

PAPER

JURISPRUDENCE

Mark Page,¹ *B.D.Sc.(Hons), Grad.Dip.Clin.Dent., G.C.Ed.*; Jane Taylor,¹ *B.D.S., B.Sc.Dent., M.D.Sc., Ph.D.*; and Matt Blenkin,¹ *B.D.Sc., M.Sc.Dent.*

Forensic Identification Science Evidence Since *Daubert*: Part I—A Quantitative Analysis of the Exclusion of Forensic Identification Science Evidence

ABSTRACT: The U.S. Supreme Court decisions in *Daubert v. Merrell Dow Pharmaceuticals Inc.* and *Kumho Tire Co. Ltd. v. Carmichael* transformed the way scientific expert evidence was reviewed in courts across the United States. To gauge the impact of these rulings on the admission of forensic identification evidence, the authors analyzed 548 judicial opinions from cases where admission of such evidence was challenged. Eighty-one cases (15%) involved exclusion or limitation of identification evidence, with 50 (65.7%) of these failing to meet the “reliability” threshold. This was largely because of a failure to demonstrate a sufficient scientific foundation for either the technique (27 cases) or the expert’s conclusions (17 cases). The incidence of exclusion/limitation because of a lack of demonstrable reliability suggests that there is a continuing need for the forensic sciences to pursue research validating their underlying theories and techniques of identification to ensure their continued acceptance by the courts.

KEYWORDS: forensic science, identification, odontology, toolmark, firearms, handwriting, fingerprint, *Daubert*, reliability, law, evidence

This article is the first of two papers that attempts to characterize the incidence and nature of evidentiary exclusions occurring for the forensic identification sciences. It is envisioned that with a clearer picture of the incidence of exclusions, coupled with an analysis of why forensic identification evidence is, at times, failing to meet the standard for admission in courts, forensic identification science practitioners can focus their research in ways that will prove more fruitful to the goal of acceptance by the judicial system.

Many legal academics envisioned the United States Supreme Court decisions in *Daubert v. Merrell Dow Pharmaceuticals Inc.* (1) and *Kumho Tire Co. Ltd. v. Carmichael* (2) as the answer to their call for the use of “evidence-based” forensic science. These seminal cases set the standard for the admission of expert evidence by mandating that the trial judge assess whether proffered expert evidence, whether “scientific” or not, is not only *relevant* but also *reliable*. Critics have argued for many years, some even prior to the *Daubert* decision, that the more traditional forms of forensic identification sciences, such as fingerprints, bitemark analysis, and toolmark identification, have been used for decades as incriminating evidence, yet can offer very little to demonstrate the reliability of their theories and techniques. A key theme recited by several authors is the direct link between the forensic science disciplines and wrongful convictions (3). Some have suggested that invalid forensic science testimony may be responsible for up to 60% of trials where defendants were found guilty but later proved to be innocent via DNA testing (4).

After *Daubert* and *Kumho*, many scholars assumed that a large proportion of forensic evidence presented in criminal and civil courts across the country would now be subject to renewed judicial scrutiny. However, some quickly realized that the real question was not whether legal academics concerned with the reliability of forensic science could interpret *Daubert* to justify the results they desired, but whether judges would do the same (5). Studies on the admissibility of forensic science since the *Daubert* decision have revealed that courts across the United States have felt its influence, even in those jurisdictions that have not explicitly adopted a *Daubert* standard. Several authors have noted that “some forensic sciences have been with us so long, and judges have developed such faith in them, that they are admitted even if they do fail to meet minimal standards under *Daubert*” (6, p. 28). The courts thus still appear extremely reluctant to deny the admission of forensic science evidence testimony in both civil and criminal trials. The legal reasoning by which forensic science evidence is admitted, characterized by some as “judicial gymnastics,” has also been the subject of much criticism. Saks characterized several ways by which the judiciary manage to shirk their gatekeeping duties, including techniques such as refusing to hold an admissibility hearing or failing to give reasons for their admissibility decision; misapplying or misinterpreting *Kumho*; reversing the burden of persuasion onto the challenger; relying on reasoning such as general acceptance or admission by other courts; overemphasizing the flexibility of the inquiry; bringing the standard down to meet the expertize; and relegating the decision to one of weight rather than admissibility (7). Others have reached similar conclusions following independent analyses of admissibility decisions in trials where forensic evidence is offered (8), resulting in a good proportion of these decisions being described in such terms as “unsatisfactory.”

¹University of Newcastle, School of Health Sciences, PO Box 127, Ourimbah, NSW 2258, Australia.

Received 16 Dec. 2009; and in revised form 10 Feb. 2010; accepted 21 Feb. 2010.

“careless,” and “troubling” (9, pp. 502, 506, 519, 525, 578). The list of authors who have criticized the criminal courts for such evasion of their *Daubert* duties is lengthy (7,10–17), and a more detailed discussion is outside the scope of this paper. Readers should refer to the literature referenced at the end of this article to obtain a more detailed understanding of such criticism.

Statistical data on the admission of forensic identification evidence post-*Daubert* are difficult to find. The few studies that have attempted such analyses are plagued by the familiar problem of the availability of unreported judgments, coupled with the sheer enormity of an inclusive search of the legal system for relevant cases. One post-*Kumho* study examined a total of 83 criminal cases, yielding 98 relevant claims where a forensic scientific issue was challenged under *Daubert* (18); however, only twenty-five of these concerned the forensic identification sciences. Merlino et al.’s (19) qualitative and quantitative study using data generated from the Lexis® database found that 25 of 37 proffers of forensic document examination (FDE; 67.6%) were held to be admissible post-*Daubert*, as were 34 of 39 proffers of fingerprint evidence (87.2%) from a total of 65 cases. Moenssens et al. (20) noted 41 cases concerning challenges to forensic odontology (FO) evidence from 1993, but make no attempt at numerical analyses and provide few examples where such evidence has been limited or excluded. Bowers (21) also referenced 19 similar cases. Pretty and Sweet (22) considered 103 cases where bitemark evidence was proposed at trial and surmised that no bitemark evidence had been refused admission because of arguments regarding *Frye*, the Federal Rules of Evidence, or *Daubert* since *People v. Marx* (23) and *State v. Hodgson* (24), but only 20 of these cases occurred after the *Daubert* decision was published.

Other attempts at the analysis of judicial acceptance of forensic identification evidence suffer from the phenomenon of selection bias. In one such example, an author considered a qualitative analysis of 66 handwriting identification cases, “selected” from over 300 federal and state cases that have considered this type of evidence since *Daubert*, in order to demonstrate “complete defeat for foes of Questioned Document Examination” (25). Similarly biased data sets (26) have been used by other authors, serving to consolidate the illusion of overwhelming acceptance of forensic science by the courts (27,28).

As an alternative to the use of legal databases such as Westlaw® and Lexis®, which only selectively return unreported judgments, or the selective sampling of judicial cases referenced primarily to bolster the author’s established views, it is possible to use an expert witness database, such as Daubert Tracker. This database is accessible via the World Wide Web (<http://www.dauberttracker.com> [accessed October 15, 2009]) on a fee-for-service basis and is primarily designed to assist lawyers in research for a witness with specific expertise. This database claims to be comprised of all reported and numerous unreported cases from both U.S. state and federal jurisdictions where an admissibility standard has been cited or mentioned in a decision and where a testifying expert’s methodology or qualification has been challenged. Daubert Tracker also has a repository of documents including opinions, briefs, docket sheets, and transcripts linked from the case record. It derives its information primarily from these sources, as well as others such as the Public Access to Electronic Court Records database, Courtlink™, court websites, and submission from individual legal authorities.

Method

The authors undertook to characterize the legal status of the forensic identification sciences in the courts using the Daubert

Tracker database rather than a conventional legal search engine. A search of the Daubert Tracker database was conducted for forensic evidence disciplines from 1993 to 2008 in four main areas: fingerprint analysis (FPA), firearms/toolmarks/ballistics (FATM) analysis, handwriting analysis (consisting of a combined search for both “Handwriting Analysis” and “FDE”), and FO (consisting of a combined search for both “Dentistry—Forensic Odontology” and “Bitemark Expert”). Cases appearing more than once were consolidated into one record, representing affirmation (or otherwise) by the highest court.

A total of 551 consolidated cases from years 1993 to 2008 (inclusive) involving a challenge to expert witness testimony were retrieved. Cases involving a challenge to bullet lead analysis, recently withdrawn by the FBI as a valid forensic technique following several reports outlining its inherent unreliability (29,30), were excluded, leaving a total of 548 cases involving a challenge to forensic expert witness testimony in the four disciplines outlined above. In seven cases, expert witnesses testifying as to the unreliability of the discipline were themselves excluded by the admissibility ruling; these were also subsequently excluded from the data analysis. The remaining 541 challenges were categorized by reviewing the judicial opinion associated with each and then coded according to the final admissibility decision as either admitted, excluded, or limited. Those challenges that resulted in exclusion or limitation of the proffered evidence (number of challenges [N_C] = 81) were further coded by the authors according to the reasoning given in the opinion.

Results

The results are given in Tables 1–3. From a total of 541 challenges to forensic evidence in the disciplines of FPA, document examination, firearms and toolmarks analysis, and FO, 467 of these (85.0%) resulted in the evidence being admitted without restriction. Sixty-seven challenges (12.4%) resulted in outright exclusion of the proffered evidence, and 14 challenges (2.6%) resulted in admission of the evidence but with limitations on the scope of the testimony.

TABLE 1—Admission of forensic identification science evidence.

Discipline	N_C	% N_C	Admitted	% ADM	Excluded or Limited	% EXC or LIM
FATM	207	38.3	170	82.1	37	17.9
FPA	176	32.5	164	93.2	12	6.8
FO	36	6.7	30	83.3	6	16.7
FDE	122	22.6	96	78.7	26	21.3
Total	541	100	460	85.0	81	15.0

N_C , number of challenges; FATM, firearms, toolmarks, and ballistics evidence; FDE, forensic document examination; FO, forensic odontology; FPA, fingerprint analysis.

TABLE 2—Exclusion versus limitation of identification evidence.

Discipline	N_C	Excluded	% EXC*	Limited	% LIM*
FATM	207	34	16.4	3	1.4
FPA	176	9	5.1	3	1.7
FO	36	4	11.1	2	5.6
FDE	122	20	16.4	6	4.9
Total	541	67	12.2	14	2.6

N_C , number of challenges; FATM, firearms, toolmarks, and ballistics evidence; FDE, forensic document examination; FO, forensic odontology; FPA, fingerprint analysis.

*Percentage expressed as % of total challenges in that discipline.

TABLE 3—Judicial reasoning for exclusion of forensic identification evidence.

Judicial Reasoning	Code	Explanation	No. Cases Citing*	% Cases Citing†
Procedural	P	Excluded because of a breach of procedural or technical rules, such as statutory time limits or rules of disclosure	4	5.1%
Qualifications	Q	The witness was deemed not qualified to give expert opinion evidence	16	20.3%
Relevancy	R	Excluded as not relevant, including exclusions under Rule 403 (or similar) discretions	15	19.0%
Witness testimony	W	The expert made inappropriate statements, drew inappropriate inferences, or attempted to testify outside the area of his or her expertise	17	23.8%
Methodology	M	The expert failed to follow approved, recognized, or accepted methods and techniques in their analysis	6	5.7%
Scientific underpinning	S	The underlying premise for the witnesses conclusions was not proven, because of failure to tender enough information about the theory or technique to allow analysis, a failure to meet or address <i>Daubert</i> or other reliability thresholds, or through the conduct of experiments or use of “experience” by the witness that was deemed to be scientifically unreliable	27	36.2%

*Total exceeds *N* cases (79) as some cases were excluded because of reasons in more than one category.

†Total exceeds 100% as some cases were excluded because of reasons in more than one category.

FO and FPA enjoyed the highest ratio of partial versus complete exclusion, with FO being only “limited,” as compared to excluded, in 33% of those cases involving restriction or exclusion. Fingerprints suffered limitation in 25% of all challenges where unrestricted admission was not granted.

Two challenges resulted in the authors being unable to find a reason given by the judge for the exclusion of evidence, representing 2.5% of challenges considered, and these were excluded from any further analysis of the data concerning judicial reasoning. Overall, procedural reasons were cited in four (5%) cases where a reason was able to be determined for the exclusion of forensic identification science evidence. The fact that the witness was not appropriately qualified was noted in 16 (20.3%) of cases, and relevancy issues were cited as a reason for exclusion in 15 (19%) cases. The three remaining categories combined represent the notion of “reliability,” witness conduct, methodology and scientific underpinning of the expert’s premises, and accounted for the reasoning in 51 (64.6%) exclusions. A reliability issue was the sole reason given for exclusion in 45 of these challenges. In the remaining six challenges, the judge cited a reliability reason and at least one other, such as a relevancy, procedural, or qualification issue. The discipline representing the largest proportion of restrictions because of reliability was that of FO, with six (100%) of challenges being excluded or limited on reliability grounds alone. The next highest was handwriting analysis, where 18 (72%) cases cited reasons concerning the reliability of the testimony.

The number of exclusions due to reliability occurring before the *Kumho* decision ($N_C = 20$) or after the *Kumho* decision ($N_C = 61$) was also considered. Prior to *Kumho*, 10 challenges (50%) resulted in exclusion due to reliability reasons. Post-*Kumho*, 40 challenges (67.8%) resulted in an exclusion citing reliability reasons. While this may represent additional scrutiny of the reliability of forensic science disciplines after the *Kumho Tire* case in accordance with the Supreme Court’s mandate, the difference in proportion of exclusions because of reliability pre-*Kumho* versus post-*Kumho* was not found to be statistically significant using either a chi-squared test ($p = 0.127$), or Fisher’s exact test (two-sided p -value = 0.177).

Criminal defendant experts’ testimony was excluded outright in 26 of 27 (96.3%) “successful” challenges (defined by the evidence being either excluded or limited). By contrast, prosecution experts experienced 36 successful challenges, with only 24 of these resulting in complete exclusion (66.7%). Civil defendant expert witnesses were completely excluded in all of the successful challenges against

them, with no instances of limitation, whereas plaintiff experts were completely excluded in 11 of 12 successful challenges.

Fingerprint Analysis ($N_C = 176$)

One hundred and sixty-four (93.2%) challenges to fingerprint evidence resulted in unrestricted admission. A total of 12 challenges to fingerprint evidence resulted in an exclusion or limitation of the evidence. Five (41.7%) of these challenges resulted in an exclusion on grounds other than reliability; two of these challenges resulted in exclusion because of procedural errors concerning rules of disclosure; two were because of the witness not being adequately qualified to provide expert opinion; and one was because rebuttal fingerprint testimony offered by the defendant was found to be irrelevant to the issue in question. Seven challenges (58.3%) resulted in an exclusion citing grounds of reliability. Two of these resulted in only a partial exclusion, where the witness was allowed to testify, but only regarding the similarities and differences between known and unknown exemplars, and not that a particular latent print could be uniquely identified as that of the defendant. One of these cases was later reversed by the same judge after reconsideration, while the other actually involved footprint rather than fingerprint evidence.

Firearms, Toolmarks, and Ballistics Evidence ($N_C = 207$)

A total of 37 challenges (17.9%) to FATM testimony resulted in either exclusion or limitation of the proffered evidence. The reasons for exclusion were unable to be ascertained by the authors in one of these challenges, and thus, it was excluded from further analysis. Reliability concerns were mentioned in the reasons given for exclusion or limitation in 20 (52.8%) of challenges. While this appears to be lower than fingerprint evidence, in excluding cases that do not deal specifically with identification (where the expert was testifying regarding gun design, bullet trajectories, distance of firing), we found that reliability played a role in 11 (64.7%) of the remaining 17 successful challenges.

Forensic Document Examination ($N_C = 122$)

FDE (including handwriting analysis) testimony was admitted without limitation in 96 (78.7%) challenges. A total of 26 challenges to handwriting analysis resulted in an exclusion or limitation on the proffered testimony. The reasoning behind one exclusion in

this set was unable to be determined, and thus, it was excluded from further analysis. Reliability reasons accounted for exclusion in 18 challenges (72%). Fifteen of these challenges resulted in the judge making a negative finding specifically on the scientific validity of the technique used by the expert witness; yet six of those cases subsequently involved only a partial limitation of the testimony by preventing the witness making any statements as to whether the handwriting was specifically that of the defendant.

Forensic Odontology ($N_C = 36$)

FO evidence was admitted without restriction in 30 challenges (83.3%). Six challenges to the reliability of FO resulted in exclusion or limitation due to reliability reasons, accounting for 100% of the exclusions in this discipline. Five of these challenges were in bitemark cases. The sixth regarded testimony given by a forensic odontologist who was also qualified in crime-scene evaluation. It was decided on an appeal for ineffective counsel that the defendant's proffered (but uncalled) evidence in this last case regarding the positioning of a body would have been excluded under *Daubert*, even if it had been called by counsel. There was one instance of a challenge to the identification of a deceased individual from the dentition; however, it was not successfully upheld.

Discussion

It is important to recognize that the results of this study do not reflect the admissibility of forensic evidence types under *Daubert*, but represent the wider consideration of admissibility under a general "reliability" requirement, applicable across many jurisdictions. There were several reasons for this approach. First, a number of authors have reached the conclusion that challenges under the two major case-law examples, *Frye* and *Daubert*, essentially result in the same outcome (31). Second, it is recognized that most states in the U.S. have enacted similar evidence codes to the Federal Rules, which since the amendment in 2001 embody the reliability ideals intended by the *Daubert* opinion (31–33). Third, the vast majority of judicial decisions recognize the fact that the admission of expert evidence is dependent on both a *relevance* and a *reliability* requirement, and it is now well-recognized that the question of whether an expert has tendered reliable evidence is not necessarily dependent on whether they have addressed issues specific to a *Daubert*-oriented inquiry. Fourth, a more global analysis is likely to be of more use and interest to the forensic science practitioner who may be asked to give evidence in other States. Finally, the research encompasses only the period of *Daubert* and its progeny, thus accounting for its impact on other jurisdictions while not necessarily being restricted to those jurisdictions that have explicitly adopted the *Daubert* precedent.

Data concerning the ratio of admitted versus excluded evidence are difficult to accept in any analysis without caveat. No single source routinely lists every challenge brought before the courts, in addition to the usual problems of sourcing unpublished judicial opinions and selection bias. Nevertheless, the results obtained in this study largely support other authors' data regarding the majority acceptance of forensic identification evidence in U.S. courts. An assessment of the accuracy of the percentage admission/exclusion rate reveals that the figures concerning admission rate are likely to be an underestimate of the true proportion of cases where evidence is admitted. A brief comparison was made with the Westlaw® database, using a search string for filtering fingerprint challenges from 1993 to 2008 ("fingerprint/2 admis! da(aft 1993 & bef 2009)") supplemented by: "fingerprint/7 reliab! da(aft 1993 & bef 2009)").

Of the 300 cases retrieved, only 153 of them specifically related to a challenge to the admissibility of fingerprint evidence. The other 147 cases usually cited a fingerprint case to prove an aspect of law related to another area, or the key words in the search string were simply used in passing while the case itself did not involve any specific challenge to fingerprint evidence. Of the 153 cases deemed to be relevant, 74 of them were not listed in *Daubert Tracker*. Fingerprints were deemed to be admissible in all of these cases, and in the majority of examples, this was ruled on without the conduct of an evidentiary hearing. Conversely, *Daubert Tracker* listed 90 cases that were not picked up by Westlaw's search engine. If one was to combine these results, then the rate of admission versus exclusion of fingerprint evidence becomes 95.2% admission and 4.8% exclusion, compared to the figures obtained by using only the *Daubert Tracker* database of 93.2% admission and 6.8% exclusion. This demonstrates that the proportion of evidence found to be admissible is likely to be underestimated.

More important, this study reveals that the reliability of the forensic identification sciences is still suffering criticism in the courts, and is responsible for the majority of exclusions or limitations of such evidence when compared to other potential reasons for exclusion such as procedural, qualification, or relevancy issues. The concept of reliability used in this study takes its meaning from numerous legal sources. Methodological shortfalls should also be considered in any discussion of reliability, as encompassed by Rule 702 of the Federal Rules of Evidence (34) in that "...the testimony [must be] the product of reliable principles and methods." The U.S. Supreme Court in *Daubert* also noted that "...[T]he requirement that an expert's testimony pertain to 'scientific knowledge' establishes a standard of evidentiary reliability," and that "...the word 'knowledge' connotes more than subjective belief or unsupported speculation" (1, p. 590). Reliability can therefore also be said to include consideration of whether the expert attempts to opine on an area outside the bounds of their particular field, whether the opinion is based on speculation, or whether the expert makes statements that remain unsupported by the bulk of their testimony. This notion is supported by other authors (35).

This study does not attempt to confirm the trend that other authors have already noted regarding a discrepancy in the admission of expert testimony favouring the prosecution in criminal cases. However, it is of interest to note that criminal defence witnesses whose evidence failed to meet the relevant statutory evidence standards were more likely to suffer complete exclusion, rather than limitation, of their evidence.

The ratio of evidence excluded pre- versus post-*Kumho* needs to be considered with caution, because of the differences in sample size and the potential for selection bias. The nonsignificant *p*-values may suggest that the notion of pre-*Kumho* courts relying on finding the majority of forensic evidence admissible because of its "nonscientific" nature may have been unfounded. Alternatively, it could be considered that post-*Kumho* courts are not necessarily finding forensic scientific evidence unreliable, as predicted by many critics. Whether this is because of the inherent reliability of forensic identification evidence, or the poor application of reliability standards by the judiciary is a question this paper does not attempt to answer.

Conclusion

While statistics regarding the admission versus exclusion of forensic evidence may not be accurate because of problems relating to selection of cases, availability of judgments, and bias, it is clear that there is a sizable proportion of forensic identification evidence

that is failing to meet evidentiary standards in U.S. courts. It is also apparent that in such cases, the reliability of forensic identification science evidence, encompassing the concerns regarding the discipline's underlying theory, the expert's testimony, and their methodology, accounts for the majority of judges' concerns regarding its admission. The forensic identification sciences need to address these concerns if they wish to enjoy continued acceptance of their evidence by the judicial system in the future.

References

1. *Daubert v. Merrell Dow Pharmaceuticals Inc.*, 509 U.S. 579, 113 S.Ct. 2786, 125 L.Ed.2d 469 (1993).
2. *Kumho Tire Co. Ltd. v. Carmichael*, 526 US 137 (1999).
3. Saks MJ, Koehler JJ. The coming paradigm shift in forensic identification science. *Science* 2005;309:892–5.
4. Garrett BL, Neufeld PJ. Invalid forensic science and wrongful convictions. *Va L Rev* 2009;95:1–97.
5. Jonakait RN. The meaning of *Daubert* and what that means for forensic science. *Cardozo L Rev* 1993;15:2103–18.
6. Moriarty JC, Saks MJ. Forensic science: grand goals, tragic flaws and judicial gatekeeping. *Judges J* 2005;44:16–33.
7. Saks MJ. The legal and scientific evaluation of forensic science. *Seton Hall L Rev* 2002;33:1167–88.
8. La Morte TM. Sleeping gatekeepers: *United States v. Llera Plaza* and the unreliability of forensic fingerprinting evidence under *Daubert* comment. *Alb LJ Sci & Tech* 2003;14:171–214.
9. Risinger DM. Appendix: cases involving the reliability of handwriting identification expertise since the decision in *Daubert*. *Tulsa L Rev* 2007;43:477–596.
10. Beecher-Monas E. Blinded by science: how judges avoid the science in scientific evidence. *Temple Law Rev* 1998;71:55–102.
11. Cole SA. Grandfathering evidence: fingerprint admissibility rulings from Jennings to Llera Plaza and back again. *Am Crim L Rev* 2004;41:1189–276.
12. Dwyer DM. (Why) are civil and criminal expert evidence different? *Tulsa L Rev* 2007;43:381–96.
13. Faigman DL, Kaye DH, Saks MJ, Sanders J. How good is good enough: expert evidence under *Daubert* and *Kumho* reply essay. *Case W Res L Rev* 1999;50:645–67.
14. Gianelli PC. Forensic science: under the microscope. *Ohio NU L Rev* 2008;34:315–40.
15. Kaye DH. The nonscience of fingerprinting: *United States v. Llera-Plaza*. *QLR* 2001;21:1073–88.
16. Risinger DM. Navigating expert reliability: are criminal standards of certainty being left on the dock? *Alb L Rev* 2000;64:99–152.
17. Saks MJ. Protecting factfinders from being overly misled, while still admitting weakly supported forensic science into evidence. *Tulsa L Rev* 2008;43:609–26.
18. Fradella HF, O'Neill L, Fogarty A. The impact of *Daubert* on forensic science. *Pepp L Rev* 2003;31:323–62.
19. Merlino ML, Springer VS, Kelly JS, Hammond D, Sahota E, Haines L. Meeting the challenges of the *Daubert* trilogy: refining and redefining the reliability of forensic evidence. *Tulsa L Rev* 2007;43:417–46.
20. Moenssens AA, Henderson CE, Portwood SG. *Scientific evidence in civil and criminal cases*, 5th edn. New York, NY: Foundation Press Thomson/West, 2007.
21. Bowers CM. Forensic odontology. In: Faigman DL, Saks MJ, Sanders J, Cheng EK, editors. *Modern scientific evidence: the law and science of expert testimony*. Vol. 4—Forensic science. St. Paul, MN: Thomson/West, 2007;649–743.
22. Pretty IA, Sweet D. The judicial view of bitemarks within the United States criminal justice system. *J Forensic Odontostomatol* 2006;24:1–11.
23. *People v. Marx*, 54 Cal. App.3d 100, 126 Cal. Rptr. 350 (1975).
24. *State v. Hodgson*, 512 N.W.2d 95 (Minn. Sup. Ct.) (1994).
25. McFarland H. Case law regarding questioned document examination; 2004, http://writeexam.com/case_law.php (accessed November 12, 2009).
26. Sarmousakis PA, Meagher S. Legal challenges to fingerprints; 2005, http://onin.com/fp/daubert_links.html (accessed November 23, 2009).
27. Haber L, Haber RN. Scientific validation of fingerprint evidence under *Daubert*. *Law Prob & Risk* 2008;7:127–41.
28. Ferriola TJ. Scientific principles of friction ridge analysis & applying *Daubert* to latent fingerprint identification. *Criminal Law Bulletin* 2004, <http://www.clpex.com/Articles/ScientificPrinciplesbyTomFerriola.htm> (accessed November 12, 2009).
29. Committee on Scientific Assessment of Bullet Lead Elemental Composition Comparison. *Forensic analysis: weighing bullet lead evidence*. Washington, DC: National Academies Press, 2004.
30. Federal Bureau of Investigation. Press Release, September 1 2005: FBI Laboratory Announces Discontinuation of Bullet Lead Examinations. FBI National Press Office 2005. http://www.fbi.gov/pressrel/pressrel05/bullet_lead_analysis.htm (accessed November 25, 2009).
31. Cheng EKY, Albert H. Does *Frye* or *Daubert* matter?—A study of scientific admissibility standards essay. *Va L Rev* 2005;91:471–513.
32. Conley JMG, Scott W. Scientific evidence in the state courts: *Daubert* and the problem of outcomes. *Judges J* 2005;44:6–15.
33. Bernstein DE, Jackson JD. The *Daubert* trilogy in the states. *Jurimetrics* 2003;44:351–66.
34. Federal Rules of Evidence. *Federal Evidence Review* 2008. <http://www.FederalEvidence.com> (accessed October 20, 2009).
35. Foster KR, Huber PW. *Judging science: scientific knowledge and the federal courts*. Cambridge, MA: MIT Press, 1999.

Additional information and reprint requests:
 Mark Page, B.D.Sc., Grad.Dip.Clin.Dent., G.C.Ed.
 Oral Health
 University of Newcastle
 PO Box 127
 Ourimbah
 NSW 2258
 Australia
 E-mail: mark.page@uon.edu.au