THE CASE AGAINST EVIDENTIARY ADMISSIBILITY STANDARDS THAT ATTEMPT TO "FREEZE" THE STATE OF A SCIENTIFIC TECHNIQUE

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[I]n an age when one scientific advancement tumbles in rapid succession upon another . . . we are not inclined to adopt a standard that would deprive the judicial process of relevant scientific evidence simply because it is of recent vintage . . . .[1]

In the Simpson prosecution, the government claimed that it had amassed "a mountain of evidence" against the accused. DNA testimony represented a large portion of that mountain. The presentation of the government's DNA evidence consumed a significant percentage of the prosecution's case-in-chief, and the defense responded by calling its own DNA experts. For that matter, both trial teams included attorneys with considerable DNA expertise—Messrs. Clarke and Harmon for the government and Messrs. Neufeld, Scheck, and Thompson for the defense.

We are fortunate to have Professor Thompson here at this Symposium. Even before the Simpson case, he had published widely on the subject of DNA evidence.[2] In his presentation today, Professor Thompson shares with us some of the insights he gained from his participation in "The Trial of the Century." Prior to the Symposium, he was kind enough to send me an outline of his planned remarks.[3] That outline touches upon virtually every

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1. Phillips v. Jackson, 615 P.2d 1228, 1234 (Utah 1980) (Stewart, J.).

2. William C. Thompson, *Evaluating the Admissibility of New Genetic Identification Tests: Lessons from the "DNA War,"* 84 J. CRIM. L. & CRIMINOLOGY 22 (1993); William C. Thompson & Simon Ford, *The Meaning of a Match: Sources of Ambiguity in the Interpretation of DNA Prints, in* FORENSIC DNA TECHNOLOGY 93 (Mark A. Farley & James J. Harrington eds., 1991); William Thompson & Simon Ford, *Is DNA Fingerprinting Ready for Trial? (An Update)*, 4 CAL. PUB. DEFENDER 36 (No. 3, 1991); William Thompson & Simon Ford, *Is DNA Fingerprinting Ready for the Courts?*, NEW SCIENTIST, Mar. 31, 1990, at 38; William Thompson, *The Myth of DNA Fingerprints*, CAL. LAW., Apr. 1989, at 34; William C. Thompson & Simon Ford, *DNA Typing: Acceptance and Weight of the New Genetic Identification Tests*, 75 VA. L. REV. 45 (1989).

3. Professor Thompson did not write on these subjects directly in his article in this volume; however, he does make mention of them. William C. Thompson, *DNA*

aspect of DNA evidence, including the related statistics, which I know Professor Koehler will be addressing. In my brief commentary essay, I can touch upon only a few of the aspects of DNA evidence that Professor Thompson mentioned. In the outline, Professor Thompson indicated that he contemplated addressing two subjects that are of special interest to me. Initially, he intended to outline the specific scientific procedures that he believed DNA analysts should follow to maximize the trustworthiness of their trial testimony. Next, he proposed addressing the question of whether there should be evidentiary admissibility standards prescribing compliance with those procedures.[4]

After considering Professor Thompson's outline, I came to two conclusions. First, I believe that Professor Thompson is right on the science. I reviewed each of the scientific procedures he urged DNA analysts to follow, and in virtually every instance I agree that compliance with that procedure would have the welcome effect of enhancing the trustworthiness of evidence presented at trial. Second, however, on the law I have grave doubts as to whether it is advisable to embody those scientific procedures in evidentiary admissibility standards. I am inclined to think that such a conversion is neither necessary nor desirable. I would like to comment briefly about the scientific and legal aspects of Professor Thompson's position.

I. SPECIFIC SCIENTIFIC PROCEDURES THAT PROFESSOR THOMPSON URGES DNA LABORATORIES TO FOLLOW IN PREPARING ANALYSES FOR TRIAL

As previously stated, on the science, I am in almost complete agreement with Professor Thompson. In a presentation this short, I do not have the time to examine every scientific protocol that he recommends. However, I want to highlight several of the procedures he mentions. In each case, the procedure itself is sensible and has broader application than the context of DNA testing.[5]

Evidence in the O.J. Simpson Trial, 67 U. COLO. L. REV. 827, 828 n.1 (1996).

4. In the final version of his published article for this issue, Professor Thompson decided to focus on other subjects, although he does at least make mention of his preference for more stringent evidentiary standards. *Id.* This article, however, concentrates on arguments made in his original outline, which is on file with Professor Imwinkelried.

5. The full version of this article deals with other applications of the four

A. Validation Studies

In his outline, Professor Thompson lists a number of deficiencies he perceives in current procedures for DNA testing. In particular, he writes of the necessity for adequate validation of the scientific technique on which the proponent's expert proposes to rely. Thus, before a trial judge permits an expert to base an opinion on the direct sequencing procedure for analyzing mitochondrial DNA,[6] Professor Thompson would require the proponent to establish that there has been adequate research verifying the hypothesis of the accuracy of direct sequencing.

Professor Thompson is certainly on firm scientific ground in insisting on proof of validation. Empirical testing is one of the essential elements of the scientific method.[7] The scientist formulates an hypothesis about a natural phenomenon and then engages in research or observation to falsify or verify the hypothesis.[8] The Newtonian tradition draws a sharp distinction between the plausible and the proven.[9] The researcher's formulation of a testable, internally consistent hypothesis[10] is merely the initial step in scientific inquiry: "The proposition [stated in the hypothesis] may be testable and plausible, but it does not deserve scientific status until it literally has been put to the test. . . . [I]f the proposition does not pass muster under this [criterion], the analysis ends. The proposition cannot be deemed scientific knowledge."[11]

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scientific procedures that Professor Thompson mentions. For example, part I.A discusses the application of the requirement for validation studies to gunshot residue (GSR) tests, part I.B explains the application of the chain-of-custody requirement in the drug-testing context, part I.C discusses the need for duplicate testing in the atomic absorption spectrometry (AAS) procedure, and part I.D touches upon the problem of subjective interpretive standards in such disciplines as polygraphy and sound spectrography. Interested readers can obtain a version of the full article by contacting Professor Imwinkelried. His telephone number is (916) 752-0727, his FAX number is (916) 752-4704, and his E-mail address ejimwinkelried@ucdavis.edu.

6. *See* PAUL C. GIANNELLI ET AL., SCIENTIFIC EVIDENCE § 18-3(D) (2d ed. 1993).

7. Bert Black et al., *Science and the Law in the Wake of* Daubert*: A New Search for Scientific Knowledge*, 72 TEX. L. REV. 715, 755 (1994).

8. *Id.* at 755-56.

9. 5 THE ENCYCLOPEDIA OF PHILOSOPHY 490-91 (Paul Edwards ed., 1967).

10. Black et al., *supra* note 7, at 755, 783.

11. Edward J. Imwinkelried, *The* Daubert *Decision:* Frye *Is Dead, Long Live the Federal Rules of Evidence*, TRIAL, Sept. 1993, at 60, 63.

B. Chain of Custody for any Physical Samples Analyzed

Professor Thompson also discusses the problems in the handling of the physical samples subjected to DNA tests such as Restriction Fragment Length Polymorphism ("RFLP") or Polymerase Chain Reaction ("PCR"). Specifically, he notes the dangers posed by inadequate documentation and contamination. If the documentation is flawed, the analyst cannot be confident that the sample she is testing is the sample acquired from the putative father or suspect. Alternatively, when the custodians neglect to safeguard delicate physical evidence from contamination during their handling of the sample, the result could be either a false positive or false negative. Professor Thompson calls for improved evidence handling procedures.

Once again, on the scientific merits Professor Thompson's position is sound. In litigation, the ultimate issue is rarely the identity or condition of the sample at the very time of the scientific analysis. Rather, the trier of fact is almost always being invited to draw an inference as to the sample's identity or condition at an earlier point in time.[12] The question is not simply the nucleotide sequence of the DNA fragment now on the autoradiogram; that information might be relevant only if that DNA was extracted from a tissue sample acquired from the putative father two months before. Again, if in a criminal case the sample had been extracted from a blood stain, the ultimate question would probably not be the nucleotide sequence of the fragment on the autorad; that information might be inadmissible if, as a result of sloppy handling at the crime scene, two blood drops came into contact with each other. The logical relevance of the results of the scientific analysis can depend upon a showing that the object analyzed is identical to the sample acquired at the earlier, material time and that the object is still in roughly the same condition it was in at that prior point in time.[13]

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12. *See* FED. R. EVID. 401.

13. *See generally* Paul C. Giannelli, *Chain of Custody and the Handling of Real Evidence*, 20 AM. CRIM. L. REV. 527 (1983).

C. *Duplicate Testing*

In his outline, Professor Thompson notes that in several respects, the treatment of the scientific evidence in the Simpson case differed from its handling in the typical case. The very first difference he lists is that there was duplicate testing of many samples in *Simpson*:

> The DNA evidence presented in most cases is the product of a single test performed by a single laboratory . . . without replication. The evidence presented against Simpson was the product of multiple tests in which a large number of samples were tested in duplicate (and in some cases in triplicate) by different laboratories. The use of replicate testing in the *Simpson* case greatly reduced concern about several issues that are of crucial importance in most other cases, including the adequacy of standards and controls within DNA laboratories, and the use of subjective procedures for interpreting test results.[14]

Professor Thompson's approval of the replicate testing in the Simpson case echoes the position taken in 1992 by the National Research Council's ("NRC") Committee on DNA Technology on PCR analysis. The National Academy of Sciences ("NAS") had asked the committee to investigate DNA testing. In its discussion of PCR testing, the committee remarked that "[o]ne of the best safeguards against contamination is to have DNA typing independently performed in two laboratories . . . . [S]erious consideration should be given to independent replication of results . . . ."[15]

As was true with Professor Thompson's recommendations for validation testing and rigorous evidence handling procedures, there is merit in Professor Thompson's call for replicate testing. In every case in which a forensic expert uses an instrumental technique to analyze a physical sample, there is some concern about the risks of substitution and contamination—hence the necessity for a showing of chain of custody. However, some scientific procedures are more vulnerable to those risks than

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14. Professor Thompson incorporated these ideas into Part III of his article for this issue, William C. Thompson, *DNA Evidence in the O.J. Simpson Trial*,66 U. COLO. L. REV. 827, pt. III (1996).

15. NATIONAL RESEARCH COUNCIL, DNA TECHNOLOGY IN FORENSIC SCIENCE § 2-18 (1992) [hereinafter NRC].

others. The 1992 NRC committee recommended duplicate PCR testing in part because of the "serious" danger of "contamination of evidence samples with other human DNA" in PCR analysis.[16] Indeed, the committee inserted its recommendation for duplicate testing at the tail end of the section of its report devoted to contamination.[17]

D. Objective Standards for Interpreting Test Results

At the conclusion of his discussion of the duplicate testing in the Simpson case, Professor Thompson states that the testing was advisable because it helped moot concern about "the use of subjective procedures for interpreting test results." In the outline's third section addressing the interpretation of DNA test results, he revisits the topic and criticizes "subjective scoring of the autorads" as "lacking in scientific rigor."

In this regard as well, he is harking back to the 1992 NRC report. In the early stages of the technology, some laboratories relied on visual matching criteria[18]—eyeballing the two autoradiograms to determine whether DNA fragments of the same size appear in the same position on the two autorads.[19] The 1992 NRC report urged the DNA laboratories to discontinue reliance on visual determinations and to develop instead "an objective and quantitative rule" as the criterion for determining whether there is a match between the DNA fragments on the two autoradiograms in RFLP testing.[20] A year before, the Arkansas Supreme Court had stated: "The evidence established that autoradiographs may sometimes be ambiguous or difficult to interpret and that the analyst can err in . . . interpreting the results. Determining whether two (2) samples match can involve subjective judgment."[21]

The use of objective interpretive standards makes eminently good scientific sense. To test earlier findings, other scientists subsequently duplicate the research to determine whether they

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16. *Id.* § 2-16 to -18.

17. *Id.* § 2-18. There is a new NRC report, THE EVALUATION OF FORENSIC DNA EVIDENCE (Prepub. Copy 1996).

18. 2 GIANNELLI ET AL., *supra* note 6, § 18-4(B), at 19.

19. *See, e.g.*, Harold M. Schmeck, Jr., *DNA Findings Are Disputed by Scientists*, N.Y. TIMES, May 25, 1989, at B1 (discussing the *Castro* case in New York).

20. NRC, *supra* note 15, § 2-3.

21. Prater v. State, 820 S.W.2d 429, 437 (Ark. 1991).

can replicate the results.[22] The use of objective, ideally quantitative, interpretive standards facilitates the determination of whether the later experiments have replicated the earlier findings. An ideal scientific technique is valid and reliable in the technical sense of those terms:

> Although courts use the terms "validity" and "reliability" interchangeably, the terms have distinct meanings in scientific jargon. "Validity" refers to the ability of a test procedure to measure what it is supposed to measure—its accuracy. "Reliability" refers to whether the same results are obtained in each instance in which the test is performed—its consistency.[23]

An objective interpretive standard makes the scientific technique more reliable; it increases the probability that different analysts will read the test outcome in the same manner.[24]

In sum, the procedures that Professor Thompson has enumerated in his outline share a common denominator: For many, if not most, forensic techniques, the procedures are merely elements of sound scientific methodology. In 1993 in its celebrated *Daubert*[25] decision, the United States Supreme Court adopted an essentially methodological definition of the expression "scientific . . . knowledge" in Federal Rule of Evidence 702.[26] Writing for the majority, Justice Blackmun declared that "[t]he adjective 'scientific' implies a grounding in the methods and procedures of science."[27] The Justice refused to equate science with a set of substantive propositions about natural phenomena;[28] rather, he viewed science as "a *process*."[29] A proposition qualifies as "scientific knowledge" if it is "derived by" "appropriate validation."[30]

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22. Edward J. Imwinkelried, *A Comparative Law Analysis of the Standard for Admitting Scientific Evidence: The United States Stands Alone*, 42 FORENSIC SCI. INT'L 15, 23 (1989).

23. Paul C. Giannelli, *The Admissibility of Novel Scientific Evidence:* Frye v. United States, *a Half-Century Later*, 80 COLUM. L. REV. 1197, 1201 n.20 (1980).

24. *See* Contini v. Hyundai Motor Co., 876 F. Supp. 540, 545 n.7 (S.D.N.Y. 1995) (discussing Chrysler Corp. v. Department of Transp., 472 F.2d 659, 675-76 (6th Cir. 1972)).

25. Daubert v. Merrell Dow Pharmaceuticals, Inc., 113 S. Ct. 2786 (1993).

26. FED. R. EVID. 702.

27. *Daubert*, 113 S. Ct. at 2795.

28. *Id.*

29. *Id.*

30. *Id.*

Given that methodological standard, conducting validation research will almost always be a component of good science. In the process of researching to refine a technique that is reliable as well as valid, whenever possible the practitioners of the technique will endeavor to develop objective, ideally quantitative, interpretive standards. Further, whenever the analyst contemplates employing a forensic technique to evaluate physical evidence, the analyst will scrupulously observe chain-of-custody procedures. Finally, when the technique in question, such as PCR, is especially vulnerable to contamination, the analyst will give serious thought to duplicate testing. All these procedures help ensure the trustworthiness of the testimony adduced at trial precisely because they are generally elements of sound scientific methodology. On the scientific score, Professor Thompson is right. For that reason, whenever an opposing scientific witness has disregarded one of these procedures, the attorney should have free rein to attack the weight of the witness's testimony. The attorney should be allowed to mention the witness's neglect in opening statement, cross-examine the witness on the topic, present contrary expert testimony explaining the significance of the neglect, and argue the point in summation.

II. THE CASE AGAINST ADOPTING EVIDENTIARY ADMISSIBILITY STANDARDS CATEGORICALLY PRESCRIBING COMPLIANCE WITH SPECIFIC SCIENTIFIC PROCEDURES

In his outline, Professor Thompson goes beyond specifying scientific procedures he recommends or of which he disapproves. After identifying what he perceives to be procedural deficiencies in DNA testing, he asks: "Should these issues go to the admissibility or merely the weight of DNA evidence? Can a case be made for prophylactic rules of evidence (that is, for the use of evidentiary rules to bring about changes in policy and practices of forensic science)?" In the following section, he seems to answer those questions; he writes that "the legal system should . . . try to stop . . . [these procedural deficiencies] through the use of stringent standards for the admissibility of scientific evidence."

Before analyzing Professor Thompson's argument, I want to state my assumptions about the precise nature of his position. I am a bit uncertain about Professor Thompson's position because, unfortunately, he did not have the time to convert his brief outline into a full manuscript before the Symposium. However,

the tenor of Professor Thompson's outline leads me to believe that he is not content with the status quo. I am assuming that he favors prescribing admissibility standards above and beyond those already in place.

In most jurisdictions today, there are three general admissibility standards that the proponent of scientific testimony must satisfy. The proponent must (1) show that the scientific theory or technique on which the expert proposes to rely has been empirically validated;[31] (2) establish an adequate chain of custody for the physical evidence that the expert will use the technique to assess;[32] and (3) demonstrate that on the particular occasion when the expert used the technique to analyze the physical evidence, the expert at least substantially complied with proper test procedure.[33]

If Professor Thompson is not content with these general standards, I presume he is suggesting that legislatures and appellate courts should announce categorical admissibility rules for lower courts requiring them to demand compliance with the specific scientific procedures he favors such as duplicate testing and objective interpretive criteria. If that is the thrust of his proposal, I have grave misgivings. I see little need to adopt such highly specified admissibility standards. Worse still, I think that it is wrongminded to attempt to formulate such detailed standards to govern the admissibility of evidence generated by scientific disciplines. In effect, such standards attempt to "freeze" a forensic technique when the state of scientific research into the technique is constantly changing.

A. The Alleged Need for Highly Specified Admissibility Standards

Even without the benefit of the highly specified admissibility standards Professor Thompson appears to be proposing, in appropriate cases the courts have been able to exclude scientific testimony that was flawed by noncompliance with the procedures

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31. Imwinkelried, *supra* note 11, at 60. *See* Joseph R. Meaney, *From* Frye *to* Daubert*: Is a Pattern Unfolding?*, 35 JURIMETRICS J. 191, 193-94 (1995) (the general acceptance test is already a minority view, followed in only 22 states).

32. 1 GIANNELLI ET AL., *supra* note 6, §§ 7-1 to -6.

33. 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, 23-24 (1991).

Professor Thompson commends. Armed with only the general admissibility standards currently in place, the courts were nevertheless able to rationalize the exclusion of the testimony.

For example, on many occasions the courts have barred the introduction of scientific testimony based on hypotheses that had not been validated. *State v. Smith*[34] is a case in point. *Smith* dealt with a new technique for gunshot residue ("GSR") testing to determine whether a person had recently discharged a firearm. There the court barred testimony about the modified Harrison-Gilroy GSR test because the modification had not been subjected to testing.[35] Even before the Supreme Court's endorsement of the empirical validation standard in *Daubert*,[36] many courts had ruled proffered scientific testimony inadmissible when the record indicated that there had been little or no experimentation to verify the expert's underlying hypothesis.[37] The *Daubert* decision has made the lower federal courts especially conscious of the question of the extent and caliber of the validation studies underpinning the expert's reasoning.[38]

Further, when the facts in the record raise serious questions about the adequacy of the chain of custody, the courts have not hesitated to bar both the physical evidence and any expert testimony about a scientific analysis of the physical evidence.[39] For instance, in *Nichols v. McCoy*,[40] the item in question was a blood sample. The sample had been extracted from a body at the coroner's mortuary. The record indicated that bodies were customarily kept at the mortuary and that samples were ordinarily extracted there. However, the proponent could not establish that the body or blood sample had been segregated from

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34. 362 N.E.2d 1239 (Ohio Ct. App. 1976).

35. *Id.* at 1245-46.

36. Daubert v. Merrell Dow Pharmaceuticals, Inc., 113 S. Ct. 2786 (1993).

37. *E.g.*, State v. York, 564 A.2d 389, 391 (Me. 1989); Nelson v. Trinity Medical Ctr., 419 N.W.2d 886, 892 (N.D. 1988).

38. *See* Deimer v. Cincinnati Sub-Zero Prod., Inc., 58 F.3d 341, 345 (7th Cir. 1995); Textron Inc. v. Barber-Colman Co., 903 F. Supp. 1546, 1556-57 (W.D.N.C. 1995); Goewey v. United States, 886 F. Supp. 1268, 1280-81 (D.S.C. 1995); Chikovsky v. Ortho Pharmaceutical Corp., 832 F. Supp. 341, 344-45 (S.D. Fla. 1993).

39. *See, e.g.*, United States v. Ladd, 885 F.2d 954 (1st Cir. 1989); United States v. Panczko, 353 F.2d 676, 679 (7th Cir. 1965), *cert. denied*, 383 U.S. 935 (1966); Novak v. District of Columbia, 160 F.2d 588, 589 (D.C. Cir. 1947); Smith v. United States, 157 F.2d 705 (D.C. Cir. 1946); United States v. Lewis, 19 M.J. 869 (A.F.C.M.R. 1985); Erickson v. North Dakota Workmen's Compensation Bureau, 123 N.W.2d 292 (N.D. 1963).

40. 235 P.2d 412 (Cal. Dist. Ct. App. 1951).

the other bodies and blood samples at the mortuary. Given the risk of inadvertent substitution, the court ruled the chain of custody inadequate.[41] In another case, *Robinson v. Commonwealth*,[42] the court found an intolerable risk of contamination rather than substitution. In *Robinson*, the prosecution presented an F.B.I. expert's testimony about the analysis of a rape victim's panties and blouse. Although the victim identified the panties and blouse at trial, the record was silent on the steps taken to safeguard the clothing from contamination between the time of seizure and the time of analysis. The court found the gap in the record fatal to the admissibility of the scientific analysis.[43]

Similarly, the courts have sometimes relied on the subjectivity of a forensic technique's interpretive standards as a reason for barring testimony about the technique.[44] In precluding polygraph testimony, several courts have pointed to the subjective nature of the determination whether the recorded physiological reactions indicate conscious deception.[45] In 1995, in a somewhat surprising holding, a federal district court ruled that the claimed expertise of questioned document examiners does not qualify as "scientific knowledge" under *Daubert*.[46] The court made it clear that the subjective character of the determination of the individuality of a handwriting style factored in its ruling.[47] Later the same year, another federal district court held that microscopic hair analysis does not qualify as admissible "scientific knowledge."[48] As in the

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41. *Id.* at 415-16.

42. 183 S.E.2d 179 (Va. 1971).

43. *Id.* at 181.

44. Both courts and commentators have bemoaned the softness or subjectivity of diagnostic standards in forensic psychiatry. Smith v. Schlesinger, 513 F.2d 462, 475 (D.C. Cir. 1975); Washington v. United States, 390 F.2d 444, 457 n.33 (D.C. Cir. 1967); Bruce J. Ennis & Thomas R. Litwack, *Psychiatry and the Presumption of Expertise: Flipping Coins in the Courtroom*, 62 CAL. L. REV. 693 (1974).

45. People v. Anderson, 637 P.2d 354, 360 (Colo. 1981); People v. Monigan, 390 N.E.2d 562, 569 (Ill. App. Ct. 1979); State v. Frazier, 252 S.E.2d 39, 48 (W. Va. 1979).

46. United States v. Starzecpyzel, 880 F. Supp. 1027 (S.D.N.Y. 1995). Although the court ruled that the testimony did not qualify as "scientific knowledge," the court nevertheless concluded that the testimony was admissible as nonscientific expertise. The court indicated, though, that it would give the jury a cautionary instruction to the effect that the expertise rested only on practical experience and not on systematic scientific investigation.

47. *Id.* at 1032-33.

48. Williamson v. Reynolds, 904 F.Supp. 1529 (E.D. Okla. 1995).

questioned document case, the court stressed the lack of objective standards for evaluating hair comparisons.[49]

In addition, in some settings even without the benefit of statute, courts have occasionally mandated duplicate testing. One such setting is intoxication testing.[50] Just as contamination is a special danger in polymerase chain reaction ("PCR") testing, some intoxication testing devices are peculiarly subject to a risk of radio frequency interference ("RFI").[51] Some Breathalyzer models have sophisticated electronic circuitry making them susceptible to RFI in the area where the Breathalyzer is being used.[52] To ensure that RFI does not distort the Breathalyzer reading, courts in several jurisdictions have imposed special restrictions on the admission of Breathalyzer evidence.[53] Courts in Massachusetts[54] and New Jersey[55] have recognized duplicate testing as a precaution against RFI.[56]

In these cases, the courts did not purport to announce highly specified admissibility standards. The courts did not make sweeping pronouncements that a validation study of a certain design is always necessary or that a scientific evidence foundation is never acceptable without proof of duplicate testing. Rather, the courts simply invoked one of the three general admissibility standards described at the beginning of this section, applied the standard to the lower court evidentiary record, and found the proponent's foundation wanting. In each case, the general admissibility standards already in place proved to be an adequate barrier to the introduction of expert testimony of suspect trustworthiness; the courts perceived no need to formulate more specific, rigid admissibility tests.

B. The Wisdom of Formulating Highly Specified Admissibility Standards for Scientific Testimony

Generally, it would be unwise to prescribe highly specified admissibility standards for scientific evidence. As Justice

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49. *Id.* at 1554-57.
50. 2 GIANNELLI ET AL., *supra* note 6, § 22-4, at 227-28.
51. *Id.* §§ 22-3(B), 22-6(D).
52. *Id.* § 22-3(B), at 213.
53. *Id.* § 22-3(B), at 215.
54. Commonwealth v. Neal, 464 N.E.2d 1356 (Mass. 1984).
55. Romano v. Kimmelman, 474 A.2d 1 (N.J. 1984).
56. 2 GIANNELLI ET AL., *supra* note 6, § 22-4, at 228 n.182.

Stewart has commented, the modern era is "an age when one scientific advancement tumbles in rapid succession upon another . . . ."[57] The state of the research into many forensic techniques is constantly changing. Forensic genetic marker analysis is illustrative. Barely two decades ago red blood cell ("RBC") testing was the state of the art.[58] Human leukocyte antigen ("HLA") analysis then made its advent.[59] In short order, HLA was followed by electrophoretic testing of enzymes and proteins.[60] DNA was the next wave.[61] Within the past decade, "there has been an explosion of interest in DNA typing."[62] The DNA technology originally imported from England was multilocus RFLP.[63] In part due to concerns raised in the 1992 NRC report, that technique has given way to single-locus RFLP.[64] As Professor Thompson's outline points out, still another technique, PCR, is now in widespread use.[65] In turn, in less than a handful of years, that technique might be supplanted by direct DNA sequencing.[66] In its report, the 1992 NRC committee speculated that direct sequencing may "ultimately be the optimal method of personal identification . . . ."[67]

The amount of DNA research is staggering. The *Journal of Forensic Sciences*, the official publication of the American Academy of Forensic Sciences, canvasses the entire domain of forensic science. Although that journal is not dedicated to genetic marker analysis, the 1994 and 1995 volumes of the journal contained 56 articles devoted to DNA typing.[68]

While the pace of DNA research is breathtaking, DNA typing is by no means the only area in which there is extensive new research. In any given year, anyone who peruses the literature

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57. Phillips v. Jackson, 615 P.2d 1228, 1234 (Utah 1980); *see supra* note 1 and accompanying text.

58. 1 GIANNELLI ET AL., *supra* note 6, § 17-8(A).

59. *Id.* § 17-8(B).

60. *Id.* § 17-8(C).

61. 2 GIANNELLI ET AL., *supra* note 6, ch. 18.

62. *Id.* § 18-1, at 1.

63. *Id.* § 18-3(A).

64. *Id.* § 18-3(B).

65. *Id.* § 18-3(C). *See also* Kamrin T. MacKnight, Comment, *The Polymerase Chain Reaction (PCR): The Second Generation of DNA Analysis Methods Takes the Stand*, 9 SANTA CLARA COMPUTER & HIGH TECH. L.J. 287 (1993).

66. 2 GIANNELLI ET AL., *supra* note 6, § 18-3(D).

67. NRC, *supra* note 15, at 1-12.

68. There were 25 DNA articles in 39 J. FORENSIC SCI. (1994) and 31 such articles in 40 J. FORENSIC SCI. (1995).

will also come across a large number of articles, documenting additional research into such subjects as pathologist's estimates of time of death[69] and drug identification testing.[70]

Given the pace of forensic research, it is extremely dangerous to adopt highly specified admissibility standards. The 1992 NRC committee sounded this cautionary note:

> It must be emphasized that new methods and technology for demonstrating individuality in each person's DNA continue to be developed. The methods outlined in this [report] are likely to be superseded in efficiency, automatability, economy, and other features by new methods. Care must be taken to ensure that DNA typing techniques used for forensic purposes do not become "locked in" prematurely. Otherwise, society and the . . . justice system will not be able to derive maximal benefit from advances in the science and technology.[71]

We should take that caution seriously. In this respect, there is a radical difference between the existing general admissibility standards and the very specific standards we are now discussing. The existing standards are flexible enough to permit the trial courts to adapt to the changing research landscape. However, if we were to move to more specified standards requiring duplicate testing or particular tests guarding against contamination, we would effectively be freezing the state of the scientific research. At a given point in time, the appellate court or legislature would be momentarily putting the state of the scientific technique on pause, taking a snapshot of the technique at that moment, and basing an evidentiary standard on that snapshot.

In many forensic disciplines such as genetic marker analysis or drug identification, the advancing research would quickly outstrip that admissibility standard. For example, suppose a legislature or appellate court prescribed a particular scientific procedure as a required part of the foundation for the admission of PCR evidence. The following week, month, or year, the ongoing PCR research might yield a superior mode of PCR analysis in which that procedure was wholly unnecessary. The clear, negative implication from the phrasing of the standard would render inadmissible any testimony about a PCR analysis in which

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69. 2 GIANNELLI ET AL., *supra* note 6, § 19-8, at 17 (Supp. 1995).
70. *Id.* §§ 23-2 to -3, at 45-49 (Supp. 1995).
71. NRC, *supra* note 15, at 1-13.

the analysts had failed to observe the specified procedure. The new standard would tie the lower courts' hands. Until the legislature or appellate court revised the standard, the lower courts would have no choice but to exclude testimony based on the improved mode of PCR analysis. The trial courts would be condemned to relying on the outmoded analytical technique.

This policy discussion should sound more than vaguely familiar. One of the foremost criticisms of the former *Frye* rule was that it built in an undesirable lag time between the validation of a scientific technique in the laboratory and its admissibility in the courtroom.[72] Under *Frye*, the caliber of the experimental verification of the technique was not determinative of admissibility. The implicit assumption was that even the judge is incompetent to resolve a "battle of the experts"; and the *Frye* rule limited the judge's role to determining whether a consensus existed in the relevant scientific community. Even if the trial judge was convinced that the scientific hypothesis in question had been amply validated, the judge could not admit testimony based on the hypothesis until the judge could find as a matter of fact that the hypothesis had gained a certain degree of popularity—that is, general acceptance—within the pertinent scientific circle.[73] It takes some time for a widespread consensus to emerge; and until it emerged, the judge's hands were tied—no matter how impressive the research data, the judge had to bar the evidence under *Frye*. Even though these newly proposed specified admissibility standards would not mandate proof of general acceptance, they would have the very same untoward effect; until the legislature or appellate court revisited the issue and revised the admissibility standard, the lower courts could not take advantage of the best research that the scientific community had to offer. In the words of the 1992 NRC committee, the lower courts would be "locked in" to reliance on the older, inferior scientific method. Hence, the adoption of such highly specified admissibility standards would repeat one of the mistakes that the Supreme

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72. Constantine J. Maletskos & Stephen J. Spielman, *Introduction of New Scientific Methods in Court*, *in* LAW ENFORCEMENT, SCIENCE & TECHNOLOGY 957, 958 (S.A. Yefsky ed., 1967). *See also* 1 GIANNELLI ET AL., *supra* note 6, § 1-5(E), at 21.

73. Coppolino v. State, 223 So.2d 68, 75 (Fla. Dist. Ct. App. 1968) (concurring opinion) ("Society need not tolerate homicide until there develops a body of medical literature about some particular lethal agent."), *appeal dismissed*, 234 So.2d 120 (Fla. 1969), *and cert. denied*, 399 U.S. 927 (1970).

Court thought it was undoing when it handed down its decision in *Daubert*.[74]

This potential mistake would be troublesome enough if the evidence law in most jurisdictions were still in common-law form. However, the problem is magnified in the "Age of Statutes."[75] The Federal Rules of Evidence took effect in federal court in statutory form in 1975, and, as of late 1995, thirty-seven states have sets of evidentiary rules patterned directly after the Federal Rules.[76] Further, a few other states such as California have their own comprehensive evidence codes.

Importantly, many jurisdictions have not simply adopted statutory schemes governing the admissibility of evidence. Rather, some courts have construed the statutes as abrogating the courts' common-law power to promulgate exclusionary rules of evidence.[77] The federal courts in particular have adopted a textualist approach to the interpretation of their statutory rules and have held that uncodified exclusionary rules are no longer in effect.[78] That approach figured in the Supreme Court's conclusion in *Daubert* that the hoary *Frye* rule is no longer good law in federal court.[79] Although at one time it was well-settled that the general acceptance test controlled in federal court—and for that matter in forty-five states[80]—the Court could not find any

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74. 113 S. Ct. 2786 (1993).

75. *See generally* GUIDO CALABRESI, A COMMON LAW FOR THE AGE OF STATUTES (1982). *See also infra* note 89 and accompanying text.

76. J. WEINSTEIN ET AL., EVIDENCE, RULES, STATUTE AND CASE SUPPLEMENT iii (1996).

77. *See generally* Edward R. Becker & Aviva Orenstein, *The Federal Rules of Evidence After Sixteen Years—The Effect of "Plain Meaning" Jurisprudence, the Need for an Advisory Committee on the Rules of Evidence, and Suggestions for Selective Revision of the Rules*, 60 GEO. WASH. L. REV. 857 (1992); Randolph N. Konakait, *Text, Texts, or Ad Hoc Determinations: Interpretation of the Federal Rules of Evidence*, 71 IND. L.J. 551 (1996); Randolph N. Jonakait, *The Supreme Court, Plain Meaning, and the Changed Rules of Evidence*, 68 TEX. L. REV. 745 (1990); Eileen Scallen, *Classical Rhetoric, Practical Reasoning, and the Law of Evidence*, 44 AM. U. L. REV. 1717 (1995); Andrew E. Taslitz, Daubert's *Guide to the Federal Rules of Evidence: A Not-So-Plain-Meaning Jurisprudence*, 32 HARV. J. ON LEGIS. 3 (1995); Glen Weissenberger, *The Supreme Court and the Interpretation of the Federal Rules of Evidence*, 53 OHIO ST. L.J. 1307 (1992).

78. Edward J. Imwinkelried, *A Brief Defense of the Supreme Court's Approach to the Interpretation of the Federal Rules of Evidence*, 27 IND. L. REV. 267 (1993).

79. Daubert v. Merrell Dow Pharmaceuticals, Inc., 113 S. Ct. 2786 (1993).

80. Betty R. Steingass, Case Comment, *Changing the Standard for the Admissibility of Novel Scientific Evidence:* State v. Williams, 40 OHIO ST. L.J. 757, 769 (1979).

statutory language codifying the test. In these jurisdictions, in order to implement highly specified admissibility standards for scientific testimony, the legislature would have to intervene and put the proposed standards in enforceable, statutory form.

The experience with HLA (Human Leukocyte Antigen) testimony illustrates the undesirability of codifying highly specified admissibility standards. On one hand, it was clear to the courts that HLA testing could be a useful tool in determining parentage. The HLA marker system is "extremely polymorphic."[81] Consequently, it can positively exclude a falsely accused father in many cases in which RBC testing fails to do so.[82] The HLA system has greater discriminatory power than the RBC system.[83] On the other hand, in some jurisdictions there appeared to be a statutory barrier to admitting testimony about HLA analysis.[84] In some jurisdictions, the statutory language regulating the admission of genetic marker testimony used expressions such as "blood" test[85]—at least suggesting that the legislature had red blood cell testing in mind when it drafted the statute. The initial use of HLA testing was not analyzing blood; rather, it was employed to determine the compatibility of tissue in transplant cases. Faced with statutory language referring to "blood" tests, courts sometimes resorted to "creative" interpretation in order to rationalize fitting square HLA pegs into round RBC holes.[86] In some instances, the courts pleaded with the

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81. 1 GIANNELLI ET AL., *supra* note 6, § 17-8(B), at 548.

82. Pravatchai W. Boonlayangoor, *True Paternity or Exclusion: Analysis in the Case of a Deceased Person*, 34 J. FORENSIC SCI. 703, 705 (1989); Paul I. Terasaki, *Resolution by HLA Testing of 1000 Paternity Cases Not Excluded by ABO Testing*, 16 J. FAM. L. 543 (1978).

83. P.I. Terasaki et al., *Ninety-five Percent Probability of Paternity with HLA, ABO and Haplo-globin*, 10 FORENSIC SCI. INT'L 227, 232 (1978).

84. Jacquelyn K. Hayes, *Proving Paternity By Means of Serological Testing: Should It Be Admitted as Evidence by the Courts?*, 1981 DET. C.L. REV. 47, 60 ("Statutes such as the Michigan legislation . . . appear to pose an insurmountable barrier . . . .").

85. Cutchember v. Payne, 466 A.2d 1240, 1241 (U.S. App. D.C. 1983); Owens v. Bell, 451 N.E.2d 241, 242 (Ohio 1983); Jean E. Maess, Annotation, *Admissibility, Weight, and Sufficiency of Human Leukocyte Antigen (HLA) Tissue Typing Tests in Paternity Cases*, 37 A.L.R. 4TH 167, 183 (1985). "Most statutes merely refer to 'blood tests.' Whether this phrase includes HLA tests is debatable." D.H. Kaye & Ronald Kanwischer, *Admissibility of Genetic Testing in Paternity Litigation: A Survey of State Statutes*, 22 FAM. L.Q. 109, 111 n.13 (1988).

86. Maess, *supra* note 85, at 177-81. In several cases, the courts emphasized that HLA testing had not yet made its advent when the legislature enacted the statutes in question. Cramer v. Morrison, 153 Cal.Rptr. 865 (Cal. Ct. App. 1979);

legislatures to amend the governing statutes.[87] Ultimately, many legislatures revised their statutes to sanction expressly the admission of HLA evidence.[88]

In *A Common Law for the Age of Statutes*, Dean Calabresi proclaimed the emergence of statutes as the dominant source of American law and argued that the courts should assert the power to revise obsolete statutes.[89] The thrust of his argument was that the courts must assume that power because of legislative default. After enacting a statutory scheme, the legislature is likely to become embroiled in other controversies and shirk the responsibility of ensuring that the statute is still consistent with contemporary social reality. Dean Calabresi's view is controversial in the extreme; some critics have countered that in order to assume the power to update outmoded statutes, the courts would have to violate traditional American separation of powers doctrine.[90] Yet, Calabresi's view unquestionably has merit. Even if the legislature feels passionately about an issue when it enacts a statutory scheme, that passion can quickly evaporate. Moreover, it may be terribly difficult to persuade the legislature to return to the issue even after subsequent developments have badly overtaken the statute.

Although all legislation presents a danger of obsolescence, legislatively prescribed, highly specified admissibility standards for scientific evidence pose that danger to an intolerable degree. To begin with, there is an above average risk that the pace of scientific research will outstrip these kinds of standards; the state of the research on PCR testing is likely to change more rapidly than the considerations relevant to the debate over the health-care system. Further, there is a great risk that once the legislature has prescribed a statutory admissibility standard, it will be difficult to convince the legislature to revisit the statute to update it. Prominent cases such as the Simpson trial can temporarily place evidentiary questions such as the admissibility of DNA

Crain v. Crain, 662 P.2d 538 (Idaho 1983); H. v. H., 426 A.2d 1073 (N.J. Super. Ct. Ch. Div. 1980); Owens v. Bell, 451 N.E.2d 241 (Ohio 1983). The courts refused to read the statutory text restrictively as excluding HLA evidence because the legislature simply had not anticipated the subsequent development of the HLA technique.

87. Goodrich v. Norman, 421 N.Y.S.2d 285, 289 (N.Y. Fam. Ct. 1979).

88. 1 GIANNELLI ET AL., *supra* note 6, § 17-8(B).

89. *See generally* CALABRESI, *supra* note 75.

90. Otto J. Hetzel, *Instilling Legislative Interpretation Skills in the Classroom and the Courtroom*, 48 U. PITT. L. REV. 663, 667 (1987).

testimony on the front page of the newspaper. In the same vein, for a time the prosecutions of boxer Mike Tyson and socialite William Kennedy Smith[91] made both the public and legislatures[92] more cognizant of the question of the admission of evidence of other sexual assaults perpetrated by alleged rapists. However, by and large, evidentiary issues are "unlikely to inflame [the] ideological passions" of legislators.[93] It is the rare evidentiary issue that would galvanize enough legislators to make the time to monitor constantly the currency of a statutory admissibility standard.

III. CONCLUSION

In *Daubert*, the Supreme Court forced the judiciary to take a dramatic step. The traditional *Frye* standard focused on an indirect indicator of scientific validity, namely, the popularity of the scientific theory or technique.[94] The general acceptance standard served as a surrogate for a direct evaluation of the underlying scientific research.[95] The standard thus allowed lower court judges to "hid[e] from science"[96] and "avoid coming to grips with science."[97] As Judge Kozinski observed on remand in *Daubert*,[98] the Court's new validation test thrusts the lower courts' judges into "a brave new world."[99] The empirical validation test of *Daubert* requires judges to employ the same standards as experts use in assessing the scientific merit of a theory or technique.[100] In his concurring opinion, Chief Justice Rehnquist

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91. Edward J. Imwinkelried, *A Small Contribution to the Debate Over the Proposed Legislation Abolishing the Character Evidence Prohibition in Sex Offense Prosecutions*, 44 SYRACUSE L. REV. 1125, 1126 (1993).

92. FED. R. EVID. 413-15; *see* Roger C. Park, *The Crime Bill of 1994 and the Law of Character Evidence: Congress Was Right About Consent Defense Cases*, 22 FORDHAM URB. L.J. 271 (1995).

93. Andrew E. Taslitz, *Interpretive Method and the Federal Rules of Evidence: A Call for a Politically Realistic Hermeneutics*, 32 HARV. J. ON LEGIS. 329, 378 (1995).

94. RONALD L. CARLSON ET AL., MATERIALS FOR THE STUDY OF EVIDENCE 289 (3d ed. 1991).

95. Black et al., *supra* note 7, at 721, 725.

96. *Id.* at 722.

97. *Id.* at 730.

98. Daubert v. Merrell Dow Pharmaceuticals, Inc., 43 F.3d 1311 (9th Cir.), *cert. denied*, 116 S. Ct. 189 (1995).

99. *See id.* at 1315.

100. Bert Black, *The Supreme Court's View of Science: Has Daubert Exorcised the Certainty Demon?*, 15 CARDOZO L. REV. 2129, 2131 (1994).

voiced his doubt that lower court judges possess the expertise "to become amateur scientists;"[101] and on remand, Judge Kozinski added that he found the task of applying the validation test "daunting."[102] However, at the end of the majority opinion in *Daubert*, Justice Blackmun expressed his firm confidence that lower court judges are up to the task of applying a test requiring them to determine whether the expert had adequately validated her theory or technique.[103] In short, the *Daubert* decision represented an act of faith in the lower courts' ability to deal directly with scientific research.

Implementing specified admissibility standards, however, would be a step beyond *Daubert*—not merely an act of faith in the judiciary but rather an act of hubris by the judiciary or legislature. It is one thing to announce general standards such as validation and chain of custody for determining the admissibility of scientific testimony. As Justice Blackmun stated in his opinion, the validation standard articulated in *Daubert* is "a flexible one"[104]—one that the trial judge can adapt to the lower court record establishing the then-current state of the scientific research. It is quite another matter for either the legislature or the appellate court to take the next step and announce categorical, highly specified admissibility standards requiring compliance with particular scientific procedures. Those procedures might have represented the cutting edge of the scientific discipline when the appellate court or legislature prescribed them; but months or years later when the lower court must still enforce the standard, the procedure could easily be outmoded in a volatile field such as genetic marker analysis.

Highly publicized cases such as the Simpson prosecution create temptations for the judiciary and legislature. If something goes wrong in such a case, one temptation is to adopt a "quick-fix" solution applicable to all future cases. Many of the "jury reform" proposals now being urged demonstrate that temptation. In his presentation, Professor Allen criticizes "magic bullet" proposals for revamping the jury system.[105] However, there is another,

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

102. Daubert v. Merrell Dow Pharmaceuticals, Inc., 43 F.3d at 1315.

103. Daubert, 113 S. Ct. at 2798-99.

104. *Id.* at 2797.

105. Ronald J. Allen, *The Simpson Affair, Reform of the Criminal Justice Process, and Magic Bullets*, 67 U. COLO. L. REV. 989 (1996).

pernicious temptation: When something goes right in such a case, the temptation can be to adopt a legal rule requiring that all later cases follow suit. We conclude that the duplicate testing and quantitative interpretive standards employed in *Simpson* enhanced the reliability of the scientific testimony in that case, and we consequently flirt with the idea of mandating that experts comply with those procedures in all later DNA cases or, more broadly, in all subsequent scientific evidence cases. The temptation is to catalogue all the sound scientific procedures followed in *Simpson* and convert that catalogue into a set of highly detailed admissibility standards for expert testimony.

That temptation should be resisted. When the time came to reduce federal evidentiary standards to formal rules, the choice was clear. The drafters had to choose among three formats: "a simple creed" of broad norms favored by Judge Charles Clark,[106] the principal architect of the Federal Rules of Civil Procedure;[107] a detailed catalogue of specific evidentiary rules urged by Dean Wigmore;[108] or the "middle course" championed by Professor Morgan, namely, a code of intermediate length, stating general principles.[109] Morgan believed that a catalogue was particularly undesirable; in his mind, "drafting fine-tuned rules of evidence to deal with every case [is] impossible."[110] The Advisory Committee, the Supreme Court, and Congress all made the same choice; rejecting both "vague generalities" and "constricting particularity,"[111] the drafters decided to use the code format.

The general principles that now govern the admissibility of scientific evidence exemplify the type of code that the committee, the Court, and Congress decided to adopt. The foundational requirements for proof of empirical validation, adequate chain of custody, and sound test procedure all are cast at a level of generality that, in the words of the Advisory Committee Chair, Albert Jenner, "leave[s] some play in the joints."[112] These general

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106. Eileen A. Scallen, *Classical Rhetoric, Practical Reasoning, and the Law of Evidence*, 44 AM U. L. REV. 1717, 1735 (1995).

107. *Id.* at 1736 n.133.

108. *Id.* at 1735-37.

109. *Id.*

110. Edmund M. Morgan, *Foreword* to American Law Institute, MODEL CODE OF EVIDENCE 1, 7 (1942).

111. Thomas M. Mengler, *The Theory of Discretion in the Federal Rules of Evidence*, 74 IOWA L. REV. 413, 414 (1989).

112. John R. Baylor et al., *The Proposed Rules of Evidence for the United States*

requirements designedly give the lower courts "a measure of flexibility."[113] They do not purport to prescribe that the lower courts require proof of a validation study with any particular design, any particular type of documentation of chain of custody, or any particular scientific procedure such as duplicate testing. Rather, they give the lower courts latitude to adapt to the constantly changing "scientific landscape."[114] When the drafters decided upon an evidentiary code rather than a catalogue, their choice was sound; and nothing that transpired during the Simpson prosecution warrants reversing that decision.

District Courts and Magistrates, 37 INS. COUNS. J. 565, 571 (1970).

113. *Id.*

114. People v. Barney, 10 Cal. Rptr. 2d 731, 744 (Cal. Ct. App. 1992).