

INTERSECTION OF SCIENCE AND LAW

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ABSTRACT

The intersection of science and law in the areas of trade secrets, trademarks and copyright is overviewed. Two recent Supreme Court cases in patent law (*Markman*, *Hilton Davis*) are summarized. The use of scientific evidence in court, and the theme of "junk science", are reviewed. Comment is made on the recent false advertising case between Gordon & Breach and the American Institute of Physics over the use of citation impact factor. The proposal that publications which are cited by patents have special value (e.g., New York Times, C1 (May 13, 1997)) is analyzed and criticized.

OVERVIEW

There are many areas of law which overlap notably with science. Within the now trendy area of intellectual property, one can find issues of interest to scientists not only in patents but also in the areas of copyright, trademark, and trade secrets. Further, the area of torts has led to Huber's book "Galileo's Revenge," giving us the soundbite "junk science," a virtually inexhaustible topic of cocktail party conversation.

Of intellectual property, we give a brief overview of the subdivisions of trade secret, trademark, copyright and patent. There are many resources on the internet, including <http://www.findlaw.com>, http://www.yahoo.com/government/law/intellectual_property, <http://www.fplc.edu/tfield/ipbasics.htm> and <http://www.abanet.org/intelprop>. Many firms have useful information including <http://pennie.com>, <http://www.fr.com>, <http://www.brobeck.com>, and <http://kuesterlaw.com>. The magazine INTELLECTUAL PROPERTY TODAY maintains current and past issues on the internet at <http://www.lawworks-iptoday.com>.

Trade secrets

The law of trade secrets can affect scientists in many ways. For example, the contract between scientist and employer can place limitations on the use by the employee of confidential information. In a recent case, a Texas company (DSC Communications Corp.) is suing Evan Brown, a former employee, over an invention that Mr. Brown is carrying in his head. Mr. Brown signed an agreement upon his employment that he grant the company rights to any inventions relating to company business or "suggested by his work." Brown claimed to have invented a system to solve the problem of outdated computer code. When initial negotiations with his employer broke down (to develop the idea for money

independently of his employment contract), the company claimed it owned the work outright. Mr. Brown refused to disclose the system and was fired. The company sued for breach of contract, over an idea which exists only in Mr. Brown's head. (National Law Journal [hereafter Nat. Law Jour.], C16, Oct. 20, 1997). The breach of confidence requirement allows post-employment obligations to be placed on employees. Because an employer/employee relationship is confidential, the employer may require an employee to sign a post-employment agreement not to compete. Provided the agreement is reasonable and necessary to protect legitimate business interests, the employer may thus prevent an employee from disclosing trade secrets.

A trade secret case which attracted some attention was that involving Dr. John Ewen and Exxon over metallocene catalysts for polypropylene synthesis (Wall Street Journal, p. A1, March 1, 1996; see also *Fina Oil and Chemical Co. v. Ewen*, 43 USPQ2d 1938 (CAFC 1997); initially, Exxon stated that information in patents assigned to Fina, a later employer of Ewen, had been "unlawfully disclosed." When asked if Dr. Ewen had taken secret information from Exxon, Italian scientist Adolfo Zambelli testified by referring to a character in an Italian comedy who told secrets to everyone. "Il segreto di Pulcinella," he said. "The secret that everybody knows." G. Taylor, Nat. Law Jour., p. A10 (April 3, 1995)).

Historically, trade secrets have been protected by state law. The Uniform Trade Secrets Act ("UTSA") is model legislation drafted by the National Conference of Commissioners on Uniform State Laws. Forty (40) states have enacted various statutes modeled after the UTSA. Two states (Alabama and Massachusetts) have enacted Trade Secrets statutes that are not modeled after the UTSA. Eight states protect trade secrets under common, or judge-made, law.

Recently, the Economic Espionage Act of 1996 ("EEA") made the theft of trade secrets a federal crime in certain instances. Section 1831 of the EEA makes theft of trade secrets to benefit any foreign government, foreign instrumentality or foreign agent a criminal offense. An individual can be imprisoned up to 15 years and/or fined up to \$500,000 and a corporation can receive a fine of not more than \$10,000,000. Section 1832 of the EEA makes theft of a trade secret within interstate or foreign commerce a criminal offense. The corresponding numbers are 10 years, \$250,000 and \$5,000,000. Section 1834 provides for criminal forfeiture of any property or proceeds derived from the violation, and section 1836 provides for injunctions.

The contours of the EEA have been explored in the recent case of *U.S. v Hsu*, 44 USPQ2d 1646 (E.D. Pa. 1997), a case involving a "sting" operation in which an FBI agent allegedly offered to defendants Hsu and Ho information on the formulae and processes for making the anti-cancer drug TAXOL, manufactured by Bristol-Myers Squibb.

The reported decision pertained to provisions of Section 1835 of the EEA ("Orders to preserve confidentiality"). An issue in trade secrets cases is the extent to which the trade secret is disclosed during trial. In the *Hsu* case, the government sought a protective order to keep the defendants from reviewing the TAXOL documents because many of the documents contained confidential trade secrets. The defendants argued that the government would have to prove that the documents used in the sting operation actually contained trade secrets, and that, accordingly, the defendants would have to review the documents. Although the court did not accept all of the reasoning of the defendants, the protective order advocated by the defendants was adopted.

In reaching its decision, the court dealt with the arcane concept of "legal impossibility". This is a defense to an attempted crime which arises when, unknown to the actor, what the actor planned to do was not criminal. Attempting to do that which is not a crime is not attempting to commit a crime. The court found that legal impossibility was not available as a defense to a charge of attempted theft of trade secrets under 18 USC § 1832. Citing to *U.S. v. Everett*, 700 F.2d 900 (CA3 1983), the court observed that the doctrine of impossibility has become one of utter frustration and further found that the legislative history of the EEA confirms that the defense of legal impossibility should not apply.

U.S. v. Everett involved the attempted sale to an undercover DEA agent of what was alleged to be P-2-P, an illegal substance, but which was not in fact P-2-P. In *Everett*, the defendant in fact believed, erroneously, the substance was P-2-P. In an earlier case, *U.S. v. Oviedo*, 525 F.2d 881 (CA5 1976), a defense of legal impossibility was allowed on a similar fact pattern [In *Oviedo*, the accused asserted he was only trying to "rip off" the agent]. In both of these drug cases, the purportedly illegal drug was in the control of the accused, who represented it to be other than what it, in fact, was. In the *Hsu* case, the alleged trade secret was in the control of the federal agent. The government argued that even if the documents had been blank or contained "dummy" formulas, the defendants still could have committed a criminal offense. In the drug cases, the government did not know, initially, whether the substance offered for sale was controlled (but the defendant knew, or should have known); in the *Hsu* case, the government did know what was in the documents, but the defendants may not have.

The substantive issues of the *Hsu* case remain to be resolved. In an earlier matter, an Indian national was sentenced under the EEA for selling secrets relating to erythropoietin, a hormone used to treat anaemia in kidney dialysis patients, to an FBI agent posing as a member of the Russian Foreign Intelligence Service. The undercover agent studied the material (an EPO cell line) for authenticity before the arrest. (R. Matthews, *London Sunday Telegraph*, p. 4 (Dec. 14, 1997)).

A number of legal experts believe that the EEA can apply in domestic situations in which an employee goes from company X to company Y carrying trade secrets:

Probably the most troublesome feature of the EEA relates to its applicability in instances in which an employee of company X, having knowledge of company X trade secret information, changes jobs to work for competitor company Y. When the employee performs work at company Y using skill and knowledge obtained during employment at company X, is the employee in violation of the EEA? (G. J. Mossinghoff, et al., *JPTOS*, 1997, 79(3), 191-210; see also L. B. Ebert, *Int. Prop. Today*, (Feb. 1998)).

Trademark law

The objective of trademark law is to protect the consumer of goods or services from confusion. Thus, a maker of goods or provider of services can mark his product to identify it, and secure protection in that mark under both state and federal law, with the objective of preventing consumer confusion. The symbol ® (encircled R) indicates that the trademark is

federally registered. Although typical trademarks are words or symbols, even a color can be a registered trademark. (*Qualitex v. Jacobson Products*, 115 S. Ct. 1300 (1995)). However, scandalous or obscene material cannot be registered. (*In re Wilcher*, 40 USPQ2d 1930 (TTAB 1996)).

The federal law on trademarks (the Lanham Act) covers situations involving a false designation of origin or source and false description or representation. The latter, termed "false advertising", requires that the plaintiff show "that an advertisement is either literally false or that the advertisement, though literally true, is likely to mislead and confuse consumers." (*McNeil-P.C.C., Inc. v. Bristol-Myers Squibb Co.*, 938 F.2d 1544, 1549 (CA2 1991)). False advertising can include a fraudulent representation that goods marketed have ingredients or qualities that they do not have but that goods of a competitor have. *Sun Trading Distributing v Evidence Music*, 44 USPQ2d 1758 (SD NY 1997).

A recent case of interest to scientists involved the allegation that use of citation impact data (by the physics societies AIP and APS) could, in part, sustain a charge of false advertising. In a preliminary decision (*Gordon and Breach v American Institute of Physics*, 37 USPQ2d 1289 (SD NY 1995)), a federal district court distinguished citation data published in a journal (protected free speech) from the same data specifically addressed to librarians (commercial speech). A decision on the merits of the latter supported the position of the societies (see *Science*, 277, 1611, Sept. 12, 1997; *Physics Today*, pp. 93-94 (Oct. 1997); *Intellectual Property Today*, p. 5 (Oct. 97) and pp. 28-29 (Nov. 97) [The text of the November article is available at <http://www.lawworks-iptoday.com/11-97/ebert.htm>]. On a lighter note, the publisher of a book on the Kennedy assassination ("Case Closed") was found not to violate the false advertising provision of the Lanham Act for an advertisement featuring pictures of conspiracy theorists with the caption "GUILTY OF MISLEADING THE AMERICAN PUBLIC" (*Groden v Random House*, 35 UPSQ2d 1547 (2d Cir 1995)).

Copyright

Federal copyright law secures protection for works of authorship, which works include books, papers, music lyrics, maps and sculpture. A compilation or grouping of papers, such as an anthology, may be copyrighted. Thus, in a whimsical decision concerning a compilation of works purportedly authored by celestial beings, the Ninth Circuit allowed copyright protection in the compilation. *Urantia Foundation v Maaherra*, 43 USPQ2d 1001 (CA9 1997).

Within copyright law, under the doctrine of fair use, under certain conditions, one may copy a copyrighted work without infringing. In cases of criticism, comment, news reporting, teaching, scholarship, or research, courts will balance issues including commercial/nonprofit character, nature of the copyrighted work, the fraction of the work copied, and the effect upon the potential market value of the copyrighted work. However, in a recent case involving the photocopying of 8 articles from a technical journal by a single scientist employed by Texaco, a federal court in New York court found the copying to be an infringement not covered by fair use (*American Geophysical Union v Texaco Inc.*, 35 USPQ2d 1547 (2d Cir 1995), cert. pet.

dismissed Dec. 4, 1995; see also "How Does the Texaco Case Affect Photocopying by Scientists", *Science*, **270**, 1450-1451, Dec. 1, 1995; various documents pertaining to the case are available at <http://fairuse.stanford.edu/primary/cases/texaco>).

The copyright law was amended on December 16, 1997 to include the No Electronic Theft ("NET") which provides sterner penalties for those who infringe a copyright for purposes of commercial advantage or private financial gain. Willful reproduction by electronic or other means of one or more copies of copyrighted work with a total retail value of more than \$1,000 falls within NET. (R. J. Palenski, *Nat. Law Jour.*, p. C1 (Feb. 2, 1998))

In a case on copyright currently pending before the U.S. Supreme Court, *Feltner v Columbia Pictures*, the court is grappling with the arcane issue of whether there is a right to a jury trial for statutory damages under the copyright law, which concerns issues of preserving rights available in the 18th century. An interesting aspect of the case is that the plaintiff is arguing against the jury trial right. During oral argument, the following interchange occurred:

Court: But it is puzzling to me as to why, because of the position filed by the amici, why this class of plaintiffs is afraid of -- seems to disapprove of juries whereas the plaintiff generally would seem to prefer juries. Is there anything about copyright law that suggests why that should develop?

Counsel for plaintiff: (...) We're dealing with cases where you have large companies suing local establishments.... it's very difficult to try to figure out how a huge music company has been injured by Joe's Bar and Grill performing.

As the court noted, generally, plaintiffs prefer juries. In the area of torts, juries have been willing to give damages for "hedonic" impairments, a practice not fully endorsed by the appeals courts. [G. D. Cox, *Nat. L. Jour.*, p. A9 (Jan. 26, 1998)].

Customarily, copyright law requires proof of access by the accused to the copyrighted work. However, if there is striking similarity between accused and copyrighted works, independent creation may be precluded and access may be inferred without proof. This is at issue in the copyright infringement suit (*Repp v Webber*) over "Phantom Song"; this also came up in a suit between Ty Inc. and GMA Accesories over copying of the Beanie Baby Squealer: "Preston resembles only Squealer and resembles him so closely as to warrant an inference that GMA Accessories Inc. copied Squealer." (Judge Richard Posner, as quoted in *Nat. Law Jour.*, p. A23 (Feb. 9, 1998)).

Information on copyright is available at various places on the internet. In addition to fairuse.stanford.edu (which includes a paper by Pamela Samuelson on legal issues involved when authors reuse portions of previous writings in subsequent articles; text on *Princeton University Press v Michigan Document Services*, the case on coursepacks), one may look to <http://www.ainmet.com/~carroll/copyright>, <http://www.mccutchen.com/ip>, <http://www.lawgirl.com> and <http://www.law.cornell.edu/uscode/17/>.

Patents

Federal patent law seeks to encourage invention by giving the inventor a right to exclude others from practicing his invention for a limited period of time. In return, the inventor must describe his invention such that one of ordinary skill in the art may practice the invention; after the limited period of time expires, the invention is in the public domain.

Of patents, we discuss below two recent Supreme Court cases, *Markman* and *Hilton Davis*, which have clarified U.S. law on literal infringement and infringement under the so-called "doctrine of equivalents". The former case, in finding that claim construction is a matter for the judge, took power away from the jury, while the latter case, in finding that infringement by an equivalent is a question of fact, left significant power with a jury.

An interesting crossover is the use of citations of patents to research articles in a manner analogous to more traditional citation analysis (a highly cited research paper is valuable because of an "inflexible etiquette" that authors should refer to all previous findings on which their own work is based). CHI Research has proposed that citations of patents to research papers funded by federal agencies supports the proposition that "public science drives innovation." (see, for example, *Chemical & Engineering News*, pp. 24-26 (Sept. 1, 1997). Because of different motivations in patent citations, we have questioned this approach (*Int. Prop. Tod.*, pp. 10-11, 29 (Dec. 96) and pp. 28-29 (Nov. 97).

Scientists frequently become involved as expert witnesses in patent cases. Professor Allan Bard was involved in *Gentex Corp v. Donnelly*, 27 USPQ2d 1714 (WD Mich 1993); 36 USPQ2d 1667 (CAFC 1995), and Professors Roy Gordon and Karl Spear were involved in *Elf Atochem North America Inc. v Libbey-Owens-Ford Co.*, 37 USPQ2d 1065 (D Del 1995).

Further information on patents may be found at <http://patents.uspto.gov>, <http://patent.womplex.ibm.com>, <http://www.micropat.com>, and <http://www.fplc.edu/IPMall>.

TWO RECENT SUPREME COURT DECISIONS IN PATENT LAW

Once a U.S. patent has issued, the patent holder ("patentee") has the right to exclude others from making, using, selling or offering to sell the composition, article or method that falls within the scope of the claims of his patent. A person or entity that, without permission, makes, uses, sells or offers to sell the claimed composition, article, or method is said to infringe the patent. A person may infringe a patent either literally (by falling within the literal scope of the patent claim) or under the doctrine of equivalents, wherein there is an "insubstantial difference" between the object covered by the words of the claim and the accused object.

Analysis of literal patent infringement involves two steps: (1) claim construction to determine the scope of the claims, followed by (2) determination of whether the properly constructed claims encompass the accused structure.

In a decision in 1996, the U.S. Supreme Court determined that the first step is a question to be determined by the court (and not by the jury). ["We hold that the construction of a patent,

including terms of art within its claim is exclusively within the province of the court".] The second step is a question of fact, which may be submitted to a jury. Many lawyers considered that this decision [*Markman v. Westview Instruments, Inc.*, 116 S. Ct. 1384 (1986)] to cut back the power of juries in patent trials.

A device that does not literally infringe a claim may nevertheless infringe under the doctrine of equivalents if every element of the claim is literally or equivalently present in the accused device. A claim element is equivalently present in an accused device if only "insubstantial differences" distinguish the missing claim element from the corresponding aspects of the accused device. In a decision in 1997, the U.S. Supreme Court declined to take up the issue of whether a jury could determine infringement under the doctrine of equivalents. In declining to reach the issue, the Supreme Court preserved the status quo, which is that juries may determine infringement under the doctrine of equivalents. [*Warner-Jenkinson v. Hilton Davis*, 117 S. Ct. 1040 (1997)]. Thus, in allowing the jury to decide infringement under the doctrine of equivalents, the court did not cut back the power of juries in patent trial.

JUNK SCIENCE

At a meeting on June 16, 1997 at New York's University Club, sponsored in part by the New York Academy of Sciences and in part by the Manhattan Institute, there was discussion of the relationship of science and the federal court system. A theme of the meeting was the admissibility of scientific evidence after the Supreme Court's decision in *Daubert v Merrell Dow Pharmaceuticals*, 113 S. Ct. 2786 (1993). The *Daubert* case found that there was no requirement of "general acceptance" within the appropriate scientific community for admissibility of scientific evidence, and thus diminished the role of scientists in the evidentiary process.

Another issue at the meeting was the recent release of the book "Judging Science: Scientific Knowledge and the Federal Courts," MIT Press, 1997 by K.R. Foster and P.W. Huber.

Both Foster and Huber were there, as well as Judge Alex Kozinski of the 9th Circuit Court of Appeals, from which circuit *Daubert* originated and to which circuit the Supreme Court sent back *Daubert*.

No discussion of Peter Huber is complete without a discussion of the term "junk science", which he popularized in his earlier book "Galileo's Revenge: Junk Science in the Courtroom," BasicBooks, 1991. In fact, a review of the Foster/Huber book in *Nature* begins as follows:

In an earlier book on science and litigation (*Galileo's Revenge*), Peter W. Huber, a lawyer and fellow of the conservative Manhattan Institute for Policy Research in the United States, made soundbite history with the phrase 'junk science'. An instant hit with journalists, politicians, corporate lawyers and many scientists, it resonated well with the across-the-board retreat in the United States from populism, judicial activism and liberal permissiveness. (Sheila Jasanoff, *Nature*, 1997, 388, 635).

Early in the meeting, Huber pointed out that he did not claim to have invented the term "junk

science," and directed the audience to footnote 1 of "Galileo's Revenge." The pertinent sentence, which appears on page 2, states "Courts resound with elaborate, systematized, jargon-filled, serious-sounding deceptions that fully deserve the contemptuous label used by trial lawyers themselves: junk science. [citing to Rheingold, "It's Time to Change the System on Junk-Science, Quack-Expert Issues," Manhattan Lawyer, November 1-7, 1988, p. 13]

The name has caught on. In the recent silicone implant litigation, plaintiffs lawyers hired Fenton Communications to help them junk the "junk science" tag ascribed to them. A. Davis, Nat. Law Jour., p. A6 (Dec. 7, 1996).

On the last page of "Galileo's Revenge," Huber states

It is not especially scientific to deny rules of evidence, to disdain the formalisms of serious science, to sit back, let everything in, and invite random groups of twelve stout citizens to vote as they please. Such attitudes serve no one but the lawyers who act as impresarios and the fringe scientists in their pay. An excess of credulity is not science.

One notes that this is not a strong endorsement of the use of juries for such cases ["random groups of twelve stout citizens to vote as they please."] A similar concern was raised by the American Bar Association Advisory Committee on Fair Trial and Free Press:

Studies indicate that people tend to form beliefs on a minimum of information and that because of the desire for social approval, they often attempt to reflect the opinions and beliefs of others. Available data also suggest that once formed, an impression or belief is extremely difficult to change, even when the individual is confronted with objective facts that tend to refute it... In other words, the individual is likely to select those elements of observed phenomena which reinforce his preexisting beliefs and to neglect others or even to distort his perceptions so that they will confirm his beliefs ... the processes by which beliefs are formed and adhered to, and their effect on perception, appear to take place to a large extent below the level of consciousness.

Thus a juror's good faith efforts to lay aside these beliefs aside cannot be determinative. [from Patent Litigation 1990, Vol. I, Practising Law Institute, course handbook series no. 299, pp. 394-395]

Prior to *Daubert* (which was decided after "Galileo's Revenge" was published), an earlier case (*Frye*) was cited as precedent for the proposition that, as a condition for admissibility of scientific evidence, the theories and methods of that science had to be "generally accepted" as valid among other scientists in the same field. The *Frye* case is important to the theme of Galileo's Revenge and has six entries in the index of (although curiously Frye is spelled as Frey in the index). Huber introduced the *Frye* case as follows:

In 1923, a federal appellate court issued a landmark ruling in *Frye v. United States* aimed at accommodating these competing concerns. Thereafter, federal courts, widely copied by the states were bound by the *Frye* rule, ... In deferring to the scientific community, the rule

conceded the courts' own limits. *Frye* marked a reasonable compromise between a populist rejection of all expertise and what was to follow, the equally populist view that experts are everywhere and there's no choosing between them. (p. 14)

Disregarding the mis-implication that other federal courts of appeal were bound by a holding of a circuit court of appeals, one observes that *Frye* was much followed prior to the codification of the Federal Rules of Evidence in 1975. The Rules did not mention *Frye* and they did not discuss any concept of "general acceptance" as a precondition for admissibility of scientific evidence. Huber darkly observed:

There are many more charlatans than Nobelists, they come cheaper, and their views are often much more readily adapted to litigious ends. And so, diligent lawyers have set off in pursuit of scientific mystics, speculators, cranks, and iconoclasts, and rushed to the waiting arms of far-siders straight out of Gary Larson cartoon. (p. 17; at page 41 Huber speaks of a time "long before *Frye* surrendered to the far-siders")

Huber correctly noted that with *Frye* absent from the federal rules of evidence, *Frye* was effectively dead; in 1993, the Supreme Court, in *Daubert*, held 9-0 that *Frye* had not survived the federal rules. Since *Daubert*, the Supreme Court has re-affirmed the role as judge as gatekeeper of scientific evidence in the case of *General Electric v. Joiner* (see Wall Street Journal, p. B1, B12 (Dec. 16, 1997)). The National Law Journal interpreted *Joiner* as giving "a psychological boost to defendants who argue that tort plaintiffs often pursue suits built on flimsy scientific evidence and species 'experts'." (Nat. Law Jour., p. A10 (Dec. 29, 1997 to Jan. 5, 1998). Chief Justice Rehnquist stated:

[N]othing in either *Daubert* or the Federal Rules of Evidence requires a district court to admit opinion evidence which is connected to existing data only by the ipse dixit of the expert. (Ibid.)

It is interesting to note that lawyers seemingly view other lawyers (judges) as more adept at keeping out flimsy scientific evidence than scientists. A legal writer expanded upon this:

The *Daubert* principles place judges under even more pressure to make decisions about evidence and experts that may lie well beyond their capacities. Some judges are already complaining that this puts them in the position of being gatekeepers for conventional science and scientific orthodoxy. The principles overlook the fact that all science begins with one report, the facts of which should be proven true or insufficient over time. There are numerous findings that fall into a vacuum and are ignored by the scientific community because they are out of the mainstream or difficult to reproduce.

The difficulty that the courts and litigants confront is that science does not exist for the law, but just frequently depends on science. Redress of injury for harmful products cannot stand still for the completion of broad, double-blind studies that can take decades.

Neither courts nor plaintiffs can wait, especially when most statutes of limitations require that suits be filed in one to three years. The scientific process is not a clean approach, especially

in evolving disciplines in which there are more hypotheses than laws. Hence, expert testimony from peer-reviewed journals and peer-approved experts is still open to question and disputation. (R. M. Silberfeld, Nat. Law Journ., p. A22 (Jan. 19, 1998)).

The author further commented on the scientific community:

Consider: The scientific community is not, and has never been, a rationalistic group. Bias, narrow-mindedness and dishonesty exist among scientists as much as they do in any other facet of human society. In the rush to "publish or perish," by which many scientists are judged and grants are based, there has been an increase in falsified data that have survived peer review. With experiments flooding from research, there is little possibility that all can be replicated in a timely fashion. Further, good scientists who do not publish often risk being ignored by the courts in favor of scientific careerists who grind out papers that survive peer review but do little to advance science.

On June 16, 1997, Judge Kozinski made remarks similar to those of Huber's in "Galileo's Revenge." He observed that scientists are promiscuous in the way they award credentials; however, nothing is ever taken back. There is no review afterwards. In a perverse way, the less time you spend in the laboratory, the more you are an expert.

Although a decision of the U.S. Supreme Court, *Daubert* is not binding on the individual states, who are free to choose their own rules for admissibility of evidence. In fact, many of the most populous states (including California and Florida) have rejected the *Daubert* approach and do require some form of "general acceptance" for admissibility of scientific evidence.

On June 16, 1997, I asked Peter Huber about the distinction between the federal courts, which do not follow *Frye*, and those state courts which do follow *Frye*. Curiously, Huber said it did not matter. Actually, it does matter. Consider who carries the burden of the scientific uncertainty. Under *Frye*, until a general consensus is developed, the risk of the burden is on the moving party. Someone wants to use results of a new scientific technique in court, but they cannot. Galileo can't testify under *Frye*. Under *Daubert*, the results may well get into court, and the burden of scientific uncertainty is now on the non-moving party. Although this does not sound exciting in a civil case, note that *Daubert* also applies to criminal cases. On June 16, there was a discussion of a "plasmograph", a device attached to a male subject's penis while showing him pornographic pictures. In some jurisdictions, this is admissible evidence. In the early days of DNA profiling, there were some notable screw-ups. L. B. Ebert, University of Chicago Roundtable, 1993, 219-253. Should criminal defendants carry the burden of uncertainty of a new scientific technique? (As an interesting twist, the *Frye* case itself concerned an attempt by the defendant to use a result of a lie detector test to exonerate him.)

"Galileo's Revenge" has an interesting chapter entitled "The Paranoia Plebiscite", which dealt with the response of the legal system for situations in which the public did not share the views of scientists. A quote from a decision of the Washington Supreme Court is revealing; in context, the court is addressing concerns of the neighbors of a tuberculosis sanitorium:

[W]e question our right to say that the fear is unfounded or unreasonable, when it is shared by the whole public... The question is, not whether the fear is founded in science but whether it exists; not whether it is imaginary, but whether it is real in that it affects the movements and conduct of men. Such fears are actual and must be recognized by the court as other emotions of the human mind

The theories and dogmas of scientific men, though provable by scientific reference, cannot be held to be controlling unless shared by the people generally. [*Everett v. Paschall*, 111 P. 879 (1910)].

One notes that the last sentence of the 1910 decision represents an interesting twist of *Frye's* general acceptance; rather than requiring a general acceptance among scientists, this sentence requires a general acceptance among the people generally! "General acceptance" of any kind is not the law under *Daubert*!

DEALING WITH ISSUES IN THE REAL WORLD

During the June 16 meeting, there was much discussion about why there was so much "junk science" floating around. Apparently, there is even a junk science page on the web (www.junkscience.com). There was a consensus that scientists weren't doing enough to police bad work. Thus, there is an issue that bad science isn't identified.

On the flip side, there are some issues that good (predecessor) science is not always properly identified. In an editorial in the journal *Nature* entitled "Restoring Good Manners in Research", then-editor John Maddox observed:

But there is evidence in the hands of all journals that bad manners increasingly coexist with good. Self-advertisement is more common now than it used to be. People refer to their own publications when others' would be more apt. When reference to competitors is unavoidable, they may refer to a minor paper, ignoring a more important work. *Nature*, 1995, 376, 113.

Failure to cite prior work is not unknown. For example, see a letter to the editor in *Chemical & Engineering News*, p. 36 (Feb. 6, 1995) about the failure of a 1994 paper in *Science*, 266, 773 to cite a paper in the *Journal of the American Chemical Society*, 1984, 106, 1983. Correct attribution is also an issue in legal circles. (*Nat. Law Jour.*, (Dec. 22, 1997)).

In my own experience, I came across one episode which illustrated the inability of the scientific community to deal with each side of the coin. In a paper by D. L. Wertz and M. Bissell, *Energy & Fuels*, 1994, 8, 613-617 on the diffraction of the graphene layer ["(002)"] peak in bituminous coals, the authors stated that the diffraction peak was "far too intense to be caused by amorphous scattering and far too broad to be caused by conventional diffraction." The authors cited three papers to justify this assertion. Of three papers relied upon to prove the statement, which was the key assumption in the paper, one was non-existent, one was irrelevant and one supported a contrary position. Following use of

the key assumption, the authors utilized an undefined short range interference function to manipulate the x-ray diffraction data of the paper. The modified data led to a remarkable conclusion: that analysis of a peak related to interference between aromatic entities (sp^2 hybridized carbon) could predict the amount of aliphatic carbon (sp^3 hybridized carbon). Pertinent prior work on diffraction of "poorly crystalline" carbonaceous systems with sp^2 and sp^3 carbon was ignored.

I contacted the editor of the journal. Of the non-citation and mis-citation issues, nothing was done, and in fact the mis-citation was repeated in a later paper. Of the issue of arguably bad science, the key assumption was re-characterized as the existence of amorphous and crystalline phases in the coal. For reference, the "crystalline" (002) peak in one coal had a full-width at half-maximum (fwhm) of 3.4° (Cu) while the other coals had fwhm of 6-10°. Thus, the "crystalline" peak was in the range most people would consider "poorly crystalline." For example, the fwhm ($^\circ 2\theta$ Cu) of liquid 1,3 dimethyl adamantane is 2.75, of liquid hexadecane 5.00 and of liquid 1-methyl naphthalene 5.71. The undefined short range interference function was found to be empirical data on carbon black, which was nowhere presented in the paper. Thus, no reader of the paper had the information on the short range interference function to perform manipulations on the data of the paper, or on any other system.

In analyzing the cites of this paper to other papers, and the cites of other papers in this journal, I noticed that there was an interesting trend of papers in the journal to cite other papers in the same journal. In less than five years of existence, articles in the journal cited more to other articles in the journal than to articles in any other single journal, in spite of the existence of a comparable journal (Fuel) which had been in existence for more than 50 years. The magazine of the American Chemical Society "ACSess" (March 1997) noted that Energy & Fuels ranked #5 in impact factor in its area in the 1995 Journal Citation Reports published by the Institute for Scientific Information. Impact factor here is the number of times a journal was cited in the scientific literature in a give year, divided by the number of papers the journal published in the prior two years. Thus, an issue in analyzing journal cites is one of self-citation or channeling. For more details of the scientific and citation issues involved, see L. B. Ebert, *Petroleum Science & Technology*, 1997, 15, 171-183.

On a related note, a federal district court recently reviewed the use of citation impact factors. The context was whether use of data on citation impact factors of different journals might constitute false advertising under the Lanham Act. The data had been collected by Harry Barschall and published in *Physics Today*; that publication was "free speech," protected by the First Amendment. The issue was whether the same data could be sent to potential journal buyers (e.g., librarians) to influence them to buy the product. The court found that the case turned on whether or not the numbers used by the defendant American Institute of Physics were correct:

Barschall's methodology has been demonstrated to establish reliably precisely the proposition for which defendants cited it -- that defendants' physics journals, as measured by cost per character and by cost per character divided by impact factor, are substantially more cost-effective than those published by plaintiffs. Plaintiffs have proved only the unremarkable proposition that a librarian would be ill-advised to rely on Barschall's study to the exclusion of all other considerations in making purchasing decisions. This

consideration in no way makes Barschall's study or defendants' descriptions thereof false, and accordingly judgment is granted to defendants.

Thus, the case does not stand for the proposition that "citations establish value". In fact, in their post-trial brief, the defendants noted: "the methodology is not false simply because the results must be used with care."

The decision presented imagery similar to the "marketplace of ideas" of former Supreme Court Justice Oliver Wendell Holmes:

Plaintiffs misapprehend the purpose and scope of the Lanham Act's limits on commercial advertising. The Act contemplates a free market into which advertisers are not to inject false or misleading information, but in which, as in any free market, it is up to the consumer to see to it that only the product that best serves the consumer's needs is bought. If G&B believes librarians will make more optimal decisions if they consider information other than that provided by defendants, its solution is to augment rather than censor the available truthful information. G&B's arguments that librarians will not adequately discharge their responsibilities if they rely solely on the output of Barschall's methodology are thus best addressed to librarians, not this Court.

The Gordon and Breach case is on appeal. The issues of competition among publishers and the high cost of journals are significant (see, for example, M. Enserink, *Science*, Nov. 28, 1997, 278, 1558).

CITATIONS

Of citation analysis, Nicholas Wade wrote in the October 7, 1997 issue of the *New York Times*:

The method works because of the inflexible etiquette in scientific publications that authors should refer to all previous findings on which their own work is based. One reason that articles in scientific journals are burdened with a long list of footnotes is that authors know to expect angry E-mail from anyone who feels unjustly neglected. Even so, the majority of published scientific articles are cited little or never and vanish leaving hardly a trace in the annals of scientific progress.

Because of this emphasis on diligent citation, the impact of a scientific paper can be assessed by counting the number of times it is footnoted by other authors.

One wonders if Mr. Wade was familiar with the issues in Maddox's 1995 editorial, or with more recent commentary by "Daedalus" in *Nature*:

Performance indicators abound--impact factors, citation counts, publications per head or per grant dollar, and so on. Mutual backscratching cliques cite each other furiously in all their

papers; journals parasitized by such publications proudly proclaim their impact factors; grant money flows to individuals and organizations who can show the best performance indicators. (D. Jones, Nature, 1997, 387, 537)

In this author's opinion, Maddox and Jones may be closer to describing present reality than is Wade. However, for the moment, let's assume that Wade's view is an accurate description of the citation process in scientific literature. As Wade indicates, one can identify scientifically valuable papers by numbers of citations because there is a rule that scientists cite all previous findings upon which their own work is based. If there is no such custom or practice, then perhaps Mr. Wade would not find that the citation analysis method works.

In an earlier article in the New York Times entitled "Study Finds Public Science is Pillar of Industry," W. J. Broad reported on a study by CHI Research which purported to show that citations BY U.S. Patents TO scientific research papers establishes that value of those research papers (New York Times, C1, C10 (May 13, 1997)). An earlier article by CHI Research purported to show that citations BY U.S. Patents TO other U.S. Patents could be used to establish the "pioneering" status of those cited U.S. Patents. We commented on difficulties with the latter approach in Intellectual Property Today, pp. 10-11, 29 (Dec. 1996). We noted that for many patents to a given assignee company, the largest number of patents citing to those patents arose from the same assignee company; this is a self-citation issue.

The most obvious problem in extrapolating from citation analysis for scientific papers to citation analysis for patents is that the rules are not the same. The references used for evaluating patentability, which references are published on the first page of the patent, arise from two sources. Under MPEP § 704, the patent examiner must search the pertinent prior art, which is listed on a PTO-892 form. Under 37 CFR § 1.56, the applicant must disclose material (non-cumulative) prior art known to those involved in the filing and prosecution of the patent; this art is listed on a PTO-1449 form. The applicant does not have to do a search of the literature; he must merely tell what he does know. There is some emphasis on brevity. If a textbook or a review article or another patent discloses the key information of a truly pioneering patent, it could well be that the textbook or the review article or the other patent is cited, to the exclusion of citing the pioneering patent. It is the "teaching" which is important, not the original source of the teaching. There is no duty on the examiner or the applicant to find all publications in the chain of discovery.

Because the fundamental predicate of science citation analysis ("the inflexible etiquette") is missing in patent citation analysis, the extrapolation from the former to the latter to infer that documents highly cited by patents must have value is improper.

The inapplicability of norms useful for scientific citation to patent citation was the subject of a paper by E. S. Simmons and N. Lambert which paper had the colorful title "Patent statistics: comparing grapes and watermelons" (Proc. 1991 Montreux International Chemical Information Conference, Special Publication No. 100, The Royal Society of Chemistry, 1992). The authors noted that patent citation statistics had been used for the evaluation of the technology in the patents and the relationships between cited and citing patents. The authors raised several issues which included the varying citation practices among different patent examiners, different citation patterns between US patents with large and small patent families, and differences in citations between active and lapsed US patents.

A further issue in citation analysis arises from the various motivations involved. There may be issues in addition to the inflexible etiquette of Mr. Wade. In an article "Perils and pitfalls of science reporting", Stu Borman pointed to reporting he did of work of Professor A. (Chem. Eng. News, p. 37 (Jan. 26, 1998)). A draft of the report was sent to Professor B, who criticized the work of Professor A as not being totally original. Professor A, who was trying to commercialize the invention, protested the inclusion of the comments of Professor B, which comments were ultimately not included. On another level, one notes that although Mr. Borman reported that "C&EN staff members routinely send their articles out to be reviewed for technical accuracy", such is not the experience of this author. (L. B. Ebert and M. Frenklach, Chem. Eng. News p. 2, p. 68 (May 14, 1990) commenting on article of Feb. 5, 1990 which was not reviewed for technical accuracy.) Objectives other than the inflexible etiquette can drive citation and non-citation. (Compare: R.F. Curl, Angew. Chem. Int. Ed. Engl., 1997, 36, 1566-1576; esp. 1574-1575 and L. B. Ebert, Carbon, 1995, 33, 1007-1010).

LAW ON THE INTERNET

In mid-July 1997, America On-Line (AOL) hired Matt Drudge, the author of The Drudge Report (www.drudgereport.com). On August 10, 1997, Drudge broadcast a report that alleged that Sidney Blumenthal, an adviser to President Clinton, had a "spousal abuse past". Mr. Drudge later retracted the report. Mr. Blumenthal and his wife sued both Mr. Drudge and AOL in federal district court for \$30 million, alleging 21 counts of libel, defamation, false light invasion of privacy, intentional infliction of emotional distress and slander. This becomes one case of many involving the liability of internet service providers (ISPs) for the content of postings. Congress did carve out some immunity for ISPs in Section 230(c)(1) of the Communications Decency Act. The policy issue becomes one of reliability vs. diversity of the internet. (W.R. Leibowitz, Nat. Law Jour., p. B7 (Sept. 15, 1997).

In a small footnote to the Drudge case, the Drudge Report played an early role in the Monica Lewinsky matter:

Mr. Drudge, who has often attacked Mr. Clinton and those around the President, got word over the weekend that Newsweek had decided not to publish an article on Ms. Lewinsky and Mr. Clinton for fear that it had not been sufficiently checked. Last Sunday [Jan. 18, 1998], he posted on his site a report of that decision.

According to a chronology also published on the Internet -- on Microsoft's Slate magazine yesterday [Jan. 22, 1998] -- the Drudge article then moved to other Internet sites and was first heard by a larger audience when William Kristol, the editor of the conservative Weekly Standard, mentioned it during a discussion of the Paula Jones case on ABC's Sunday morning news show "This Week."

Mr. Kristol said, "The story in Washington this morning is that Newsweek magazine was going to go with a big story based on tape-recorded conversations which a woman who was a summer intern at the White House, an intern of Leon Panetta's ---"

Mr. Kristol was cut off by another commentator, George Stephanopoulos, the former senior adviser to the President, who said: "And Bill, where did it come from? The Drudge

Report. You know, we've all seen how discredited ---" (E. Bronner, New York Times, p. A17 (Jan. 23, 1998).

[See also <http://www.abcnews.com/sections/tech/FredMoody/moody38.html>.]

Registration of domain names on the internet has been a significant issue. Details on domain name cases may be found at www.bna.com/e-law/libindex.html and www.softdisk.com/comp/dan/politics/cyber/domain.html. The dual owners of the SCRABBLE trademark split the domain (see www.scrabble.com).

THE VALUE OF INTELLECTUAL PROPERTY

As noted at the beginning of this paper, the legal field of intellectual property is considered hot. A recent article in Intellectual Property Today discussed a talk of Ernest Davenport, the CEO of Eastman Chemical:

The lesson for America's businesses is that they too have a vast potential of value-creating assets just waiting to be discovered and unleashed. These assets are the minds and spirits of our employees. Their intellectual capital...

Finally, Mr. Davenport concluded his remarks by stating one last benefit to this approach.

"By focusing on the intellectual assets of our workforce and by telling that story, we can send a clear signal to our employees that their ideas matter. That we want more than their bodies. That we want, indeed we need, their minds." (F. P. Zotos, Int. Prop. Today, p. 12, 18 (Dec. 1997)).

The flip side of this story was explicated in Chemical & Engineering News:

Few would dispute that the U.S. chemical industry has seen much change in recent years. The turmoil of downsizing and restructuring and the intensity of global competition have brought about a radical change in the nature of the relationship between employee and employer. Gone are the expectation of a complete career with a single company, replaced by an attitude that both employee and employer must fend for themselves in this time of competitive change.

The fate of intellectual property--either as trade secrets, patent details, or customer lists--is not clear in these uncertain times. As employees become disgruntled with their current employers and pursue better offers, often from competitors, this valuable information can walk out the door, possibly into the wrong hands. And in the worst cases, current employees can sell company secrets for a price. (P. M. Morse, Chem. & Eng. News, p. 8 (Dec. 1, 1997))

Approximately one month later, there was a letter to the editor in Chem. & Eng. News stating that the article reads like a brief that a patent attorney might have written on behalf of an employer seeking to block a former employee from earning a respectable living by using his or her knowledge or

experience to practice a lawful profession. The writer further asked "Is there a better way of blocking competition by a former employee than by unleashing fee-hungry lawyers? (E. D. O'Brian, Chem. & Eng. News, p. 5 (Jan. 5, 1998)).

Of the initial Dec. 1 article in Chem. & Eng. News, one notes that trade secret issues between employer and employee did not originate with the changes of the last few years. More than 30 years ago, the court in *Winston Research Corp. v. Minnesota Mining and Manufacturing* wrote:

Conflicting policy considerations come into play in deciding what limitations should be imposed upon an employee in the use and disclosure of information acquired in the course of a terminated employment relationship--or, conversely, what protection should be extended to the former employer against use and disclosure of such information.

On the one hand, restrictions upon the use and disclosure of such information limit the employee's employment opportunities ... They inhibit an employee from either setting up his own business or from adding his strength to a competitor of his employer, and thus they diminish potential competition.

On the other hand, restrictions upon an employee's disclosure of information which was developed as a result of the employer's initiative and investment, and which was entrusted to the employee in confidence, are necessary to the maintenance of decent standards of morality in the business community. Unless protection is given against unauthorized disclosure of confidential business information by employees ... espionage ... among employers will be encouraged. (350 F.2d 134, 137-8 (CA9 1965))

Sometimes there is a delicate balance. Eastman Kodak has recently sued Minnesota Mining & Manufacturing over the alleged unauthorized use of trade secrets obtained from an ex-Kodak employee, Harold Worden. (Nat. Law Jour., B3, (Dec. 22, 1997); see also Chem. & Eng. News, p. 10 (Dec. 1, 1997)). Yet, as a result of recent layoffs by Kodak, New Jersey businesses place ads in Rochester papers to attract newly unemployed chemists and engineers. (Newark Sunday Star-Ledger, p. 1, 26 (December 28, 1997)).

However one views the picture, the intersection of law and science is an important one.

[The opinions expressed above are those of Lawrence B. Ebert and not those of Pennie & Edmonds LLP.]