

# **DAUBERT'S ASYMMETRICAL IMPACT ON CIVIL AND CRIMINAL LITIGATION: THE CURIOUS CASE OF AN EVIDENTIARY STANDARD**

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At first glance, one would not think that a single Federal Rule of Evidence (FRE) would have a disparate impact on civil as opposed to criminal cases. Sure, the burden of proof, the weight of evidence needed to win, differs greatly in civil as opposed to criminal cases, but what counts as evidence, what the jury gets to hear, does not. Such thinking, though intuitively plausible, is seriously mistaken. This paper examines the disparate impact of *Daubert v. Merrell Dow Pharmaceuticals, Inc.*<sup>1</sup> on civil as opposed to criminal cases. *Daubert* has been called “the most important Supreme Court case you’ve never heard of,”<sup>2</sup> and the description is fitting. *Daubert*’s disparate impact has important implications for the criminal justice system in the United States.

The technical question before the Court in *Daubert* was whether Rule 702 of the Federal Rules of Evidence<sup>3</sup> superseded the *Frye* test<sup>4</sup> for determining the admissibility of scientific evidence. A unanimous Court ruled that Rule 702 did supersede *Frye*. A majority of the Court<sup>5</sup> interpreted Rule 702 to require a two-prong test for the admissibility of scientific evidence focusing on (1) the reliability of the evidence, and (2) the helpfulness of the evidence to the jury. The reliability prong has been called a “screening” or “gatekeeping” role, one the Court assigned to the trial judge.<sup>6</sup> This role allows the judge, in a pre-trial motion, to “ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable”<sup>7</sup> by assessing “whether the reasoning or methodology underlying the testimony is scientifically valid.”<sup>8</sup> By making the reliability of expert testimony a matter for pre-trial decision, *Daubert* significantly changed American jurisprudence.<sup>9</sup> Whether judges want, or are really fit for,<sup>10</sup> this gatekeeper role is a fascinating matter, but beyond the scope of this paper. The helpfulness prong requires that the evidence have “a valid scientific connection to the pertinent inquiry as a precondition to admissibility,”<sup>11</sup> that is, there is a nexus between the expert testimony and the facts of the particular case that makes the evidence relevant to resolving the dispute.

*Daubert* was decided against the backdrop two jurisprudential trends that were moving in opposite directions. On the one hand, the 1975 revision of the Federal Rules

of Evidence had a distinctly permissive approach towards the admissibility of evidence, and Rule 702 was seen as decidedly more permissive than Frye since the “general acceptance” a method was not required.<sup>12</sup> The Frye standard was, so the thinking went, denying jurors access to relevant evidence.<sup>13</sup> On the other hand, there was a cultural debate over “junk science” in court.<sup>14</sup> News stories about outrageous legal claims, often based on wildly improbable “science” (e.g. the Twinkie defense<sup>15</sup>) were common. Many observers hoped that *Daubert* would put an end to plaintiffs relying on junk science,<sup>16</sup> and experts as diverse as the U.S. Chamber of Commerce and Noble Prize winners filed amicus briefs.<sup>17</sup>

Given these conflicting trends, it is not surprising that *Daubert* represents a compromise. On the one hand, the Court clearly ruled that Rule 702 requires a more liberal standard for the admissibility of expert testimony than *Frye*.<sup>18</sup> On the other hand, it was also clearly unwilling to take a Feyerabendian approach and put all scientific questions to the jury. At least one commentator reasons the Court was worried that allowing all relevant evidence (without a reliability test) would confuse juries by exposing them to specious claims about causation that rely on “questionable science” or the temporal sequence of events and invite *post hoc* inferences.<sup>19</sup> The Court, however, expressed confidence in the capabilities of juries and the adversary system by stating that “[v]igorous cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof are the traditional and appropriate means of attacking shaky but admissible evidence.”<sup>20</sup> A somewhat cynical summary of the decision is that the Court placed its trust in neither scientific nor legal procedures and institutions, and that the result is an approach to evidence that is epistemologically, if not jurisprudentially, incoherent.<sup>21</sup> Initial reaction to the decision was divided, some observers thinking it was a major blow to business interests (i.e., it would result in more junk science going before jurors) while others thought it meant the end of junk science in court.<sup>22</sup> Empirical studies of the impact of *Daubert* indicate that scientific evidence offered by plaintiffs in civil cases is more likely to be disqualified today than it was pre-*Daubert*,<sup>23</sup> but that there has been practically no impact on the admissibility of scientific evidence offered by prosecutors in criminal cases.<sup>24</sup> The first of these findings is merely odd, but the second poses serious questions about the nature and reliability of our criminal justice system.

A 2002 RAND Corporation study revealed that after *Daubert* the number of expert witness challenges rose significantly, as did the success rate of those challenges. What is more, almost 90% of the successful challenges were against plaintiffs. *Daubert* challenges generally come as pre-trial motions, and a successful challenge effectively rules that the evidence is inadmissible. Since 2005, the rate and success rate of *Daubert* challenges appears to have stabilized, but the total number of toxic tort suits initiated has decreased significantly. The RAND study found that most of the successful challenges were based on the reliability of the science underlying the challenged evidence. So, contrary to the “permissive thrust” of Rule 702, *Daubert* resulted in jurors being presented with less scientific evidence. One particularly puzzling result in the RAND study is that the significance of Frye’s “general acceptance” test became more important after *Daubert*. A multiple regression analysis found that general acceptance pre-*Daubert* was not a statistically significant indicator of whether evidence would be

found reliable (and thus admissible) or not, but general acceptance post-*Daubert* was, in fact, a statistically significant predictor of admissibility.<sup>25</sup> The RAND study found no evidence that “it became easier for novel evidence to be admitted” after *Daubert*.<sup>26</sup> A separate study undertaken by the Federal Judicial Center confirmed the findings of the RAND report.<sup>27</sup> This study involved surveys sent to federal judges and to attorneys practicing before them. The judges in this study self-reported both that they were more likely to scrutinize and less likely to admit expert evidence after *Daubert* than before. The exclusion rate increased from 25% prior to 1991 to 40% in 1998.<sup>28</sup>

As a practical matter, *Daubert* appears to have been a victory for the defense bar in civil litigation. As one synopsis put it:

Cutting-edge science has been banished from courthouses. And juries, a fundamental element of the justice system, have been stripped of much of their power. “*Daubert* lets judges have much too much leeway to follow their personal inclinations,” says Stanley Feldman, retired chief justice of the Arizona Supreme Court. “It’s an interference in the jury process and wholly unneeded.” ... But now rigorous science also gets thrown out. “There have been numerous examples where highly qualified scientists, sterling scientists, have been *Dauberted* out,” says David Ozonoff, chair emeritus of Boston University’s department of environmental health. That’s because controversial lawsuits often turn on groundbreaking science—the type that attracts the best researchers and the type *Daubert* discourages.<sup>29</sup>

Whether this state of affairs is beneficial is fascinating,<sup>30</sup> but a matter for a separate paper. I am more concerned with *Daubert*’s impact on criminal cases, and studies of that impact are rare.<sup>31</sup> In criminal cases, *Daubert* has had far less impact than in civil cases,<sup>32</sup> and where it has had an impact, the benefit has flowed to prosecutors (the criminal analog to the civil plaintiff) rather than to defense attorneys.<sup>33</sup> One study found that in criminal cases the strongest predictor of the admissibility of expert testimony was the perceived relevance of the evidence to the case,<sup>34</sup> a stark contrast with the civil cases in which reliability was the strongest predictor. Another study found that there is a significant difference in the outcomes of *Daubert* challenges in civil as opposed to criminal cases.<sup>35</sup> Civil defendants (frequently a corporation) succeed in two-thirds of their *Daubert* challenges, but criminal defendants succeed in one-twelfth of their challenges,<sup>36</sup> meaning that criminal defendants “virtually always lose their reliability challenges.”<sup>37</sup> This discrepancy in success rates for *Daubert* challenges would not be troubling if one had a high degree of confidence in the reliability of scientific evidence introduced by prosecutors. Such confidence, however, is unwarranted, as will be demonstrated by looking at problems underlying the science of issues of increasing significance for defendants: marijuana identification, the forensic identification of persons, and forensic fire science. Criminal defendants, it seems, are being sent to jail on the basis of unreliable junk science,<sup>38</sup> and judges, the gatekeepers of reliability, are failing to do their duty.

Of all the prisoners in the United States, more than 25% are incarcerated for drug crimes (50% of all Federal prisoners<sup>39</sup> and 20% of all State prisoners are doing time

for drug crimes<sup>40</sup>). Of those incarcerated for possession offenses, marijuana possession accounts for a majority. But how reliable are the tests used to identify marijuana? Not very.

The most common field test for marijuana is the Duquenois-Levine Reagent test (D-L). The D-L test is a preliminary field test, one whose results should be confirmed by a more extensive laboratory test. Of course, laboratory confirmations are time consuming and expensive, and both police and prosecutors have an interest in relying exclusively the D-L test. In 2006 Virginia passed an “emergency regulation” that allowed police officers trained in using the D-L test to be qualified as expert witnesses.<sup>41</sup> This regulation negates the need for a laboratory confirmation of the field test. In 2009, Georgia trained some 1600 police officers in the use of the D-L test with an attendant drop in laboratory confirmations of 98%.<sup>42</sup> Stories in which the D-L test is the sole basis for a conviction abound. This would not be troubling if the D-L test is specific for marijuana, that is, if it does not produce false positive results. But it does.

One study conducted by the Law Enforcement office of the National Institute of Standards and Technology (NIST) found explicitly that the D-L test is nonspecific and that it generated false positives for mace, nutmeg and tea.<sup>43</sup> One leading manufacturer of D-L field test kits, NIK, specifically states that the test “may or may not yield a valid result” and may produce “false positive results, “ and literature accompanying the NIK NarcoPouch 908/Duquenois-Levine Reagent field test kit states that “The results of a single test may or may not yield a valid result.... There is no existing chemical reagent test, adaptable to field use, that will continually eliminate the occurrence of an occasional invalid test results [sic].”<sup>44</sup> On the face of it, it would seem clear that a positive D-L test, absent a confirming test, is insufficient evidence upon which to base a marijuana conviction. This conclusion rests merely on the documented and accepted unreliability of the test. Relevant case law confirms this conclusion. In 1979 the Supreme Court ruled that a nonspecific test or an inconclusive finding is an insufficient basis for a criminal conviction.<sup>45</sup> In 1973, the Supreme Court of Wisconsin found that the D-L test alone was insufficient to establish guilt because a nonspecific test does not satisfy the requirement of proof beyond a reasonable doubt.<sup>46</sup> Despite the unreliability of the D-L test, however, its use appears to be increasing. But if it is the only evidence offered in support of the claim that a substance is marijuana, a true gatekeeper, applying *Daubert*, should exclude the evidence. Instead, thousands of people go to jail for possessing a substance that may or may not be marijuana.

The forensic identification of persons, particularly perpetrators of crimes, raises more troubling issues. Recent studies have found significant problems many methods of forensic identification including DNA analysis,<sup>47</sup> serology, mitochondrial hair DNA (mtDNA) analysis, microscopic hair analysis, fingerprinting, and even compositional analysis of bullet lead.<sup>48</sup> Forensic identifications can fail in at least two very distinct ways: first, the scientific tests themselves may be unreliable, which raises a clear *Daubert* issue, and second, there may be bias, incompetence, and inadequate oversight of the laboratories in which the tests are performed. While problems of the latter sort are significant, they are not my concern here, and I will limit my discussion to unreliable science.

Before the widespread availability of DNA testing, ABO serology<sup>49</sup> and micro-

scopic hair analysis were frequently used to identify perpetrators, particularly in rape cases. In one infamous Montana case, a Jimmy Ray Bromgard spent 15 years in prison for a crime he did not commit after forensic expert testified that there was only a 1 in 10,000 chance that the hairs found on the victim came from someone other than the defendant. But there is no scientific basis at all for such a claim, and an FBI analysis of hair identification expert s found that even the best experts have an 11% error rate.<sup>50</sup> It was only when the Innocence Project took up his case and obtained a DNA analysis that Bromgard was fully exonerated. As of 2005, some 158 convictions based on hair analysis had been overturned.

Fingerprint identification does not fare better than microscopic hair analysis. In 1997 Stephen Cowans was convicted of shooting a Boston police officer on the basis of fingerprint identification. The forensic specialist in the case told the jury that a print at the crime scene was “unique and identical” for Cowans since it matched his at 16 points. When subsequent DNA evidence excluded Cowans as a possible perpetrator, he was exonerated, and Boston ultimately closed its fingerprint unit.<sup>51</sup> In 2004 Brandon Mayfield was arrested as a suspect in the Madrid train bombing after two FBI fingerprint experts testified that they were 100% certain that Mayfield’s fingerprint were left on a bag used in the attack. Mayfield was lucky, he spent only two weeks in prison before Spanish authorities identified and arrested the real perpetrator. The FBI tried to explain its faulty identification on the basis of “blurry digital images.” One wonders how 100% certainty can be based on blurry images, and what that means for justice.

Finally I turn to the issue of forensic fire science. While tragic high profile cases like that of Cameron Todd Willingham<sup>52</sup> have gained some notoriety, the generally deplorable state scientific arson investigation, which really underlies the Willingham case, is less well appreciated. Physical science teachers are well acquainted with the fact that most people have intuitions about the behavior of the physical world that are distinctly Aristotelian, and quite wrong. Recent fire studies<sup>53</sup> indicate that the same pattern of grossly mistaken intuitions about fire behavior is found in the testimony of “arson experts.”<sup>54</sup> While it seems intuitively obvious that gasoline fires burn hotter than wood fires, they do not, and while accelerants produce “fast fires,” not all “fast fires” are the result of using accelerants. As early as 1985 the National Fire Prevention Association (NFPA) appointed a Technical Committee to formulate principles for valid arson investigations. The committee’s product, the NFPA 921 *Guide for Fire and Explosion Investigations*, was met by “howls of protest from fire investigation “professionals.”<sup>55</sup> Many of the myths about fire behavior can be traced to the 1977 Law Enforcement Assistance Administration (LEAA) booklet entitled *Arson and Arson Investigation: Survey and Assessment*. The authors of this study go so far as to point out that, “Although burn indicators are widely used to establish the causes of fires, they have received little or no scientific testing.”<sup>56</sup> Despite this clear admonition toward precaution in arson investigation, unreliable, unscientific “fire science” continues to be used 20 years after NFPA 921 and appears to have sent an innocent Willingham to his death. Similar problems plague forensic pathology, particularly in cases where the victim is a deceased child,<sup>57</sup> but I think the essential point has been established.

In civil cases *Daubert* has had the effect of excluding arguably unreliable science

offered by plaintiffs from the courtroom.<sup>58</sup> In criminal cases, however, unreliable science offered by the prosecutions is regularly admitted with the result that far too many innocent people are wrongly convicted.<sup>59</sup> In the criminal context, one might expect judges, acting as proper gatekeepers, to take judicial notice of certain facts concerning the scientific reliability of prosecution evidence and exclude it accordingly (or demand additional proof). But this is not happening, and overworked, underfunded criminal defense attorneys are not mounting *Daubert* challenges.

Because most violent crimes are committed by the poor, their court appointed advocates—overworked and underfinanced—are not up to the challenge. In the absence of a system of effective representation, *Daubert* will not improve scientific evidence in criminal cases. The only way to guard against the misapplication of forensic science is to impose controls and reforms long before the cases come to court.<sup>60</sup>

Perhaps it is too much to expect of a judge that she act as a gatekeeper for scientific evidence. By training and often temperament, judges are not scientists. During oral arguments over the EPA's jurisdiction to regulate atmospheric CO<sub>2</sub>, Justice Scalia confused the stratosphere with the troposphere. After being corrected by council, Scalia remarked "Troposphere, whatever. I told you before I'm not a scientist. (Laughter) That's why I don't want to have to deal with global warming, to tell you the truth."<sup>61</sup> It does not bode well for the validity and legitimacy of a system of criminal that the gatekeepers of reliable evidence do not recognize what should be let within and what should be kept outside the gates.

## NOTES

1. 509 US 579, 125 L Ed 2d 469, 113 S. Ct. 2786 (1993).
2. "Daubert:-The Most Influential Supreme Court Decision You've Never Heard Of, A Publication of the Project on Scientific Knowledge and Public Policy, coordinated by the Telus Institute," June 2003. Web. <<http://www.defendingscience.org/upload/Daubert-The-Most-Influential-Supreme-Court-Decision-You-ve-Never-Heard-Of-2003.pdf>>.
3. "If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise." Federal Rule of Evidence 702 (1975).
4. *Frye v. United States*, 54 App. D.C. 46, 47, 293 F. 1013 (1923). *Frye* set forth a "general acceptance" test for scientific evidence, if a method, procedure, principle, or technique is generally accepted by the scientific community, that it is admissible as expert testimony. *Frye* ruled against the admissibility of polygraph evidence.
5. Justices Rehnquist and Stevens concurred that Rule 702 superseded *Frye*, but dissented on the gatekeeper role of the trial judge.
6. *Daubert*, 509 U.S. 596-97.
7. *Ibid.* 589.
8. *Ibid.* 592-93.
9. Thomas G. Gutheil, and Harold J. Bursztajn, "Attorney Abuses of *Daubert* Hearings: Junk Science, Junk Law, or Just Plain Obstruction?" *Journal of the American Academy of Psychiatry and the Law* 33.2 (June 2005):150-152.



10. Sophia Gatowski et al., "Asking the Gatekeepers: A National Survey of Judges on Judging Expert Evidence in a Post-Daubert World," *Law & Human. Behavior* 25 (2001): 433.

11. Daubert 592.

12. Christopher B. Mueller, "Daubert Asks the Right Questions: Now Appellate Courts Should Help Find the Right Answers," *Seton Hall Law Review* 33 (2003): 987.

13. Edward J. Imwinkelried, "Trial Judges—Gatekeepers of Usurpers? Can the Trial Judge Critically Assess the Admissibility of Expert Testimony Without Invading the Jury's Province to Evaluate the Credibility and Weight of the Testimony?" *Marquette Law Review* 84 (2002): 1.

14. See generally, P Huber, *Galileo's Revenge: Junk Science in the Courtroom* (New York: Basic Books, 1991). Huber offers sensational examples of the abuse of science in the courtroom such as an alleged soothsayer who, "with the backing of expert testimony from a doctor and several police department officials," has won a \$1,000,000 jury award due to the loss of her "psychic powers following a CAT scan" (3-4). For a vigorous critique of Huber's book, see Kenneth J. Chesebro, *Galileo's Retort: Peter Huber's Junk Scholarship* American University Law Review 42 (1993): 1637.

15. The expression "Twinkie defense" refers to a legal defense strategy that relies on improbable or highly speculative propositions. The term was coined by a reporter covering the trial of Dan White, who was accused of the murders of Harvey Milk and George Moscone. White's defense team argued that he suffered from diminished capacity due to depression, and that changes in his diet (from a healthy diet to one rich in sugary snacks) was a strong symptom of that depression. A news report using the expression "Twinnkie defense" led to a widespread misperception that the defense argued that Twinkie consumption produced a "sugar high" that caused the actions.

16. See Marcia Coyle, "Supreme Court to Examine Scientific Proof," *National Law Journal* 1 Feb. 1993: 1; Tony Mauro, "Tort-Reform Week Looms at the Court," *Legal Times*, 22 Mar. 1993: 12.

17. Brief Amici Curiae of the Chamber of Commerce of the United States of America in Support of Respondents, *Daubert III*, 509 U.S. 579 (No. 92-102); Brief Amici Curiae of Nicolaas Bloembergen, et al., in Support of Respondents, *Daubert III*, 509 U.S. 579 (No. 92-102).

18. Justice Blackmun made this clear in stating that a "rigid general acceptance requirement would be at odds with the liberal thrust" of the *Federal Rules of Evidence*. *Daubert* at 587.

19. See David E. Bernstein, "The Admissibility of Scientific Evidence After *Daubert v. Merrell Dow Pharmaceuticals, Inc.*," *Cardozo Law Review* 15 (1994): 2139.

20. Daubert 596.

21. Margaret G. Farrell, "Daubert v. Merrell Dow Pharmaceuticals, Inc.: Epistemology and Legal Process," *Cardozo Law Review* 15 2183 (1994) (arguing that *Daubert* is an incoherent view that is neither positivist nor constructionist). See also, David M. Malone and Paul J. Zwier, "Epistemology After Daubert, Khumo Tire, and the New Federal Rule of Evidence 702," *Temple Law Review* 74 (2001): 103, 106.

22. Compare Paul M. Barrett, "Justices Rule Against Business," *Wall Street Journal* 29 June 1993: A3; Marcia Coyle, "Supreme Court Eases Admissibility of Experts," *National Law Journal* 12 July 1993: 12; Marcia Coyle, "Supreme Court Says Judges Should Evaluate Scientific Testimony," *Liability Week* 8(1993): 27 (arguing *Daubert* was a setback for manufacturers because "junk science" now can get into the courtroom and sway juries); Marcia Coyle with Linda Greenhouse, "Justices Put Judges in Charge of Deciding Reliability of Scientific Testimony," *New York Times* 29 June 1993: A13; Thomas W. Kirby, *Junking Bad Science*, *Connecticut Law Tribune* 2 Aug. 1993: 24.

23. Lloyd Dixon and Brian Gill, "Changes in the Standards for Admitting Expert Evidence in Federal Civil Cases Since the Daubert Decision, RAND Institute for Civil Justice Report" (2001) [hereinafter "RAND Study"]; Carol Krafka et al., "Judge and Attorney Experiences,

Practices, and Concerns Regarding Expert Testimony in Federal Civil Trials,” *Psychology, Public Policy, and Law* 8 (2002): 309.

24. Jennifer L. Groscup et al., “The Effects of Daubert on the Admissibility of Expert Testimony in State and Federal Criminal Cases,” *Psychology, Public Policy, and Law* 8 (2002):339 [hereinafter “Groscup Study”]; D. Michael Risinger, “Navigating Expert Reliability: Are Criminal Standards of Certainty Being Left on the Dock?” *Albany Law Review* 64 (2000): 99 (for a discussion of the differences in outcomes of challenges by civil versus criminal defendants); Sophia Gatowski et al., “Asking the Gatekeepers: A National Survey of Judges on Judging Expert Evidence in a Post-Daubert World,” *Law & Human Behavior* 25 (2001): 433; P. Neufeld, “The (Near) Irrelevance of *Daubert* to Criminal Justice and Some Suggestions for Reform,” *American Journal of Public Health* 93 (2005):107.

25. RAND Study 44.

26. Ibid.

27. Carol Krafska, Meghan A. Dunn, Molly TreadwayJohnson, Joe S. Cecil, and Dean Miletich, “Judge and Attorney Experiences, Practices, and Concerns Regarding Expert Testimony in Federal Civil Trials,” Federal Judicial Center study 2002 (excerpted from *Psychology, Public Policy, and Law* 8 (2002) 309-333.

28. Federal Judicial Center study 322.

29. Barry Yeoman, “Putting Science in the Dock,” *The Nation* 26 Mar 2007. A similar conclusion is found in C. F. Cranor, “Judicial Distortion of Science and the Handicapping of Justice in US Law.” *European Journal of Oncology* 12 Dec 2007: 229-34. In this, Cranor claims that “[w]hen responsible, respectable experts disagree, this is precisely the kind of issue juries, not judges, should decide”

30. See Brandon L. Boxler, “Judicial Gatekeeping and the Seventh Amendment: How Daubert Infringes On the Constitutional Right to a Civil Jury Trial,” *Richmond Journal of Law and the Public Interest* 14 (Winter 2011): 1. Boxler Argues that Daubert denies civil plaintiffs a fair trial by denying the trier of fact, the jury, access to relevant evidence.

31. A. Leah Vickers, “Daubert, Critique And Interpretation: What Empirical Studies Tell Us About The Application Of Daubert” *The University of San Francisco Law Review* 40 (Fall 2005):109.

32. Margaret A. Berger, “Expert Testimony in Criminal Proceedings: Questions Daubert Does Not Answer,” *Seton Hall Law Review* 33.4 (2011): 1125; P. Neufeld, “The (Near) Irrelevance of *Daubert*” 107; Groscup Study339; Risinger, “Navigating Expert Reliability” 99.

33. See Berger, Risinger.

34. Groscup Study 363.

35. Risinger 99.

36. Risinger 109-110.

37. Risinger 99.

38. See Beth Schwartzapfel, “No Country for Innocent Men: How a Rapist’s Confession Forced Rick Perry, Champion of Texas Justice, to Pardon a Dead Man,” *Mother Jones* 2012 Jan./Feb..

39. US Bureau of Prisons Statistics <<http://www.bop.gov/news/quick.jsp#1>>.

40. US Department of Justice Statistics available at <<http://bjs.ojp.usdoj.gov/index.cfm>>

41. Virginia Code §19.2-188.1 (2006).

42. Georgia Bureau of Investigations <[http://gbi.georgia.gov/00/press/detail/0,2668,67862954\\_67866877\\_141078271,00.html](http://gbi.georgia.gov/00/press/detail/0,2668,67862954_67866877_141078271,00.html)>

43. C. L. O’Neal, D. J. Crouch, andA. A. Fatah, “Validation of Twelve Chemical Spot Tests for the Detection of Drugs of Abuse,” *Forensic Science International* 109 (2001): 189-201. Similar results were found by Frederic Whitehurst, “Forensic Analysis of Marijuana and



the Kurzman Mystery: A Case Study of Flawed Logic in the Determination of Guilt,” *Texas Tech Law Review* 41 (Fall 2008): 1; and a series of tests conducted in 2008 and 2009 by Omar Bagasra and Krishna Addanki at the South Carolina Center for Biotechnology (see, John Kelly, “False Positives Equals False Justice” Mintwood Media Collective, 2008, <[http://www.cacj.org/documents/SF\\_Crime\\_Lab/Studies\\_Misc\\_Materials/FalsePositives.pdf](http://www.cacj.org/documents/SF_Crime_Lab/Studies_Misc_Materials/FalsePositives.pdf)>).

44. John Kelly, “Has the Most Common Marijuana Test Resulted in Tens of Thousands of Wrongful Convictions?” 28 July 2010, [alternet.org < http://www.alternet.org/investigations/147613/has\\_the\\_most\\_common\\_marijuana\\_test\\_resulted\\_in\\_tens\\_of\\_thousands\\_of\\_wrongful\\_convictions?page=entire>](http://www.alternet.org/investigations/147613/has_the_most_common_marijuana_test_resulted_in_tens_of_thousands_of_wrongful_convictions?page=entire)

45. *Jackson v. Virginia*, 443 U.S. 307 (1979).

46. *State v. Wind* No. State 53, Supreme Court of Wisconsin 60 Wis 2d 267, 208 N.W. 2d 357 1973 Wis.

47. Richard Lempert, “Some Caveats Concerning DNA As Criminal Identification Evidence: With Thanks to the Reverend Bayes,” *Cardozo Law Review* 13 (1991): 303, 312-13.

48. Margaret A. Berger, “Expert Testimony in Criminal Proceedings: Questions Daubert Does Not Answer,” *Seton Hall Law Review* 33.4 (2011): 1125 and Neufeld, “The (Near) Irrelevance of Daubert to Criminal Justice” 95.

49. The expression “ABO serology” refers to the common medical and forensic tests used to classify human blood types. Karl Lansteiner won the Nobel Prize in Physiology or Medicine in 1930 for his discovery of the antigens that lead to this classification scheme. ABO serology has a long history in forensic analysis, but a proper discussion of it is beyond the scope of this paper.

50. M. Houck and B. Budowle, “Correlation of Microscopic and Mitochondrial DNA Hair Comparisons,” *J Forensic Sci*, 2002;47(5). Available at: <<http://journalsip.astm.org/journals/forensic/toc02/4752002.htm>>. See also Clive A. Stafford Smith and Patrick D. Goodman, “Forensic Hair Comparison Analysis: Nineteenth Century Science or Twentieth Century Snake Oil?” *Columbia Human Rights Law Review* 27 (1996): 227 and Barry Scheck, et al., “Actual Innocence: Five Days to Execution and Other Dispatches from the Wrongly Convicted” (New York: Random House, 2000), 166. Scheck et al. discuss expert testimony about hair analysis in cases leading to DNA exonerations.

51. S. Smalley, “Police Shutter Print Unit.” *The Boston Globe*, 14 Oct. 2004.

52. David Grann, “Trial by Fire: Did Texas Execute an Innocent Man?” *The New Yorker*, 7 Sep. 2009.

53. John J. Lentini, “Arson Investigation: Misconceptions and Mythology,” *Wiley Encyclopaedia of Forensic Science* (Hoboken: John Wiley & Sons, 2009).

54. John J. Lentini, “The Mythology of Arson Investigation,” <<http://www.firescientist.com/Documents/The%20Mythology%20of%20Arson%20Investigation.pdf>>. Lentini writes “fire investigation is held back by the burden of an entrenched mythology ... some fire investigators still rely on ‘misconceptions’ about the meaning of various fire effects and fire patterns.”

55. Lentini, “Mythology of Arson Investigation” 2.

56. John F. Boudreau, Quon Y. Kwan, William E. Faragher, and Genevieve C. Denault, *Arson and Arson Investigation: Survey and Assessment*, project awarded to the Aerospace Corporation by the National Institute of Law Enforcement and Criminal Justice, the Law Enforcement Assistance Association, and the U.S. Department of Justice, 1977, 87, available at <https://www.ncjrs.gov/App/publications/Abstract.aspx?id=147389>.

57. A.C. Tompson, Chisun Lee, Joe Shapiro, and Sandra Bartlett, “Shocking: How Faulty Science Lands Innocent People Behind Bars as Accused Child Murderers,” *Pro Publica*, 28 June 2011. Thompson et al. go into detail on convictions based on faulty forensic pathology on children.

58. There is a case to be made that it has actually excluded reliable, but new, science much

to the benefit of the corporate defense bar, but that is a topic for another paper.

59. See Schwartzeffel. See also A.C. Thompson et al..

60. Neufeld, The (Near) Irrelevance of Daubert in Criminal Cases.

61. Oral arguments in *Massachusetts vs. EPA*, 549 U.S. 497 (2007). Transcripts of the oral arguments can be found at , <[http://www.supremecourt.gov/oral\\_arguments/argument\\_transcripts/05-1120.pdf](http://www.supremecourt.gov/oral_arguments/argument_transcripts/05-1120.pdf)>