored in a number of different factual contexts.

94. Federal Rule of Evidence 706(a) provides in part:

The court may on its own motion or on the motion of any party enter an order to show cause why expert witnesses should not be appointed, and may request the parties to submit nominations. The court may appoint any expert witnesses agreed upon by the parties, and may appoint expert witnesses of its own selection.

FED. R. EVID. 706. Rule 706 and related statutes authorize payments to the experts from public funds. See Joe S. Cecil & Thomas E. Willging, *Court-Appointed Experts: Defining the Role of Experts Appointed Under Federal Rule of Evidence 706*, 58-59 (Federal Judicial Center 1993).

95. See, e.g., MOENSSSENS ET AL., *supra* note 71, at 664 (noting that whatever "general acceptance" existed with regard to voiceprints, "it was only among those few workers who had staked a career on practicing 'voiceprint identification'").

particular case as opposed to the laboratory. When analyzing blood samples, for example, the expert must consider whether particular problems exist, such as degraded or contaminated blood, whose impact has not yet been adequately tested.⁹⁶ Lawyers are probably more likely than scientists to see such case specific issues. A court might also consider appointing a scientifically sophisticated neutral lawyer⁹⁷ to articulate for the methodological expert the issues that need to be addressed.⁹⁸

It may prove more difficult to provide assistance to a court so that it can avoid errors and prejudice due to misrepresentations or omissions about the statistical significance of the evidence produced. Experience with DNA indicates that there may be strong differences of opinion in the scientific community about how to calculate probability estimates.⁹⁹ When scientists strongly disagree, the judge may have to limit the court-appointed expert's conclusions to explaining why and how experts in the field differ. Consequently, the court will be in a better position to make choices, such as placing limits on the probabilities to which the expert may testify.¹⁰⁰ It may also be possible to use verbal formulations to avoid prejudice when uncertainty surrounds probability estimates.¹⁰¹

96. See *supra* note 65 and accompanying text.

97. At the risk of touting my own field, I would suggest that law professors might function effectively in such a capacity.

98. Cf. Margaret A. Berger, PROCEDURAL AND EVIDENTIARY MECHANISMS FOR DEALING WITH EXPERTS IN TOXIC TORT LITIGATION: A CRITIQUE AND PROPOSAL 53 (Carnegie Comm'n on Science, Technology & Gov't 1991) (suggesting that special masters might formulate issues for Rule 706 experts in toxic tort litigations).

99. See *United States v. Bonds*, 12 F.3d 540, 542, 564-65 (6th Cir. 1993); NATIONAL RESEARCH COUNCIL, *supra* note 77 (Chapter 3 recommends "ceiling" principle).

100. For a discussion of the controversy that arose with regard to the calculation of frequency estimates in connection with DNA evidence, see, for example, *United States v. Porter*, 618 A.2d 629 (D.C. Cir. 1992); *State v. Vandebogart*, 616 A.2d 483 (N.H. 1992); *State v. Anderson*, 853 P.2d 135 (N.M. Ct. App.), cert. granted, 848 P.2d 531 (N.M. 1993). For an explanation and analysis of the ceiling principle endorsed by the NRC report, see Richard Lempert, *DNA, Science and the Law: Two Cheers for the Ceiling Principle*, 34 JURIMETRICS J. 41 (1993). See also B. Devlin et al., *Comments on the Statistical Aspects of the NRC's Report on DNA Typing*, 39 J. FORENSIC SCI. 28, 34 (1994) (concluding that "there is no scientific motivation for the NRC panel's ceiling principle," but acknowledging that "the appropriate degree of conservatism is a decision for legal scholars, not population geneticists or statisticians.").

101. See Kenneth R. Kreiling, *DNA Technology in Forensic Science*, 33 JURIMETRICS J. 449, 479 n.132 (1993) (discussing Canadian cases in which juries are instructed that matches are "rare" or "extremely rare."); see also GIAN-

Instead of appointing expert witnesses, a magistrate might conduct hearings about the new technique and then render a report.¹⁰² Issues bearing on laboratory procedures and proficiency might be better explored in such a setting than by asking a court-appointed expert to investigate the laboratory which performed the forensic work.

B. CIVIL CASES

1. Characteristics and Scope of Discussion

The procedural landscape in which issues arise as to the admissibility of scientific evidence is obviously vastly different in civil cases. The central imperative to protect a particular party against inaccurate determinations is absent in the civil context. Courts must consider efficiency and economy, as well as just results, in handling expert proof, because the effective resolution of controversies is itself a central goal of our civil procedural system.¹⁰³

In civil cases, disputes about scientific evidence almost invariably arise in the context of battling adverse experts. In many sorts of civil litigation, the plaintiffs cannot satisfy their burden of proof without scientific evidence. Consequently, unlike criminal defendants who need not present a case, civil plaintiffs will always have some expert testimony available or they would not be in court. The potential for adversarial exploration of scientific evidence is thus more even-handed in civil than in criminal cases.¹⁰⁴ Furthermore, the new rules on expert discovery provide civil litigants with tools to test their opponents' sci-

NELLI & IMWINKELRIED, *supra* note 65, at 578 (guidelines for verbal formulations for evaluating paternity statistics).

102. See *United States v. Yee*, 134 F.R.D. 161 (N.D. Ohio 1991) (adopting a magistrate's 120-page report and admitting evidence which resulted in a conviction), *aff'd sub nom.* *United States v. Bonds*, 12 F.3d 540 (6th Cir. 1993).

103. See, e.g., FED. R. CIV. P. 1 (these rules "shall be construed to secure the just, speedy, and inexpensive determination of every action."); Civil Justice Reform Act of 1990, Pub. L. No. 101-650, 104 Stat. 5090 (codified at 28 U.S.C.A. §§ 471-482 (West 1993)) (codifying expense and delay reduction plans); see also *supra* text accompanying note 49 (quoting the *Daubert* Court regarding efficiency and finality).

104. Of course, disparities in resources among civil litigants may mean that the parties will not have equal access to experts. In the mass tort context discussed below, this problem may be less pressing than in other kinds of litigation, because the plaintiffs' bar now has adequate capital to handle these cases effectively. See Jack B. Weinstein, *Ethical Dilemmas in Mass Tort Litigation*, 88 Nw. U. L. Rev. 469, 480 (1994) (discussing impact of well-organized and well-financed plaintiffs' bar).

entific evidence prior to trial in an adversarial context, as depositions of experts are now available as of right.¹⁰⁵

The following discussion demonstrates the impact these characteristics have on the resolution of issues surrounding the presentation of scientific evidence. The discussion considers these questions in the context of toxic tort litigation, both because *Daubert* itself belongs in this category and because a considerable number of opinions already exist that illuminate problems that will arise.

The first section considers how *Daubert's* twin objectives—liberality in admitting expert proof and the exclusion of unreliable scientific evidence—intersect with the new discovery rules¹⁰⁶ to affect the in limine screening of expert scientific testimony. The discussion concentrates on objections a defendant can make to a plaintiff's expert evidence because that is the usual context in which challenges to the admissibility of expert scientific evidence arise. The second section considers a number of other issues that a court will face in exercising its gatekeeping obligation such as the nature of in limine hearings and the impact of *Daubert* on summary judgment motions. The final section considers the problems raised by multi-party toxic tort litigation and the potential of various procedural devices to reduce the need to re-examine scientific evidence in numerous separate actions.

105. Federal Rule of Civil Procedure 26(b)(4)(A) provides as follows: "A party may depose any person who has been identified as an expert whose opinions may be presented at trial. If a report from the expert is required under subdivision (a)(2)(B), the deposition shall not be conducted until after the report is provided." FED. R. CIV. P. 26(b)(4)(A).

106. Throughout the following discussion, the author assumes that the December 1, 1993 amendments to the discovery rules are in effect. Primarily pertinent to the discussion below are the provisions for mandatory expert disclosure in Rule 26(a)(2)(A) and the provisions for planning future discovery in Rule 26(f), both of which are discussed below. See *infra* notes 131-135, 155-156 and accompanying text. Neither of these rules changes were hotly opposed in Congress, and they were not included in the bill passed by the House of Representatives that sought to keep some provisions from taking effect. Carl Tobias, *Let Sleeping Legislation Lie*, CONN. L. TRIB., Feb. 7, 1994, at 24. Although some districts have opted-out of these provisions, they have primarily opted-out of the initial mandatory disclosure procedure specified in Rule 26(a)(1) that has no bearing on this Article. As of the date of this writing, the situation is so fluid and confused that it seems pointless to provide details about the various districts' actions. Indeed, a memorandum prepared by the Federal Judicial Center dated March 3, 1994 contains the most current and detailed information available. This memorandum summarizes the action taken by the district courts, but the FJC specifically requests that the document not be cited as legal authority.

2. Triggering Judicial Screening

a. *Defendant's Burden*

The *Daubert* Court did not enumerate the circumstances that will trigger judicial screening pursuant to Rule 104(a). In a civil case, however, the evidentiary policies underlying *Daubert's* competing rationales, efficiency and fairness concerns, and the structure of the discovery rules, all dictate placing a burden on the opponent of the evidence to make a prima facie showing that the proponent's evidence suffers from the deficiencies identified in *Daubert*, before the court has any obligation to undertake an admissibility determination.¹⁰⁷

Allocating the initial burden to the opponent of the evidence furthers the *Daubert* Court's gatekeeping objective without hampering the "liberal thrust" of the Federal Rules—vis a vis expert testimony. The Federal Rules of Evidence mandate a somewhat similar approach for evidence that satisfies the business record or public record hearsay exceptions. The evidence is admissible "unless the sources of information or other circumstances indicate lack of trustworthiness."¹⁰⁸ This formulation accommodates the preference for liberally admitting such evidence and the concern that such evidence may at times be unreliable. Consequently, the evidence is made presumptively admissible. The Court's analysis in *Daubert* suggests that scientific expert testimony requires the same treatment—the evidence should be presumed to be admissible until the opponent discharges its burden to show the contrary. There is one important difference. Unlike the hearsay exceptions which place the burden of persuasion on the opponent of the evidence with regard to lack of trustworthiness, Rule 104(a) requires the burden of persuasion to remain with the profferor.¹⁰⁹ Accordingly, the defendant only has to shoulder the burden of coming forward with evidence showing that the plaintiff's expert proof is inadmissible. Plaintiff bears the burden of showing by a preponderance of the evidence that the expert's opinion is admissible.

107. See *infra* part II.B.4. (discussing analogous treatment of defendant's initial burden of production on summary judgment motions turning on the admissibility or sufficiency of scientific evidence).

108. FED. R. EVID. 803(8); see FED. R. EVID. 803(6).

109. See *supra* notes 28-33 and accompanying text.

Placing the burden of production on the defendant also furthers the prime evidentiary objective of accurate fact-finding¹¹⁰ which in the civil context is not skewed by the need to protect the accused. The core insight of *Daubert* is the recognition that expert scientific evidence cannot assist the trier of fact unless it reflects valid scientific thinking. By rejecting *Frye's* "general acceptance" standard, the Court has spurned reliance on pat formulae. Instead, the majority's analysis acknowledges that determining validity will require judicial consideration of numerous complex factors. In order for a court to perform this task, it needs information. Imposing a burden on the defendant increases the likelihood that the court will have access to detailed methodological data that has been explored in an adversarial context at discovery. The new discovery rules on expert testimony facilitate inquiries mandated by *Daubert* because they too seek to ensure the disclosure of data underlying an expert's conclusions.¹¹¹

Daubert's endorsement of judicial screening pursuant to Rule 104(a) presupposes pretrial termination of some litigations in which scientific expert testimony is crucial. Courts have heretofore read evidentiary and procedural rules together in the context of expert testimony so as to further the goal of more effective adjudication at the pre-trial stage. Even before Rule 705—which allows experts to state their conclusions before revealing their bases—was amended to restrict its applicability to the trial context¹¹²—courts refused to allow parties to submit conclusory expert affidavits on summary judgment motions. Courts excluded such affidavits as useless in determining whether summary judgment was proper, though the experts' statements mirrored the direct testimony allowed by Rule 705, and Rule 56(e) of the Federal Rules of Civil Procedure provides

110. Federal Rule of Evidence 102 provides: "These rules shall be construed . . . to the end that the truth may be ascertained and proceedings justly determined." FED. R. EVID. 102.

111. See *infra* notes 112-113 and accompanying text.

112. In 1993, Rule 705 of the Federal Rules of Evidence was amended because amendments to Rules 16 and 26 of the Federal Rules of Civil Procedure explicitly require disclosure in advance of trial of the basis and reasons for an expert's opinions. See FED. R. CIV. P. 16 & 26. The original Rule 705 and its amended version read as follows:

The expert may testify in terms of opinion or inference and give reasons therefore without prior disclosure of first testifying to the underlying facts or data, unless the court requires otherwise. The expert may in any event be required to disclose the underlying facts or data on cross-examination.

See FED. R. EVID. 705; Fed. R. Evid. 705 (1987).

that affidavits "shall set forth such facts as would be admissible in evidence."¹¹³ The courts' reconciliation of Rule 705 and Rule 56(e) had the same objective that is here proposed—to improve the judge's ability to determine how the case should proceed.

Finally, judicial economy is served by placing an initial burden on defendant. To require courts to undertake judicial screening whenever scientific evidence is offered would needlessly overwhelm the courts. In order for a judge to determine whether an examination into methodology is justified, the burden must be higher than merely allowing the defendant to point to a battle of the experts and claim that the other side's expert is relying on invalid science.¹¹⁴

b. *Suggested Approach*

The approach proposed in this Article can be illustrated by examining a pre-*Daubert* toxic tort action, *In re Paoli R.R. Yard PCB Litigation*,¹¹⁵ and analyzing how a court might handle the expert proof issues after *Daubert*. In *Paoli*, thirty-eight plaintiffs, who worked at, or lived adjacent to the defendants' railroad yard, claimed injuries caused by exposure to PCBs.¹¹⁶ The district court granted summary judgment for the defendants after excluding the plaintiffs' expert evidence.¹¹⁷ The Third Circuit Court of Appeals reversed in an extensive opinion by Judge Becker, faulting the trial court for failing to give the plaintiffs

113. FED. R. CIV. P. 56(e); see, e.g., *Mendes-Silva v. United States*, 980 F.2d 1482, 1488 (D.C. Cir. 1993) (explaining that conclusory affidavit by expert will not suffice to avert summary judgment when discovery is almost complete).

114. Although judges express unhappiness about undue partisanship on the part of expert witnesses, see Cecil & Willging, *supra* note 94, at 13 n.23, disagreements by experts about the interpretation of data do not mean that one of the experts is relying on an invalid methodology. Much of science is subjective. A recent survey by the Federal Judicial Center concluded that orthopedists (17.8%) and neurologists (15.6%) are the two most prevalent types of experts testifying in civil cases. See J. CECIL & MOLLY JOHNSON, PROBLEMS OF EXPERT TESTIMONY IN CIVIL TRIALS: PRELIMINARY FINDINGS (Federal Judicial Center 1994) (forthcoming). *Daubert* is unlikely to have any effect in most cases in which these two types of experts testify.

115. 706 F. Supp. 358 (E.D. Pa. 1988), *rev'd*, 916 F.2d 829 (3d Cir. 1990), *and cert. denied*, 499 U.S. 961 (1991).

116. *Id.* at 361.

117. *Id.* at 376.

sufficient opportunity to develop an adequate record¹¹⁸ and for not heeding the Circuit's test for applying Rule 702.¹¹⁹

On remand, before *Daubert* and before the 1993 amendments to the Federal Rules of Civil Procedure, the district court, after five days of in limine hearings, again excluded much of the plaintiffs' expert evidence¹²⁰ and granted summary judgment.¹²¹ That determination is now on appeal. The following discussion does not address the merits of the district court's decisions; it only discusses how post-*Daubert* courts should handle the admissibility of testimony similar to that of the plaintiffs' expert witness, Dr. Nisbet, the subject of one of the in limine motions before the district court.¹²²

After the Third Circuit Court of Appeals remanded *Paoli*, the defendants, pursuant to Federal Rule of Evidence 702, requested the trial court to again exclude the testimony of Dr. Nisbet, the plaintiffs' expert in assessing the plaintiffs' exposure to PCBs.¹²³ In March 1992, Dr. Nisbet had provided a report that concluded the plaintiffs "were sufficiently exposed [to PCBs from the Paoli rail yard] . . . to lead to the expectation that they would suffer adverse health effects."¹²⁴ At a deposition in 1992, he had also testified in some detail about his theory of calculating the plaintiffs' exposure to PCBs.¹²⁵ The defendants' motion in limine to exclude Dr. Nisbet's testimony was accompanied by an affidavit from a Dr. Whysner, who then testified for the defense at the two day in limine hearing at which Dr. Nisbet also testi-

118. *Paoli*, 916 F.2d at 854 n.30. The case management order granted the plaintiffs three months for discovery limited to the nature and extent of PCBs at the railroad yard and health effects on the defendants' employees. *Id.* It also permitted the defendants discovery with regard to the plaintiffs' prima facie case of causation but did not permit the plaintiffs any discovery with regard to the defendants' experts. *Id.*

119. *Id.* at 836. Judge Becker concluded that the district court had not properly applied the circuit's *Downing* test which stresses that a Rule 702 inquiry should focus on the validity of an expert's methodology. *Id.* at 856-57 (citing *United States v. Downing*, 753 F.2d 1224 (3d Cir.1985)). The *Daubert* Court also cited *Downing* with approval and stated that it is a decision "on which our discussion draws in part." *Daubert*, 113 S. Ct. at 2797 n.12.

120. See *In re Paoli R.R. Yard PCB Litig.*, 1992 WL 321226, 1992 WL 323512, 1992 WL 323525, 1992 WL 323531, 1992 WL 323536, 1992 WL 323559, 1992 WL 323564, 1992 WL 323589, 1992 WL 323633, 1992 WL 323675, 1992 WL 323493 (E.D. Pa. 1992) (reviewing in limine motions to exclude expert testimony).

121. 1992 WL 315216 (E.D. Pa. 1992).

122. 1992 WL 321226 (E.D. Pa. 1992).

123. *Id.* at *1.

124. *Id.* at *5.

125. *Id.* at *4.

fied.¹²⁶ The court excluded Dr. Nisbet from testifying,¹²⁷ as well as other experts proffered by the plaintiffs, and granted summary judgment for the defendants.¹²⁸

The district court's opinion on the motion in limine does not identify the details of Dr. Nisbet's report. Now, however, experts who may testify at trial must furnish reports that include specified items. A few months after the *Daubert* opinion, Rule 26(a) of the Federal Rules of Civil Procedure was amended to require a party, independently of any discovery request, to disclose the identity of all expert witnesses expected to testify at trial, to provide the experts' written signed reports, and to make the expert available for deposition after the report is submitted.¹²⁹ In the absence of court order or stipulation, a party must disclose these items at least ninety days before the trial date or the date on which the case is to be ready for trial.¹³⁰

Rule 26(a)(2)(B) requires the reports to set forth "a complete statement of all opinions to be expressed and the basis and rea-

126. The defendants raised two major problems with Dr. Nisbet's methodology. First, he multiplied 1987 laboratory results regarding the plaintiffs' PCB blood levels by a factor of two and one-half to three, because he decided that the results were unreliable. *Id.* at *6. He reached this conclusion because the laboratory had reported results on other persons in 1986 that were lower than those reported by another laboratory on the same samples, which had been split and sent to different laboratories for testing. *Id.* at *5. According to the defendants' expert, standard techniques existed, which Dr. Nisbet never used, to check reliability when split sample results differ, such as requesting quality control data from the laboratories in question or seeking inter-laboratory verification data from the EPA's proficiency testing program. *Id.* at *6-8. Further, Dr. Nisbet used a method of back-calculation to arrive at conclusions about the plaintiffs' exposure to PCBs that rested on assumptions which the defendants' expert testified had no support in the scientific literature and studies. *Id.* at *11. The district court noted that Dr. Nisbet's back-calculation method had been previously found unreliable in *Carroll v. Litton Systems, Inc.*, 1990 WL 312969 (W.D.N.C. 1990). *Id.* at *19.

127. *Id.* at *20.

128. 1992 WL 315216.

129. FED. R. CIV. P. 26(a)(2); *see supra* note 106 (regarding district courts opting-out of this provision).

130. FED. R. CIV. P. 26(a)(2)(C). The Advisory Committee's note further explains that the information should be disclosed in the following manner:

[S]ufficiently in advance of trial [such] that opposing parties have a reasonable opportunity to prepare for effective cross examination and perhaps arrange for expert testimony from other witnesses. Normally the court should prescribe a time for these disclosures in a scheduling order under Rule 16(b), and in most cases the party with the burden of proof on an issue should disclose its expert testimony on that issue before other parties are required to make their disclosures with respect to that issue.

FED. R. CIV. P. 26(a)(2) advisory committee's note.

sons therefor" as well as the "data or other information considered by the witness in forming the opinions."¹³¹ These provisions probably do not contemplate underlying methodological details such as those which appear on the *Daubert* Court's non-definitive checklist of factors; the mandatory disclosure rule was drafted long before the Supreme Court issued the *Daubert* opinion.¹³² Yet, the experts' reports do provide a starting point for further inquiry, and *Daubert* informs parties of the issues that warrant further exploration during the deposition of the expert, as now authorized by Rule 26(b)(4)(A).

Assuming that the *Paoli* remand had occurred after *Daubert* and the Rules amendments, what would be the parties' obligations regarding expert scientific evidence? First, the plaintiffs would have to furnish Dr. Nisbet's report. It would have to reveal how he reached the conclusion that the plaintiffs' exposure to PCBs was sufficient to cause anticipated future adverse health effects.¹³³ As yet we have no judicial guidance about how much detail an expert must provide relating to "basis," "reasons," "data," or "information."¹³⁴ The text of Rule 26(a)(2), however, does not seem to require divulgence of error rates or whether an expert's methodology is currently used by others, two of the factors noted by the *Daubert* Court.¹³⁵ We also do not know how much information must be furnished about the methodology used.

If the defendant now moves to exclude Dr. Nisbet's testimony and supports its motion with an affidavit by Dr. Whysner alleging that Dr. Nisbet's methodology is flawed, must a court,

131. FED. R. CIV. P. 26(a)(2)(B).

132. We do not yet know if courts will look to *Daubert* in interpreting Rule 26(a)(2). See *supra* note 90 and accompanying text (discussing the similar requirement that has been added to the Federal Rules of Criminal Procedure).

133. See *supra* text accompanying note 34.

134. FED. R. CIV. P. 26(a)(2)(B). Compare the previous provision in Rule 26(b)(4), now deleted, that permitted parties to obtain the following information through interrogatories: "the subject matter on which the expert is expected to testify, and . . . the substance of the facts and opinions to which the expert is expected to testify and a summary of the grounds for each opinion." Fed. R. Civ. P. 26(b)(4)(A)(i), U.S.C.S. RULES OF CIVIL PROCEDURE, RULE 26 (1982). The Advisory Committee's note to Rule 26(a)(2) explains as follows: "The information disclosed under the former rule in answering interrogatories about the 'substance' of expert testimony was frequently so sketchy and vague that it rarely dispensed with the need to depose the expert and often was even of little help in preparing for a deposition of the witness." FED. R. CIV. P. 26(a)(2) advisory committee's note.

135. See *supra* text accompanying notes 131-132. Both of these factors were implicated in the defendants' attack on Dr. Nisbet at the *Paoli* in limine hearing. See *supra* note 126.

without more, entertain the motion in limine? If the defendant has a substantial initial burden of production, as this Article advocates,¹³⁶ then under these circumstances it did not satisfy its burden. Unless flaws in methodology are self-evident on the face of the plaintiff's expert's report, the defendant should obtain the information needed for a Rule 702 challenge without judicial assistance by deposing the expert. The amendments to the Rules are designed to provide litigants with enough information through the reports so that a subsequent deposition can focus economically and efficiently on points that need elaboration. The parties should specify the specific methodological details about which their experts disagree before the court is required to expend time on the motion.

The defendant may at times be able to satisfy its initial burden of production through statements made by the plaintiff's expert at a deposition, either by wringing a concession from the expert¹³⁷ or by developing concrete details about flaws in the expert's methodology.¹³⁸ Otherwise, the defendant will have to put forward its own experts to justify a Rule 104(a) inquiry.¹³⁹

136. See *supra* text accompanying note 114 (addressing *Daubert's* impact on the defendant's burden in a 104(a) motion).

137. See, e.g., *Porter v. Whitehall Lab., Inc.*, 9 F.3d 607, 614-15 (7th Cir. 1993). After the district court granted summary judgment on the basis of *Frye*, the Seventh Circuit remanded for further proceedings under *Daubert* and affirmed the grant of summary judgment, because "the district court's approach anticipated *Daubert's* directive." *Id.* at 614. The plaintiff claimed that the defendant's product caused plaintiff's kidney disease. *Id.* at 609. The district court rejected the plaintiff's three experts on causation. One expert failed to implicate the defendant's product as the cause for the plaintiff's disease. *Id.* at 614. The second admitted offering a "kind of a curb side opinion." *Id.* at 615. She admitted on deposition that "[i]f . . . you were asking me to give you an analytical, scientific opinion, then, I would have to research it, and I have neither the time nor the inclination to do that." *Id.* The plaintiff's third expert agreed that his opinion was a "hypothesis, the proof of which remains to be made." *Id.*

138. See, e.g., *Chikovsky v. Ortho Pharmaceutical Corp.*, 832 F. Supp. 341, 345-46 (S.D. Fla. 1993) (excluding plaintiff's expert testimony regarding the link between topical use of a Vitamin A derivative and birth defects because it did not meet *Daubert*; the expert could not testify as to how much Vitamin A could be absorbed through the skin and had not compared the dosages of Vitamin A in prior studies with the dosages in defendant's product); cf. *DeLuca v. Merrell Dow Pharmaceuticals, Inc.*, 791 F. Supp. 1042 (D.N.J. 1992), (excluding expert testimony that failed to conform to any known methodology) *aff'd mem.*, 6 F.3d 778 (3d Cir. 1993), and *cert. denied*, 114 S. Ct. 691 (1994).

139. See *Petruzzi's IGA Supermarkets, Inc. v. Darling-Delaware, Co.*, 998 F.2d 1224 (3d Cir.), *cert. denied*, 114 S. Ct. 554 (1993). The court held that the trial judge had erred in granting summary judgment by concluding that the plaintiff's expert economic evidence was inadmissible. *Id.* at 1241. The court found that the economists' method was reliable and that the defendants had not

In our *Paoli* hypothetical, this means that the defendant must produce its own expert during discovery if Dr. Nisbet did not concede errors in his methodology.¹⁴⁰

The defendant should not be permitted to satisfy this burden of production by affidavits from experts who were not part of the discovery process. In terms of fairness, both sides should be entitled to notice and a meaningful opportunity to challenge scientific expert opinions in an adversarial context. In our hypothetical, the plaintiff has not had an adequate opportunity to challenge Dr. Whysner. Courts should extend Rule 26(a)(2)'s requirement of mandatory expert disclosure to all experts utilized in bringing an in limine motion—even those who are not technically subject to Rule 26(a)(2)(B) because they are not listed as trial witnesses.¹⁴¹ Courts should not permit the defendant to obtain a hearing on a motion in limine by relying on affidavits from experts unless their identity and reports have been supplied to the plaintiff in the course of discovery and the plaintiff had an opportunity to depose. Moreover, courts should not allow

established the contrary. *Id.* at 1238. The defendants' attempt "to poke holes" in the economists' study during the experts' depositions did not suffice to establish the study's invalidity. *Id.* The court cited *Daubert*, *id.* at 1241, and specifically mentioned that no defense experts had testified that the study's method was methodologically flawed, *id.* at 1238. It therefore concluded that the defendants had "established no valid basis for challenging the study's reliability." *Id.* at 1241.

140. In *Paoli*, the defendant did depose the expert; although it may have elicited details about Dr. Nisbet's methodology during that deposition, it seems unlikely that Dr. Nisbet conceded flaws in his methodology at that time because the opinion makes no mention of this fact. His failure to verify data by standard methods seems to have been developed through Dr. Whysner's testimony at the motion in limine. *See supra* note 126.

141. A court undoubtedly has power pursuant to Federal Rule of Civil Procedure 16 to require parties to provide each other with expert reports and an opportunity for the deposition of experts retained in connection with in limine motions. Revisions to Rule 16 in 1993 emphasize the power of trial judges via "limitations or restrictions on the use of testimony under Rule 702 of the Federal Rules of Evidence," FED. R. CIV. P. 16(c)(4), "the control and scheduling of discovery," FED. R. CIV. P. 16(c)(6), and facilitating "the just, speedy, and inexpensive disposition of the action," FED. R. CIV. P. 16(c)(16). The court can inform the parties that Rule 26(a)(2)(B) provisions will apply to experts retained for in limine motions, either when considering their proposed discovery plan pursuant to Federal Rule of Civil Procedure 26(f) or at a later Rule 16 conference.

If the expert whom the defendant wishes to use in connection with a motion in limine was expected to testify at trial and disclosure was not forthcoming, the witness could not be used in connection with the motion. Federal Rule of Civil Procedure 37(c) was amended in 1993 to provide that a party may not "use as evidence at a trial, at a hearing, or on a motion any witness or information not so disclosed." FED. R. CIV. P. 37(c).

the defendant to rely on affidavits from expert witnesses whose identity and reports were disclosed, but who now wish to raise new issues about which the plaintiff never had notice.

Effectuating the goals of *Daubert* requires the defendant to meet a higher burden of production than merely alleging infirmities in the plaintiff's expert proof. The Supreme Court acknowledged that a liberal admissibility policy is embedded in the Federal Rules of Evidence, but also confirmed the judge's role in keeping unreliable evidence out of the courtroom.¹⁴² Treating the plaintiff's expert testimony as presumptively admissible until the defendant comes forward with concrete examples of unreliability accommodates both rationales. The court's need for information that may lead to a final adjudication would be frustrated if a defendant may simply allege that the plaintiff's scientific evidence is unreliable instead of providing assistance to the court. Further, requiring a defendant to show specific defects developed through discovery means that courts need not expend limited resources in manning the gates except in instances when there is good reason to fear that unreliable evidence might otherwise enter.

3. The Rule 104(a) In Limine Proceeding

As mentioned above, once the court undertakes a Rule 104(a) inquiry, the plaintiffs bear the burden of showing by a preponderance of the evidence that their expert's opinion is admissible.¹⁴³ The answers to other issues that may arise in connection with judicial screening are considerably less clear-cut.

a. *Procedural Issues*

If a court entertains a 104(a) motion, it must choose an appropriate procedure for resolving the particular controversy.¹⁴⁴ Whether a court proceeds on submitted papers, oral arguments, or evidentiary hearings will depend on the nature of the methodological issues and the responses of the parties' experts. The court may not need to hear testimony from the experts if the

142. See *supra* notes 28-33 and accompanying text.

143. *Daubert*, 113 S. Ct. at 2796 n.10 (citing *Bourjaily v. United States*, 483 U.S. 171 (1987)).

144. Federal Rule of Civil Procedure 43(e) provides the following: "When a motion is based on facts not appearing of record the court may hear the matter on affidavits presented by the respective parties, but the court may direct that the matter be heard wholly or partly on oral testimony or depositions." FED. R. Crv. P. 43(e).

methodological issues have been adequately explored at depositions.

Because of the changes in Rule 26 and the *Daubert* decision, when a court orders evidentiary hearings, they will probably be considerably shorter than the five day in limine hearings in the *Paoli* case. The court will no longer need to detail the plaintiffs' expert's methodology or the defense expert's contentions about its defects, because the parties will have elicited this information before the defendant sought judicial screening.¹⁴⁵ Instead, the court should concentrate on determining whether the plaintiffs can justify the methodology their expert used by reference to factors discussed in *Daubert*.¹⁴⁶ The court may also seek assistance from an expert appointed pursuant to Rule 706,¹⁴⁷ or authorize a magistrate judge to report after conducting a hearing so as to develop an adequate record.¹⁴⁸

b. *Types of Evidence Courts Should Consider During a Rule 104(a) Inquiry*

No evidentiary rules other than those of privilege apply at a hearing pursuant to Rule 104(a),¹⁴⁹ and Rule 43(e) of the Federal Rules of Civil Procedure authorizes the judge to proceed on affidavits, depositions, or oral testimony.¹⁵⁰ Although the dis-

145. The court might wish the parties to furnish a brief statement summarizing the facts that are in dispute about the expert's methodology. Such a statement would be akin to statements some local court rules require to be filed with a motion for summary judgment. *See, e.g.*, S.D.N.Y. & E.D.N.Y. LR 3(g) (providing that the moving party must annex "a separate, short and concise statement of the material facts as to which the moving party contends there is no genuine issue to be tried;" the opposing party must issue a similar statement setting forth the material facts as to which it claims there is a dispute).

146. *See supra* text accompanying notes 35-45.

147. *See supra* note 94 (setting forth text of Rule 706); *Renaud v. Martin Marietta Corp.*, 749 F. Supp. 1545, 1548, 1553 (D. Colo. 1990) (relying on testimony of court-appointed geologist to grant summary judgment motion for defendants; court-appointed expert advised that plaintiffs' exposure over an 11-year period to hazardous wastes could not be extrapolated from one water sample), *aff'd*, 972 F.2d 304 (10th Cir. 1992); *see also supra* notes 94-102 and accompanying text (discussing court-appointed experts in criminal cases). *See generally* Cecil & Willging, *supra* note 94, at 12-13 (noting that interviews with federal judges indicated some willingness to use court-appointed experts on issues of technical expertise).

148. *Cf. United States v. Bonds*, 12 F.3d 540, 550-51 (6th Cir. 1993) (discussing six-week DNA hearing held by magistrate judge resulting in 120-page report and recommendation that was adopted by the district court in the case below, *United States v. Yee*, 134 F.R.D. 161 (N.D. Ohio 1991)).

149. For text of Federal Rule of Civil Procedure 104(a), *see supra* note 28.

150. For text of Federal Rule of Civil Procedure 43(e), *see supra* note 144.

strict court has enormous discretion on how to proceed, oral testimony and depositions should clearly be preferred. Courts should not permit parties to submit evidence from undisclosed experts or to raise new issues for the same reasons it should not allow the defendants to rely on this evidence in obtaining a Rule 104(a) inquiry. Courts cannot attain the Supreme Court's objectives in *Daubert*—to honor the “liberal thrust” of the Federal Rules towards expert opinion while simultaneously demanding reliability—if they base decisions to exclude experts on allegations not yet tested through the adversarial process.¹⁵¹

Consequently, a court should generally restrict its review to materials developed during discovery when it rules on a Rule 104(a) motion, unless it wishes to hold an evidentiary hearing. Affidavits are too often conclusory, unfocused, and vague.¹⁵² Moreover, parties should not expect the scientifically untrained, generalist judge to deal with chapters of scientific books and articles attached to motion papers. In connection with such materials, Chief Justice Rehnquist's concern in *Daubert* is particularly apt; he expressed fears about the “obligation or authority” of trial judges “to become amateur scientists” to fulfill their gatekeeping role.¹⁵³ At a trial, the Federal Rules of Evidence ensure that such scientific data is subject to adversarial scrutiny.¹⁵⁴

c. *Procedure upon Exclusion of Expert Evidence*

To maintain the efficiency of judicial screening, courts should generally refuse to grant the plaintiff additional opportunity to obtain new expert evidence if the court excludes their original expert.¹⁵⁵ Allowing the plaintiff to look for another ex-

151. *Cf.* *Christophersen v. Allied-Signal Corp.*, 939 F.2d 1106, 1122 (5th Cir. 1991) (*en banc*) (Reavley, J., dissenting) (objecting to exclusion of plaintiff's expert testimony where exclusion was based on affidavits of defendant's experts who were never deposed), *cert. denied*, 112 S. Ct. 1280 (1992).

152. *Cf. supra* note 9 and accompanying text (regarding conclusory nature of Dr. Lamm's affidavit).

153. *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 113 S. Ct. 2786, 2800 (1993) (Rehnquist, C.J., concurring in part and dissenting in part).

154. *See* FED. R. EVID. 803(18) (allowing learned treatises to be read at trial but only in connection with expert testimony: the statements have to be “called to the attention of an expert witness upon cross-examination or [be] relied upon by the expert witness in direct examination”). Experts may rely on hearsay evidence as a basis for their opinions, *see* FED. R. EVID. 703, on cross-examination, however, the expert may be required to reveal the basis underlying the opinion, *see* FED. R. EVID. 705.

155. *Cf. Tabatchnick v. G.D. Searle & Co.*, 67 F.R.D. 49 (D.N.J. 1975) (refusing to permit testimony by expert retained by plaintiffs after trial began when

pert, who would then be subject to discovery, would obviously cause delay, expense, and the additional outlay of judicial time. If the defendant must meet a burden of production in connection with a Rule 104(a) inquiry as the foregoing discussion suggests, the plaintiff will have had notice of the defendant's objections to the plaintiff's experts, an opportunity to challenge the defense's experts, and some time in which to secure additional assistance.¹⁵⁶

4. The Motion for Summary Judgment

As the *Paoli* case demonstrates, when the defendant succeeds in excluding the plaintiffs' experts on a crucial element of the plaintiffs' case, summary judgment follows as a matter of course. In addition, as the *Daubert* Court acknowledges,¹⁵⁷ the plaintiffs' scientific evidence testimony, although admissible, may be insufficient to sustain a verdict. If the standard of proof applied to a defendant's initial burden of production in moving for summary judgment is lower than that imposed in connection with motions in limine, the defendant will seek to move for summary judgment without first moving in limine. Furthermore, if the defendant can force the plaintiffs to put in their scientific evidence without the defendant having to supply affirmative proof, the defendant will have no incentive to conduct discovery. The defendant will instead seek to bring a summary judgment motion as soon as possible. This section first considers the present unsettled law relating to the moving party's burden on a

plaintiffs should have known that testimony by other expert retained prior to trial was insufficient as to causation).

156. The plaintiffs may, of course, have considerable difficulty in obtaining scientific data supporting their position when a particular type of toxic tort claim is first put forth. A study of the Bendectin litigation suggests that scientific studies may be undertaken in response to litigation. See Sanders, *supra* note 7, at 321-48. Whether courts should respond by requiring a lesser showing from plaintiffs in early cases is beyond the scope of this Article. Cf. Richardson v. Richardson-Merrell, Inc., 857 F.2d 823 (D.C. Cir. 1988). The Richardson court explained its earlier decision in *Ferebee v. Chevron Chem. Co.*, 736 F.2d 1529 (D.C. Cir.), *cert. denied*, 469 U.S. 1062 (1984) thus:

Ferebee stands for the proposition that courts should be very reluctant to alter a jury's verdict when the causation issue is novel and "stand[s] at the frontier of current medical and epidemiological inquiry." If experts are willing to testify to causation in such situations and their methodology is sound, the jury's verdict should not be disturbed.

857 F.2d at 832 (quoting *Ferebee*, 736 F.2d at 1534) (footnote omitted). Procedural devices such as class actions and consolidation may also have the effect of lessening the plaintiff's burden. See *infra* part II.B.5.b. (discussing aggregated actions).

157. See *supra* note 47 and accompanying text.

Rule 56 motion. It then suggests that the defendant should have a substantial initial burden of production on all summary judgment motions. Relieving the defendant of the incentive to conduct discovery deprives the court of an adequate record on which to make a decision and poses too great a risk for plaintiff harassment.

Current law is far from clear on the precise nature of the standard of proof that applies to the defendant's initial burden of production in moving for summary judgment.¹⁵⁸ Although the Supreme Court addressed this issue in 1986 in *Celotex Corp. v. Catrett*,¹⁵⁹ the ensuing three opinions did little to abate the confusion. Chief Justice Rehnquist's opinion, which was joined by three other justices, commanded a majority only because Justice White concurred in the result. Justice White, however, wrote separately and disagreed sharply with the Chief Justice on the nature of the defendant's initial burden, as did Justice Brennan, who dissented.

In *Celotex*, Chief Justice Rehnquist referred to a previous opinion by the Court in *Adickes v. S.H. Kress & Co.*¹⁶⁰ and explained that language in that case should not be

construed to mean that the burden is on the party moving for summary judgment to produce evidence showing the absence of a genuine issue of material fact, even with respect to an issue on which the nonmoving party bears the burden of proof. Instead, as we have explained, the burden on the moving party may be discharged by "showing"—that is, pointing out to the district court—that there is an absence of evidence to support the nonmoving party's case.¹⁶¹

Justice White, who cast the deciding vote in *Celotex*, took a very different view: "It is not enough to move for summary judgment without supporting the motion in any way or with a conclusory assertion that the plaintiff has no evidence to prove his case. . . . It is the defendant's task to negate, if he can, the claimed basis

158. See Linda S. Mullenix, *Summary Judgment: Taming the Beast of Burdens*, 10 AM. J. TRIAL ADVOC. 413, 462 (1987) ("Remarkably, after almost fifty years of experience with the Federal Rules of Civil Procedure, it is still difficult to summarize burdens of production and persuasion under Rule 56.").

159. 477 U.S. 317 (1986).

160. 398 U.S. 144 (1970).

161. *Celotex*, 477 U.S. at 325. In *Celotex*, the defendant moved for summary judgment, claiming that the plaintiff had failed to produce any evidence of exposure to a Celotex product. *Id.* at 319-20. The Court remanded for the lower court to determine whether documents the plaintiff had produced in response to the motion would defeat summary judgment; no issue was raised relating to the admissibility of expert testimony. *Id.* at 326-28.

for the suit."¹⁶² Whatever the merits of the plurality approach in the ordinary case, when the crucial issues revolve around scientific evidence, shifting the burden to the plaintiff to "put up or shut up" should not generally suffice.¹⁶³ The nature of the court's task is of a very different order when it must evaluate scientific expert opinions than when it searches the record in a case like *Celotex* to determine whether the plaintiff has identified evidence relevant to specific facts essential to its case. In the latter case, the court must consider whether the plaintiff has pointed to witnesses or documents that it believed would prove its position.¹⁶⁴

When the defendant alleges inadequacies in the plaintiff's scientific expert proof, the court has a very different assignment. If the defendant asserts that the opinion never passed the threshold of admissibility, the court must engage in the complex analysis of methodology mandated by *Daubert*.¹⁶⁵ If the defendant contends instead that the studies on which the plaintiff relies are "insufficient to allow a reasonable juror to conclude that the [plaintiffs] position more likely than not is true,"¹⁶⁶ the court must evaluate the conclusions reached in the studies. In

162. *Id.* at 328 (White, J., concurring). In his dissent, Justice Brennan predicted that the majority's failure to clearly explain its reasoning would "very likely create confusion" in the district courts. *Id.* at 329 (Brennan, J., dissenting). Commentators have agreed with his assessment. See Mullenix, *supra* note 158, at 456. Justice Brennan agreed with Justice White, concluding that, "[p]lainly, a conclusory assertion that the nonmoving party has no evidence is insufficient. Such a 'burden' of production is no burden at all and would simply permit summary judgment procedure to be converted into a tool for harassment." *Celotex*, 477 U.S. at 332 (Brennan, J., dissenting) (citations omitted). Justice Brennan also suggested that the moving party may have an affirmative duty "to depose the nonmoving party's witnesses . . ." *Id.*

163. Shifting the burden to the plaintiff may be justified, however, when the plaintiffs' own experts on discovery concede the absence of a valid scientific theory in support of their position. See, e.g., *Porter v. Whitehall Labs., Inc.*, 9 F.3d 607, 614-15 (7th Cir. 1993). Under such circumstances, however, the defendant is able to make more than a bare assertion.

164. In *Celotex*, the defendant claimed that the plaintiff had failed to identify witnesses who could testify to the asbestos exposure, and, in response, the plaintiff produced letters from two individuals. 477 U.S. at 319-21. The Supreme Court ultimately remanded the case to the Court of Appeals to determine whether the plaintiff's evidence was sufficient to sustain her burden. *Id.* at 327-28.

165. The Court proposes in *Daubert* that the admissibility of scientific expert proof pursuant to Rule 702 hinges on the methodology and not the conclusions of the expert. See *supra* notes 30-40. The Court mentions, but does not discuss, other rules that may bear on admissibility. See *supra* text accompanying note 46.

166. *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 113 S. Ct. 2786, 2798 (1993).

either event, the court may have to resolve numerous complex questions relating to methodology and the likelihood that the plaintiff's experts' opinions are more likely than not true. If the defendant denies that its product caused the plaintiff's injuries, the court may, for instance, have to decide which methodologies are valid for proving causation,¹⁶⁷ whether the methodology employed was too skewed to be valid,¹⁶⁸ how to resolve issues of conflicting methodologies,¹⁶⁹ how to handle statistical significance,¹⁷⁰ and how to reconcile the preponderance of proof standard with the risks found in an epidemiological study.¹⁷¹

Unless the defects in the plaintiff's expert proof are apparent on the face of the plaintiff's submission,¹⁷² the court cannot

167. Is testimony by a physician relying on the methodology of clinical medicine admissible to prove causation? See *Ferebee v. Chevron Chem. Co.*, 736 F.2d 1529, 1535-36 (D.C. Cir.) (permitting physician to testify to causal relationship based solely on diagnostic methodology and refusing to require animal or epidemiological studies as a prerequisite to admissibility of testimony), *cert. denied*, 469 U.S. 1062 (1984); cf. Edward J. Imwinkelried, *The Admissibility of Expert Testimony in Christophersen v. Allied-Signal Corp.: The Neglected Issue of the Validity of Nonscientific Reasoning by Scientific Witnesses*, 70 DENVER U. L. REV. 473, 485-93 (1993) (suggesting that Rule 702 permits analogical reasoning).

168. See, e.g., *DeLuca v. Merrell Dow Pharmaceuticals, Inc.*, 791 F. Supp. 1042, 1047-59 (D.N.J. 1992), *aff'd mem.*, 6 F.3d 778 (3d Cir. 1993), *cert. denied*, 114 S. Ct. 691 (1994).

169. Compare *Burrell v. Septa (In re Paoli R.R. Yard PCB Litig.)* No. 86-2229, 1992 WL 323633, at *6 (E.D. Pa. 1992) (excluding evidence of animal studies on a motion in limine on the ground that using animal studies in the face of contradictory epidemiological data is an unreliable use of data) with *Vilari v. Terminix Int'l, Inc.*, 692 F. Supp. 568, 571 & n.1 (E.D. Pa. 1988) (refusing to exclude animal studies on motion in limine, but noting that court was not deciding sufficiency issue).

170. See, e.g., *DeLuca v. Merrell Dow Pharmaceuticals, Inc.*, 911 F.2d 941, 946-49 (3d Cir. 1990) (discussing issues arising from use of statistical significance concepts); *Brock v. Merrell Dow Pharmaceuticals, Inc.*, 874 F.2d 307, 312 (5th Cir.) (discussing statistical significance and confidence intervals), *modified*, 884 F.2d 166 (5th Cir. 1989), *cert. denied*, 494 U.S. 1046 (1990); see Brief Amici Curiae of Professors Rothman et al., in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, reprinted in 1 SHEPARD'S EXPERT & SCI. EVID. Q. 75, 78-82 (1993) (discussing the importance of statistical significance).

171. Compare *Maiorana v. National Gypsum Co. (In re Joint E. & S. Dist. Asbestos Litig.)*, 827 F. Supp. 1014, 1037-50 (S.D.N.Y. 1993) (granting judgment as a matter of law on the ground that epidemiological studies failed to demonstrate a sufficiently strong and consistent association between asbestos exposure and colon cancer) with *Grassis v. Johns-Manville Corp.*, 591 A.2d 671, 675-77 (N.J. Super. Ct. App. Div. 1991) (stating that physician may factor out other known risk factors for colon cancer such as family history and diet and conclude that asbestos caused colon cancer in question and reversing grant of summary judgment in favor of defendants to allow such testimony).

172. See *supra* part II.B.2. (triggering judicial screening).

answer these questions solely by looking at the record that the plaintiff submits in response to the motion. The court needs more information. In a case like *Celotex* in which the defendant disputed that the plaintiff had been exposed to the defendant's product, the court can review the depositions and other materials that the plaintiff produced to assess whether the plaintiff can produce admissible evidence at trial. The court, however, should not be required to look at the epidemiological study on which the plaintiff's expert relies and reach a conclusion about its methodology and correctness in the absence of a record developed through the adversary process. Consequently, both sides must have an opportunity for discovery.

Although shifting the burden to the plaintiff by simply "pointing to the record" has a surface appeal—why should the defendant expend resources if it has been haled into court by a party unable to prove its case—the defendant will have no incentive to engage in discovery if it can support its motion with affidavits and exhibits after the plaintiff has been forced to reveal its expert proof.¹⁷³ Judges complain that experts are too partisan. If so, the defendant should have little difficulty finding an expert to provide a conclusory affidavit disagreeing with the plaintiff's expert. Courts will then have to resolve the motion on materials that have not been tested through the adversarial process, a procedure some judges have already denounced,¹⁷⁴ or they will have to spend valuable time holding evidentiary hearings in connection with the motion.

Whether the summary judgment device was intended to function as a "preliminary trial" is questionable.¹⁷⁵ Trial by affidavit seems singularly inappropriate, however, as a means of resolving cases that not only require an understanding of complex scientific data, but often implicate intricate economic, sociological, and political concerns.¹⁷⁶ *Celotex's* authorization of

173. See Melissa L. Nelken, *One Step Forward, Two Steps Back: Summary Judgment After Celotex*, 40 HASTINGS L.J. 53, 66 (1988) ("If defendants seek to avoid the delay and expense of trial, at a minimum they must shoulder the expense of doing sufficient discovery to show that the plaintiff does not have a case. Discovery is as integral a part of the Federal Rules as summary judgment. There is little merit in an interpretation of summary judgment procedure that would encourage parties not to use the discovery rules, in hopes of then invoking summary judgment to force an opponent to reveal his case.").

174. See *supra* note 118 and accompanying text and note 147.

175. See Richard L. Marcus, *Completing Equity's Conquest? Reflections on the Future of Trial Under the Federal Rules of Civil Procedure*, 50 U. PITT. L. REV. 725, 740-41 (1989).

176. See Weinstein, *supra* note 104, at 472-76.

“summary judgment as a substitute for trial”¹⁷⁷ must be read in conjunction with *Daubert’s* recognition of the complex factors that bear on “scientific knowledge” and its praise of the adversary system in dealing with expert proof. Courts should avoid granting motions for summary judgment unless the parties have had a full opportunity and incentives to develop an adequate record during the discovery phase. Consequently, courts should require a motion in limine for admissibility objections to scientific proof and impose on the defendant an initial burden of production that insists on an affirmative demonstration of the inadequacies of the plaintiff’s proof.¹⁷⁸ The trial court will then have an adequate record for making a Rule 56 determination, and the appellate court will have a far more suitable record for review.

5. Procedural Mechanisms for Avoiding the Re-Examination of Scientific Issues

No discussion of procedural issues surrounding the admissibility of expert scientific evidence in toxic tort cases can possibly conclude without a glimpse at the mass tort context in which the most complex and troubling interface of procedural and evidentiary issues is presently occurring. Although inefficiencies result when courts repeatedly examine the same scientific issues, mass aggregation of cases may accomplish efficiency at the expense of establishing greater scientific certainty.

a. *The Discredited Expert*

The Bendectin litigation provides a perfect example of a toxic tort that various federal districts and state court systems handled in numerous separate actions.¹⁷⁹ Although the defendants were ultimately successful in virtually all of the cases,¹⁸⁰ courts could not use collateral estoppel to bind subsequent plaintiffs who were not parties to the prior proceedings and who had

177. Marcus, *supra* note 175, at 740.

178. See Eric K. Yamamoto et al., *Summary Judgment at the Crossroads: The Impact of the Celotex Trilogy*, 12 U. HAW. L. REV. 1, 23-26, 35-37 (1990) (discussing the various *Celotex* opinions and fleshing out Justice Brennan’s framework).

179. See Sanders, *supra* note 7, at 396 (providing table summarizing yearly totals of Bendectin related cases filed in the state and federal courts in the period from 1977 to 1988).

180. See *supra* note 7 and accompanying text. As of this writing, the *Daubert* case itself is still pending on remand.

never litigated the causation issue.¹⁸¹ Consequently, courts repeatedly decided the same issues with regard to scientific evidence, often offered by the same witness.

One possible consequence of the procedures suggested in this Article, requiring adversarial exploration of defects in expert testimony in connection with motions in limine and summary judgment, is that courts might be able to deal more effectively with the repeat witness who does not pass the test of Rule 702. When the parties develop the methodological defects underlying a proffered expert's opinions through cross-examination and the court provides the proponent adequate opportunity to be heard before it excludes the expert's testimony, another judge should be able to take judicial notice of the record from these proceedings.¹⁸² The second judge would in no way be bound by the prior determination, but the losing party could be directed that if it intends to proffer the same expert again it must make a showing that the particular defects found by the first judge either do not exist or have been cured.

b. *Science in the Aggregated Case*

Whether the mass tort litigation of the future will proceed like the Bendectin cases is, however, questionable. The cost in terms of time and money was immense, although not nearly as costly as the asbestos litigation, that threatened to overwhelm court dockets and resulted in the bankruptcy of many corporations.¹⁸³ Courts are beginning to react to the enormous strain of

181. See *Parklane Hosiery Co. v. Shore*, 439 U.S. 322 (1979) (outlining requirements for application of collateral estoppel).

182. The Federal Rules of Evidence authorize a court to take notice of facts "not subject to reasonable dispute" because they are either "(1) generally known within the territorial jurisdiction of the trial court or (2) capable of accurate and ready determination by resort to sources whose accuracy cannot reasonably be questioned." FED. R. EVID. 201. Even if the other proceedings were held in a different territorial jurisdiction, the record submitted on a motion in limine or a summary judgment motion ought to fit into the second category. For cases in which courts have taken judicial notice of other proceedings, see JACK B. WEINSTEIN & MARGARET A. BERGER, 1 WEINSTEIN'S EVIDENCE ¶ 201[03] n.28, at 201-35 (Supp. 1993). For a thoroughly documented example of defective expert testimony, see *DeLuca v. Merrell Dow Pharmaceuticals, Inc.*, 791 F. Supp. 1042, 1047-59 (D.N.J. 1992) (scrutinizing expert's affidavit and ultimately excluding it while granting summary judgment in favor of defendant), *aff'd mem.*, 6 F.3d 778 (3d Cir. 1993), *cert. denied*, 114 S. Ct. 691 (1994).

183. See *Findley v. Blinken (In re Joint E. & S. Dist. Asbestos Litig.)*, 129 B.R. 710, 932-55 (E. & S.D.N.Y. 1991) (exhibit estimating debtor's total expected costs for pending asbestos litigation), *vacated*, 982 F.2d 721 (2d Cir. 1992), *modified on reh'g*, 993 F.2d 7 (2d Cir. 1993); *In re Asbestos Prods. Liab. Litig.*, 771 F. Supp. 415 (J.P.M.L. 1991) (multi-districting 26,639 pending asbestos claims).

these cases by increasing attention to efficiency tools, especially those that permit aggregation of individual cases.¹⁸⁴ Some commentators urge courts to concentrate as many cases as possible in one forum as soon as possible, viewing such a strategy as the key to effective resolution of the mass tort problem.¹⁸⁵

When courts permit early aggregation, however, they may find themselves ahead of the scientists. Until litigation begins with regard to a particular product or substance, little research may yet exist with regard to scientific questions that are critical to the validity of the plaintiffs' claims.¹⁸⁶ Once the actions are aggregated, scientific uncertainty exerts an enormous pressure toward settlement. Neither side knows what answers future research will yield; parties often need considerable time to study particular issues, especially if they do not expect some claimed possible disease consequences to become manifest until an ex-

184. See Judith Resnik, *From "Cases" to "Litigation,"* 54 LAW & CONTEMP. PROBS. 5, 45 (Summer 1991) ("[P]erceptions have shifted. The debate in the 1990s, shaped by those working in mass tort cases, is not whether to aggregate mass torts but what if any limits to impose."). Asbestos cases were not consolidated until late in the litigation when the federal cases were finally multi-districted. See *Asbestos Prods.*, 771 F. Supp. 415 (J.P.M.L. 1991); Linda S. Mullenix, *Beyond Consolidation: Postaggregative Procedure in Asbestos Mass Tort Litigation*, 32 WM. & MARY L. REV. 475, 478-79 (1991). On the other hand, breast implant cases were multi-districted soon after the press began to report on the magnitude of the problem. See *In re Silicone Gel Breast Implants Prods. Liab. Litig.*, 793 F. Supp. 1098 (J.P.M.L. 1992). Whether class actions are suitable for mass torts is currently the subject of considerable debate. As of this writing, the breast implant cases appear to be moving toward a class action settlement. Cf. *In re "Agent Orange" Prod. Liab. Litig.*, 818 F.2d 145 (2d Cir. 1987) (upholding approval of class action settlement), cert. denied, 484 U.S. 1004 (1988); *Keene Corp. v. Fiorelli*, 14 F.3d 726 (2d Cir. 1993) (finding no case or controversy and vacating district court's order certifying a mandatory limited fund class action brought by a corporation on the verge of bankruptcy because of asbestos injury claims).

185. See, e.g., Margaret A. Berger et al., *Civil Litigation in the Twenty-First Century: A Panel Discussion*, 19 BROOK. L. REV. 1199, 1206 (1993) ("One, as almost a *sine qua non* for resolving these mass cases, there must be more and more efforts at aggregation. If you don't have all the cases in one forum, woe unto anybody trying to deal nationally with the phenomenon.") (statement of Kenneth R. Feinberg). For suggested approaches, see A.L.I., COMPLEX LITIG. PROJECT (Tent. Drafts Nos. 1 (Apr. 14, 1989); 2 (Apr. 6, 1990); 3 (Mar. 31, 1992)); MARK A. PETERSON & MOLLY SELVIN, RAND INSTITUTE FOR CIVIL JUSTICE, RESOLUTION OF MASS TORTS: TOWARD A FRAMEWORK FOR EVALUATION OF AGGREGATIVE PROCEDURES (1988) (Rand Note N-2805-ICJ) (setting forth agenda for research program on mass litigation and reporting results obtained to date); John C. Coffee, Jr., *The Regulation of Entrepreneurial Litigation: Balancing Fairness and Efficiency in the Large Class Action*, 54 U. CHI. L. REV. 877 (1987) (discussing class action litigation and proposals for its reform).

186. See Sanders, *supra* note 7, at 321-48.

tended latency period expires.¹⁸⁷ The huge potential risk and transaction costs may drive the defendant to make the plaintiffs a settlement offer.¹⁸⁸ The parties may therefore seek to reach a global legal resolution long before meaningful data from scientific studies would be available about central questions such as causation, exposure, and disease outcomes.

This scenario produces numerous complex issues that the law has just begun to address. Given scientific uncertainty, when is it fair to a defendant to force some form of consolidation on pending claims?¹⁸⁹ How can one settle an aggregated proceeding if the extent of damages to future claimants is unknown?¹⁹⁰ How can one settle such a proceeding if the number

187. Some potential claims may involve injury to the next generation. For a discussion of claims by grandchildren of women who took DES, see Margaret M. Hershiser, Note, *Preconception Tort Liability—The Duty to Third Generations: Enright v. Eli Lilly & Co.*, 24 CREIGHTON L. REV. 1479 (1991); Marisa L. Mascaro, Note, *Preconception Tort Liability: Recognizing a Strict Liability Cause of Action for DES Grandchildren*, 17 AM. J.L. & MED. 435 (1991); John B. Maynard, Note, *Third-Generation-DES Claims*, 27 NEW ENG. L. REV. 241 (1992); see also Rebecca Weisman, Article, *Reforms in Medical Device Deregulation: An Examination of the Silicone Gel Breast Implant Debacle*, 23 GOLDEN GATE U. L. REV. 973, 973 n.3 (1993) (detailing medical problems associated with silicone breast implants and specifically noting alleged problems of infants who nursed from mothers with implants).

188. Steven Morris, *Baxter Oks \$556 Million Implant Settlement Share*, CHIC. TRIB., Feb. 15, 1994, at 1 (Business Section) (reporting on proposed \$3.7 billion settlement of breast implant cases and quoting company spokesman who stated that scientific research "has not established any link between breast implants and disease").

189. See *Debruyne v. National Semiconductor Corp.* (*In re Repetitive Stress Injury Litig.*), 11 F.3d 368 (2d Cir. 1993) (rejecting consolidation of repetitive stress injury cases as premature on the ground that claim of injury was so general that it covers different ailments with a variety of possible causes and stating that "[t]he systematic urge to aggregate litigation must not be allowed to trump our dedication to individual justice") (quoting *In re Brooklyn Navy Yard Asbestos Litig.*, 971 F.2d 831, 853 (2d Cir. 1992)).

190. Cf. *Ivy v. Diamond Shamrock Chem. Co.* (*In re "Agent Orange" Prod. Liab. Litig.*), 996 F.2d 1425 (2d Cir. 1993) (holding that Texas state court plaintiffs claiming Agent Orange injuries were bound by settlement in federal class action suit that enjoined future litigation by class members and consequently dismissing their state suit and upholding removal to federal court pursuant to All Writs Act), *cert. denied*, 114 S. Ct. 1125 (1994). The court noted "serious obstacles to recovery," *id.* at 1436, "despite continuing research, the crucial issue of 'general causation,' i.e., whether any injuries are attributable to Agent Orange, remains unsettled," *id.* at 1437.

of future claimants is unknown?¹⁹¹ Can one bind the unknown future claimants through a class action?¹⁹²

A central question in deciding these issues is the extent to which present legal decisions should be conditioned on future scientific developments. For instance, in settling a mass tort action must funds be set aside for continued scientific research into as yet unanswered latency issues? Must projections about future claims be monitored and must the payouts be readjusted periodically if the initial projections turn out to be skewed? Will the results of further research be made public or kept confidential in the confines of the settlement?

It is too early, as yet, to predict with any certainty the extent to which the courts must protect future claimants by taking account of future scientific knowledge. Too much insistence on readjusting "final" resolutions in light of further scientific studies will impact on litigants' willingness to settle in the face of unknown contingencies.¹⁹³ Conditional resolutions would also impose additional costs on the court system by requiring judicial supervision.¹⁹⁴ The difficulty of resolving these problems suggests that aggregation procedures have the potential to force questions of scientific knowledge to the periphery or even off the

191. See Weinstein, *supra* note 104, at 507-10 & n.164 (discussing future claimants and detailing author's efforts to determine probable incidence of claims against the Manville Personal Injury Settlement Trust through projections performed by court-appointed experts).

192. See Frederick M. Baron, *Future Claimants Class Actions—Blueprint for Disaster*, 8 Mealey's Litig. Rep., Asbestos (Mealey Publications, Inc.) 20 (June 11, 1993) (commenting on proposed settlement of Carlough [now Georgine] v. Amchem, Civ. Action No. 93-0215 (E.D. Pa.), an asbestos settlement involving the Center for Claims Resolution); cf. Brown v. Ticor Title Ins. Co., 982 F.2d 386 (9th Cir. 1992), *cert. granted in part*, 114 S. Ct. 56 (1993) (certifying the question, in an anti-trust action, of whether a federal court may refuse to enforce a judgment in a class action certified pursuant to Rule 23(b)(1) and (b)(2) on ground of absent class members' constitutional due process right to opt-out of class action which asserts monetary claims on their behalf); *writ dismissed as improvidently granted*, 62 U.S.L.W. 4216, 4217 (U.S. Apr. 4, 1994) (majority voted to dismiss because constitutional claim would be avoided if all class actions seeking money must be brought pursuant to Rule 23(b)(3) which permits opt-outs; procedural posture of case prevented Court from considering this issue; three dissenters wished to decide case because of importance of deciding whether opt-out right is constitutionally required).

193. Defendants may be unwilling to risk potential unknown future claims if future claimants cannot be bound. In limited fund cases, because of the potential impact on legal fees, plaintiffs' lawyers will be leery of any settlement that allows the percentage payments for present and future claimants to be adjusted.

194. Indeed, given the possible latency period for some diseases, the life expectancy of the litigation might exceed that of the supervising judge.

screen. If the courts ultimately allow class actions and other forms of aggregation to dictate the resolution of future mass toxic tort and product actions, then ironically *Daubert* may have less of a role to play in the type of case in which the opinion originated than in many other kinds of litigation before the courts.

CONCLUSION

Daubert is an important case because it confirms the federal trial judges' responsibility for the quality of science that enters their courtroom. The prevalence of expert proof on scientific issues means that the judges may be called upon to exercise a gatekeeping role in many of their cases. *Daubert* is not, however, a self-executing opinion. Although the opinion is a litany about rules—rules of civil procedure as well as evidence—ultimately neither set of rules applies to many of the decisions that will have to be made. To implement the suggestions of the Supreme Court for analyzing scientific evidence, the courts will have to devise procedures that will effectuate the Court's evidentiary objective without sacrificing fairness and efficiency goals.

Although *Daubert* seems to be an opinion about evidence, and evidence is commonly thought of as the rules that apply at trial, *Daubert's* greatest impact, especially in civil cases will be on pre-trial proceedings. Consequently, implementation of the framework set out by the Supreme Court requires judicial attention to how the *Daubert* opinion intersects with discovery and motion practice. It would be ironic if a leading opinion on the law of evidence results in dispositions based on evidence that has not been subjected to adversarial testing. The desire to dispose of litigation efficiently must be balanced against the parties' rights to have crucial determinations made upon adequate records.