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I. INTRODUCTION

Those who projected trends in the legal profession in the 1970s and 1980s correctly identified environmental law and toxic torts as specialties that were expected to boom as we approached the twenty-first century. This was no doubt attributable in large part to heightened public concern over the consequences of exposure to the numerous toxins that occur naturally and artificially in the environment.[1] That sensitivity, in turn, led to a demand for increased public law regulation of the environment and also resulted in a literal explosion of private law toxic tort claims.

The intent of this essay is to focus primarily on the trial of private law claims with an emphasis on how the requirements of proof affect trial strategy and tactics.[2] The following discussion presents certain "touchstones" that experience indicates assure the effective presentation of proof in toxic tort cases. The focus then shifts to the application of those principles of proof to a specific setting, *i.e.*, the use of experts in the wake of the requirements imposed by the United States Supreme Court in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*[3]

For purposes of the ensuing discussion, it is assumed that trial is by jury. However, the principles of effective proof set forth below apply equally to bench

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1. The experience in Louisiana has been typical. Concern over this state's high mortality from environmental causes led then-Governor Dave Treen to appoint a Task Force on Environmental Health in 1983. The Task Force was charged with assessing health and the environment in Louisiana and with compiling a report of its findings. The Task Force chose to focus its attention on cancer because it was a disease of particular concern in the state. Its report, entitled *Environment and Health in Louisiana: The Cancer Problem*, was published in 1984.

2. The bulk of this essay is drawn from practical experience gained in jury trials of toxic torts involving phosgene, asbestos, and pertussis vaccine, as well as trials in numerous other personal injury cases, representing both plaintiffs and defendants. Some of these trials produced appeals that are reported. *See, e.g.*, Dawsey v. Olin Corp., 782 F.2d 1254 (5th Cir. 1986); Thornton v. Gulf Fleet Marine Corp., 752 F.2d 1074 (5th Cir. 1985); Musial v. A & A Boats, Inc., 696 F.2d 1149 (5th Cir. 1983); Broussard v. Olin Corp., 546 So. 2d 1301 (La. App. 3d Cir. 1989); Wills v. Olin Corp., 533 So. 2d 1375 (La. App. 3d Cir.), *writ denied*, 536 So. 2d 1220 (1989); Miller v. Louisiana Dep't Transp. & Dev., 484 So. 2d 993 (La. App. 3d Cir. 1986); Schepp v. Olin Corp., 445 So. 2d 1280 (La. App. 3d Cir.), *writ denied*, 448 So. 2d 117 (1984). Because so much of the text presents observations drawn from these experiences, there are fewer footnotes here to secondary references than are usually encountered in law review writing.

3. 509 U.S. 579, 113 S. Ct. 2786 (1993).

trials, and every lawyer must of course evaluate each case individually to assess whether the prospects for success are greater with a judge or a jury.

II. THE FIVE PRINCIPLES OF EFFECTIVE PROOF IN TOXIC TORTS

A. Build Your Case on Fact, Not Fiction

There are no shortcuts to effective proof. Any lawyer who counts on jury emotion or hysteria to carry him or her to victory is courting disaster. It is the lawyer who bases his or her case on scientific and medical principles and effectively communicates that message to the jury who will ordinarily win.

The trial of a toxic tort claim usually centers on two issues: (1) whether the plaintiff was exposed to the toxin in quantities significant enough to cause injury, and (2) whether the plaintiff suffered an injury as a consequence of the exposure. These issues of exposure and causation are generally more susceptible of objective proof than other tort cases (*e.g.*, automobile accidents) in which temporal causation is often sufficient to persuade the jury.

When a personal injury is alleged to have been suffered in an automobile or mechanical accident, the physical trauma that caused the injury is easily understood and comprehended. However, in a case involving an exposure to a chemical or toxin, there is no such familiarity.

Simply put, an individual unfamiliar with asbestos, industrial chemicals, or pharmaceutical agents has no point of reference from which to anticipate the effects of any exposure. If that same individual fractures his ankle, he knows from general life experiences that he will have to wear a cast for several weeks and, after its removal, endure several additional weeks of therapy. He also knows what, if any, residual impairment he will experience thereafter. Most significantly, he knows that the injury did not cause a cold he contracted two weeks after the accident, a skin rash that appeared some six weeks later, or unexpected sexual impotence he experienced one evening. In other words, he has settled expectations of the consequences of the injury because the injury is a familiar one.

Unlike the worker who suffers a broken ankle, the worker who is exposed to an unfamiliar toxin has no basis from which to determine whether or not subsequent physical complaints are related to the exposure. If anything, his fear of the unknown will prompt him to become "sensitized" to the slightest ache or pain, exaggerate its importance, and attribute its cause to the exposure. This fear is sometimes compounded when the worker visits his family doctor, who may be unfamiliar with the toxin and therefore unable to allay his fears.

A common example is that of a worker who has smoked cigarettes for twenty years and first notices a cough after fearing that he was exposed to a chemical. That worker may have had a slowly developing "smoker's cough" for several years prior to the exposure—he simply was not alarmed by it at the time. His fear of being exposed to a dangerous chemical, however, makes him sensitive to the slightest symptom and falsely attribute it to the possible chemical

exposure. Therefore, it becomes crucial in a case alleging injury because of chemical exposure to separate fact from fiction.

It is not uncommon in toxic tort cases for plaintiffs to attribute a variety of complaints to what they perceive to be an exposure to a toxin. At the same time, the effects of exposure to numerous toxins are ordinarily well-documented in the literature. A plaintiff who too easily recites a litany of complaints and attempts to relate them to the exposure is often effectively impeached at trial by a defendant who shows that the various complaints offered by the plaintiff are not recognized in the medical literature and could not be related to the exposure the plaintiff claims to have sustained.

Obviously, expert testimony is critical in settling this question. It is vital that any medical expert called by either side be well-versed in the toxicological effects of exposure to the toxin in question. Often, treating physicians can offer no more than their own observations about the plaintiff's condition when they saw him. Depending on their familiarity with the literature on the sequelae of exposure to the particular toxin at issue, their testimony may or may not be effective. Both sides must then consider whether to retain an independent medical expert knowledgeable about the particular toxin and its effects. This expert may be a specialist in the field that normally treats the type of injury at issue (*e.g.*, a pediatric neurologist in the case of a stroke in a child) or he may be an expert in the field of medical toxicology. In either case, his testimony will involve the application of principles of toxicology.

The most fundamental principle of toxicology is expressed in what is known as Haber's Law. Simply put, Haber's Law holds that the effects of exposure to a toxin are dose-related. In other words, the effects of exposure depend upon the amount of the toxin involved in the exposure.

This is nothing more than an expression of common sense, and it can be illustrated by reference to numerous familiar substances. For example, there is enough salt in a table-sized shaker to kill a two-year-old child, yet salt is routinely added to food before it is eaten. One aspirin tablet may produce little relief for a headache, but two or three usually provide relief. One glass of wine at dinner is seen as a pleasurable aid to digestion, while drinking the entire bottle is likely to produce markedly different effects.

In toxic tort cases, it is important, therefore, to identify the dose of exposure. From the dose, experts can then extrapolate the expected consequences. In gas cases, dose is measured by multiplying the concentration of the gas to which the individual was exposed (expressed in parts-per-million) and the time of exposure (expressed in minutes). This yields a unit of dose referred to as parts-per-million-minutes. Thus, an individual exposed to phosgene or hydrogen sulfide at a concentration of 150 parts-per-million for five minutes has received a dose of 750 parts-per-million-minutes. The medical literature can identify the anticipated effects of exposure to 750 parts-per-million-minutes. If the plaintiff's medical condition is consistent with that described in the literature, proof of exposure and causation are compelling.

How does one determine concentration and time? In cases of industrial releases, the plant itself often has computed the amount of the release and its conditions, and this information is discoverable. Many chemical companies utilize computer programs that produce dispersion analyses. These analyses utilize raw data such as the amount of chemical released, pressure, atmospheric conditions, and the like and print out a "plume" over a map of the area showing the direction the gas travelled from the point of emission and further showing its concentration at regular intervals from the point of emission. Many of these programs also show the length of time that the plume may have lasted. If they do not, a dispersion analyst can often compute this figure from other data. By then locating the individual plaintiff on the map, concentration and time of exposure can be determined.

In the case of asbestos, a dispersion analysis is obviously not available. Occupational exposure to asbestos typically has occurred at varying intervals in varying amounts at varying locations over a period of time. Moreover, there is a lengthy latency period between exposure and the onset of medical sequelae. For example, cancers that can be related to asbestos exposure (*e.g.*, lung cancer and mesothelioma) generally do not manifest themselves until at least fifteen to twenty years after exposure.

In such cases, the most reliable method of proving exposure is by pathology, either by examination of biopsy tissue or tissue taken from autopsy after death. Dose of exposure is then measured by counting asbestos bodies per gram of lung tissue. The medical literature distinguishes between low counts that reflect casual exposures in the general population and high counts that are indicative of occupational exposures at job sites in which insulating materials containing asbestos were used in significant quantities. Moreover, pathological examination of lung tissue can reveal whether there is accompanying fibrosis bilaterally—another indicator of asbestos exposure.

The next best level of proof consists of the interpretation of chest radiographs. While this method of proof cannot show conclusively whether asbestos bodies are present, the x-rays can be compared to a standard set of x-rays approved by the International Labor Organization (hence called the "ILO Standards") that describe various states of mineral dust disease. Physicians can be trained and certified in matching an individual's chest x-ray with one of the standard x-rays and thereby giving it a classification. By this method, a physician may be able to conclude, without pathology, that there exists diffuse bilateral pulmonary interstitial fibrosis attributable to asbestos exposure (known as "asbestosis"). It is generally agreed that a diagnosis of asbestosis provides a sufficient medical basis to relate any subsequent onset of lung cancer to asbestos exposure.[4]

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4. *See* Andrew Churg & Francis H.Y. Green, Pathology of Occupational Lung Disease 285 (1988).

In pharmaceutical cases, the extensive drug trials required by the Food and Drug Administration before licensing of a pharmaceutical product provide both sides with extensive information regarding possible adverse side effects resulting from ingestion of a particular drug. This information usually is quite detailed and includes both a description of all possible sequelae as well as a time table for their onset. For example, the American Medical Association has issued a policy statement on pertussis vaccine injury that recognizes that an adverse reaction to such a vaccination must manifest itself with seventy-two (72) hours of the vaccination before subsequent symptoms can be medically related to the vaccine.[5] Absent a demonstrable sign of injury or adverse reaction within three days, most medical experts will not attribute later developing symptoms to the vaccination.

In summary, building a case with hard data and scientific principles is vital to persuading a jury of its merits. There is nothing too complicated about science that cannot be explained to a jury. The lawyer's challenge is to communicate the concepts in simple terms. The lawyer who effectively communicates the scientific principles that govern the case to the jury establishes himself as an authority figure with the jury. He then has a real advantage over his opponent.

B. Explain and Emphasize the Burden of Proof

Several years ago, a tax lawyer with a large New York law firm was selected to serve as a civil juror in federal court in New York. Shortly thereafter, she spoke about her experiences to the litigation section of her firm and prepared a paper as part of that presentation. That paper became an article that was later published in a professional journal.[6]

The lawyer's observations from her perspective as a juror are most interesting. The case on which she served involved a prisoner who was suing several prison guards and administrators for damages resulting from a beating he had allegedly received while being escorted from solitary confinement. He was represented by a prominent, large New York firm. The defendants were represented by the New York Attorney General's Office. Thus, there were competent lawyers on both sides.

The author's first impression was that she and her fellow jurors, who were all serving for the first time, floundered about throughout most of the trial because they had no framework within which to decide the case. More specifically, some of the jurors did not even understand that they were required to decide the case based only upon the evidence presented during the trial. The problem was that neither set of lawyers had given the jury very helpful guidance on how to decide the issues that confronted them.

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5. AMA Panel Report, *Pertussis Vaccine Injury*, 254 JAMA 3083 (1985).

6. Cynthia R. Shoss, *Beyond the Locked Door: A Lawyer's Perspective on Jury Duty*, For the Defense 2 (June 1991).

This is less surprising than it might seem at first glance. Most jurors are very unsophisticated about trials. Lawyers tend to forget that. It seems clear that the lawyer who best explains to the jury what is going to take place and what they will be called upon to do establishes himself as an authority figure and also earns the jury's gratitude and goodwill.

There is a familiar maxim that an individual can win any argument if he is allowed to state the issue. If one regards the jury as a blank canvas on which to paint, it seems clear that a lawyer has a real opportunity to get the jury to think about the case according to his terms from the outset.

In state court, voir dire is the lawyer's first real opportunity to speak to the jury. In federal court, voir dire by the lawyers is still quite limited, and opening statements provide the first chance for most lawyers to paint on the canvas. In either event, a lawyer should build his case on science and fact rather than hysteria and fiction, and should begin by emphasizing that the case must be decided on the evidence. For the lawyer on the defense side, this especially means emphasizing the burden of proof.

It is axiomatic that the plaintiff bears the burden of proving that what he claims is more probable than not by a preponderance of the evidence.[7] A plaintiff may use this to his advantage by emphasizing in voir dire and in opening statement what "the facts will show." The defendant can counter this by emphasizing that he has nothing to prove in the case and that the "plaintiff must prove" what he claims is true. Where the plaintiff's case consists of circumstantial evidence, the defendant should also emphasize that the plaintiff's burden is to exclude other reasonable hypotheses or causes with a fair amount of certainty.[8]

While conventional wisdom is that emphasizing the burden of proof and limiting consideration to the evidence in the case is to the defendant's advantage, an argument can be made that it is to the advantage of both sides to emphasize these rules of law. If the jury considers only the evidence and decides the case based upon what has been proved, the lawyers retain an element of control. If the jury considers matters outside of the evidence, neither side has control.

Never underestimate the impact of television on jurors. In fact, most of what jurors think they know about the legal system comes from watching television. Thus, many jurors expect the trial to result in tearful confessions from the witness stand or from the back of the courtroom *a la* Perry Mason. They are not prepared to decipher and contrast convincing testimony that conflicts. One can expect the experience to unsettle jurors as they are required to choose between lines of testimony which appear to be equally convincing.

From the defense perspective, that is where emphasizing the burden of proof is most helpful. The rule on the burden of proof gives the jury a way to resolve the case when it is otherwise unable to choose between the two sides.

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7. *E.g.*, Jordan v. Travelers Ins. Co., 257 La. 995, 245 So. 2d 151 (La. 1971).

8. *E.g.*, Baronet v. Mobil Chemical Corp., 422 So. 2d 563 (La. App. 3d Cir. 1982).

C. *Use the "Twin Peaks" of Proof: Science and Medicine*

As the above discussion makes clear, there are essentially two ways to document whether an individual was exposed to a particular toxin. The first method is to review the individual's medical records to determine whether he or she showed any sign known to be consistent with or indicative of exposure to the toxin and, further, whether this sign appeared within the time period generally expected following exposure. The second method is to calculate the release itself to determine whether the individual could have been exposed to a dose (expressed either in parts-per-million-minutes or some other unit) sufficient to cause injury. This second method is called a dispersion analysis and consists of calculations based upon the quantity of toxin released, meteorological conditions, duration of release, pressure of release, size of orifice, etc. When both methods (medical review and dispersion analysis) are used, a reliable evaluation of the alleged exposure can be obtained.

The medical review begins with an understanding of the known signs or symptoms of exposure to the chemical in question. For example, the known sequelae of exposure to phosgene and hydrogen sulfide are limited to the respiratory tract. The standard method of documenting respiratory impairment is through the use of pulmonary function studies. This series of medical tests is commonly used to evaluate how well a person's lungs are working. More specifically, lung function studies measure: (1) The volume of air that the lungs are capable of holding; (2) The rate at which that volume of air can be expelled or exhaled from the lungs; and (3) The ability of the lungs to transfer, or diffuse, air into the blood stream.

Pulmonary function studies are conducted with the aid of an instrument known as a spirometer. An individual being tested is first required to blow as hard and as long as he can into a tube approximately one inch in diameter that is connected to the spirometer, which then records and prints out certain measurements of that air flow. Next, the individual is required to breathe in and out forcefully and rapidly for a sustained period of time, and the instrument records that activity. A bronchodilator is then administered, and the process is repeated. The readings are then compared to the predicted capacity for the individual, which is computed from certain personal vital information (*i.e.*, height, weight, etc.). A percentage of the predicted capacity is then calculated with respect to each measurement. Most physicians regard a performance of eighty (80%) percent of predicted capacity to be within normal range.

Obviously, the individual's efforts during administration of the test are essential to a valid result. Failure to exert maximum effort may lead to a falsely poor reading.[9] For this reason, it is imperative that the test be administered by competent personnel who exert the individual to a maximum effort. In cases of

9. Clearly, an individual cannot raise his performance to a falsely high level, since he cannot exert greater than the maximum effort required by the test.

poor performance, it is important to determine whether the individual exerted maximum effort before considering the results to be a valid measurement of lung function.

The various measurements of spirometric testing are easily explained. Lung volume is recorded under the heading of Forced Vital Capacity (FVC). Rates of air flow, which indicate whether or not an individual suffers from an obstructive airways disease, are measured by Forced Expiratory Volume (FEV) and by Forced Expiratory Flow (FEF). The number following either of these measurements indicates the time at which the measurement was taken. For example, the amount of air exhaled during the first second of sustained exhalation is referred to as FEV_1. The rate of air flow after one-half of a second of sustained exhalation is expressed as $FEF_{.5}$ or, in some cases, FEF_{50}. Finally, measurements of the lung's capacity to diffuse oxygen into the blood stream are referred to as blood gas diffusion.[10]

Lung function studies can show whether or not a person's lungs are impaired. They do not, however, show *why* they are impaired. In cases of abnormal lung function, it then becomes necessary to determine, by further medical "detective work," whether the exposure was the cause of the impairment or whether other common causes of abnormal lung function, such as cigarette smoking or asthma, account for the impairment.

Obviously, if the medical evidence indicates that an individual has no abnormality, it is clear that the individual sustained no injury from the exposure—or from anything else. If pulmonary function studies, physical examinations, chest x-rays, or other diagnostic tests indicate an abnormal finding, this abnormality must be compared with what are known to be the effects of exposure to the toxin. If the abnormality is not consistent with the known sequelae of the gas in question (*e.g.*, phosgene or hydrogen sulfide), it cannot reliably be attributed to that toxin.

As noted above, the second method for documenting a claim of gas exposure is by dispersion analysis. The laws of physics have produced reliable equations whereby the release of a foreign gas into the atmosphere can be quantified. These calculations have formed the basis for computer modeling. Computer programs, or software, have been developed that can chart the dimensions of gas dispersing into the atmosphere based upon release data such as the time of release, amount of gas released, duration, pressure, height, atmospheric temperature, topographical data, humidity, wind direction, wind speed, and other pertinent evidence. These computer programs are widely used by the Environmental Protection Agency, other federal and state agencies, and private industry. By this means, a dispersion analyst can determine the maximum exposure of any individual in the area of the release. That exposure, measured in recognized dose units, can then be compared to the known effects by dose as reported in the literature.

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10. For an excellent discussion, see W. Keith C. Morgan & Anthony Seaton, Occupational Lung Diseases 107-16 (2d ed. 1984).

The above discussion illustrates the "Twin Peaks" of science and medicine available in the case of a gas exposure. Discussions in earlier sections of this paper have shown the scientific methods available to document claims of asbestos exposure. Similar methods exist for claims of adverse reactions to pharmaceutical products, as well as for virtually any known toxin.[11]

D. Keep It Simple, Stupid (KISS)

This familiar principle of litigation especially applies to toxic tort litigation. Experience has indicated that the scientific principles that pertain to toxic tort litigation are not beyond the average jury's comprehension. It is the responsibility of the trial lawyer to explain the concepts in voir dire and opening statement and to make certain that his presentation when questioning witnesses is clear and well-explained.

E. Carry the Theme Forward

An old speaker's maxim holds that there are three parts to a good speech:

1. Tell 'em what you're gonna tell 'em.
2. Tell 'em.
3. Tell 'em what you told 'em.

In other words, the trial lawyer must repeat his theme often enough to imprint it in the collective memory of the jury.

The worst thing a trial lawyer can do is abandon his theme. If he becomes preoccupied answering the other side's case rather than presenting his own, he has allowed his opponent to define the issue, which means he will usually lose the argument. However, if his theme is supported by the evidence and by science, there is no reason to chase his opponent's issues.

The initial theme should be carried forward into a motion for a directed verdict, jury instructions, and the closing argument. In certain areas (*e.g.*, asbestos exposure), there are detailed judicial decisions that describe what evidence is necessary to show occupational exposure to asbestos.[12] Thorough research should be conducted to obtain a complete list of all reported cases that

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11. Much of the scientific literature is readily available to any lawyer. Patty's Industrial Hygiene and Toxicology is a helpful publication. So is Stanley McQuade's Medical Information System for Lawyers. Both Westlaw and Lexis can access into medical library files. Anyone who is not computer literate can simply obtain the assistance of a physician in his community to conduct a literature search. A medical literature database known as Medline is available on most on-line services, including Lexis. This literature can provide both substantive information about the sequelae of exposure to the toxin that is the subject of your case as well as names of possible experts (*i.e.*, the authors of the articles).

12. *E.g.*, Lohrmann v. Pittsburgh Corning Corp., 782 F.2d 1156 (4th Cir. 1985).

contain the name of the toxin. Many of these cases provide explicit applications of rules of causation. These decisions often can be used as jury instructions.

The Louisiana law of product liability has long held that a manufacturer of a product is liable for damages caused by an unreasonably dangerous condition in the product that produces injury when the product is in normal or foreseeable use.[13] The discussion here has largely ignored this rule of liability and has concentrated instead on proof of exposure and causation.

That has been a deliberate omission. Most toxic tort cases have been resolved on the issues of exposure and causation, and not on the issue of liability.[14] In fact, most defense lawyers would agree that a plaintiff who establishes an injury that was caused by exposure to a toxin as a practical matter is likely to be successful without significant additional evidence on product defect.

Whether the claim of injury resulted from breathing, eating, drinking, or injecting the toxin, it is vital that both sides realistically examine the case on the basis of scientific principles of toxicology. From the plaintiff's perspective, science is the only way to show that the injury's most probable cause was the toxin. From the defendant's perspective, science is often the only way to show that the plaintiff's injury most likely had another cause. And the only way for either side competently to present scientific evidence is through the use of expert witnesses.

III. THE EXPERT WITNESS

> If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise.[15]

As a practical matter, expert witnesses are now like automobiles: everyone has one. Rarely is a case tried without the opinion testimony of an expert witness.

Experts can assist the lawyer in two ways: by teaching the lawyer about technical aspects of the case, and by serving as a witness at the trial of the case. A lawyer should not automatically assume that he needs an expert to perform both functions. Quite often, an expert can help a lawyer prepare a cross-

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13. *E.g.*, Weber v. Fidelity & Cas. Ins. Co., 259 La. 599, 250 So. 2d 754 (1971); Brumley v. Firestone Tire & Rubber Co., 459 So. 2d 572 (La. App. 3d Cir. 1984). Of course, Louisiana product liability law is now statutory. *See* La. R.S. 9:2800.51-2800.59 (1991).

14. *E.g.*, Tramonte v. Fibreboard Corp., 947 F.2d 762 (5th Cir. 1991); Dawsey v. Olin Corp., 782 F.2d 1254 (5th Cir. 1986).

15. La. Code Evid. art. 702; *see also* Fed. R. Evid. 702.

examination of the opposition's expert that is so effective that there is no need for the expert thereafter to testify.

Almost every case has technical aspects that provide the occasion for expert testimony. For example, in personal injury cases, medical experts (physicians) testify about the injuries, economists testify about the loss of earning capacity, and engineers of various disciplines testify about whatever failures may (or may not) have caused the injury.

Obviously, this does not exhaust the role of experts. Common sense usually indicates whether there is a need to retain an expert. The simple test is whether or not the subject matter requires specialized knowledge to be clearly understood. If so, an expert having the necessary specialized knowledge should be retained.

The procedures for presenting expert testimony are easily described. The attorney offering the expert calls him to the stand and begins a direct examination of the witness on the subject of the expert's qualifications. The attorney then tenders the witness in his field of expertise for "traversal" by opposing counsel of the witness's qualifications. (It is critical that the field of expertise be correctly identified. It must match both the expert's qualifications and the subject on which the lawyer needs testimony.) At the conclusion of the traversal, the court then accepts or rejects the witness as an expert in the field in which he is tendered. If accepted, the witness can then give expert opinion testimony in his field of expertise. Significantly, once accepted as an expert, the witness may be asked leading questions on direct examination.[16]

Traditionally, the acceptance or rejection of a proffered expert has been committed almost exclusively to the discretion of the trial judge. According to Comment (d) under article 702 of the Louisiana Code of Evidence: "Broad discretion should be accorded the trial judge in his determination as to whether expert testimony should be held admissible and who should or should not be permitted to testify as an expert."

IV. THE RISE AND FALL OF "JUNK SCIENCE"

In practice, this "broad discretion" resulted in few tendered experts being rejected. Trial judges typically preferred to err on the side of admitting the testimony and rationalized that any argument on qualifications should "go to the weight" given the expert's opinion testimony. As a consequence, a cottage industry of supposed experts who did little other than testify as professional witnesses emerged, and their real expertise was litigation support. The problem was particularly severe in the field of toxic torts, as charlatan physicians provided rather bizarre testimony about medical causation. For example, published reports disclose that medical experts have testified that an impact with a car's steering wheel causes lung cancer, a fall from a street car triggers breast cancer, a slip in a grocery store causes breast cancer, a bump from a can of

16. La. Code Evid. art. 611(C).

orange juice causes breast cancer, whooping cough vaccine causes permanent brain damage, and obstetrician incompetence is a leading cause of cerebral palsy.[17]

Trial lawyers developed a contemptuous label for this kind of expert testimony: "Junk science." As described by Peter Huber:

> Junk science is the mirror image of real science, with much of the same form but none of the same substance. There is the astronomer, on the one hand, and the astrologist, on the other. The chemist is paired with the alchemist, the pharmacologist with the homeopathist. Take the serious sciences of allergy and immunology, brush away the detail and rigor, and you have the junk science of clinical ecology. The orthopaedic surgeon is shadowed by the osteopath, the physical therapist by the chiropractor, the mathematician by the numerologist and the cabalist. Cautious and respectable surgeons are matched by some who cut and paste with gay abandon. Further out on the surgical fringe are outright charlatans, well documented on the credulous pulp press, who claim to operate with rusty knives but no anesthesia, who prey on cancer patients so desperate they will believe a palmed chicken liver is really a human tumor. Junk science cuts across chemistry and pharmacology, medicine and engineering. It is a hodgepodge of biased data, spurious inference, and logical legerdemain, patched together by researchers whose enthusiasm for discovery and diagnosis far outstrips their skill. It is a catalog of every conceivable kind of error: Data dredging, wishful thinking, truculent dogmatism, and, now and again, outright fraud.
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> On the legal side, junk science is matched by what might be called liability science, a speculative theory that expects lawyers, judges, and juries to search for causes at the far fringes of science and beyond. The legal establishment has adjusted rules of evidence accordingly, so that almost any self-styled scientist, no matter how strange or iconoclastic his views, will be welcomed to testify in court. The same scientific questions are litigated again and again, in one courtroom after the next, so that error is almost inevitable.[18]

The use of "junk science" became so severe in recent years that the courts were bound to react. It happened first in federal court, where the United States Fifth Circuit Court of Appeals began in 1986 to author a series of opinions tightening the requirements for admissibility of expert witness testimony.

The first case that prompted the court to address this subject was the appeal of wrongful death awards arising out of an airplane crash. Finding that an economist's opinion that there was a collective loss of inheritance for three children whose parents died in the crash was "completely airborne," the Fifth

17. Peter Huber, Galileo's Revenge 1 (1991).

18. *Id.* at 2-3.

Circuit launched into an attack of the abuses of expert witnesses, commenting that "the trial judge ought to insist that a proffered expert bring to the jury more than the lawyers can offer in argument."[19] Continuing, the court observed: "That a person spends substantially all of his time consulting with attorneys and testifying is not a disqualification. *But experts whose opinions are available to the highest bidder have no place testifying in a court of law, before a jury, and with the imprimatur of the trial judge's decision that he is an 'expert.'*"[20] The court concluded that the economist in the case had so abused known facts and had testified on a subject so removed from any area of demonstrated expertise as to provide no reasonable basis for calculating the loss to which he testified. Accordingly, the court set aside the jury's award for loss of inheritance.

A year later, in *Viterbo v. Dow Chemical Co.*,[21] the Fifth Circuit began its opinion in a toxic tort case by saying that "today we consider the question whether it is so if an expert says it is so."[22] The court ultimately determined that the trial court had correctly excluded the testimony of a physician regarding causation because he brought to court little more than "credentials and a subjective opinion."[23] Calling the expert's testimony "no more than [the plaintiff's] testimony dressed up and sanctified as the opinion of an expert,"[24] the court of appeals concluded that the testimony was properly excluded. Accordingly, summary judgment for the defendant was affirmed.

The next year, the Fifth Circuit again attacked medical expert testimony that was given without adequate foundation. In *Washington v. Armstrong World Industries, Inc.*,[25] the surviving spouse of a colon cancer victim sued asbestos makers, claiming that exposure to asbestos caused the colon cancer. The defendants moved for summary judgment on the ground that there was no known causal connection between asbestos exposure and colon cancer. In opposing the motion for summary judgment, the plaintiff relied solely upon an affidavit by a physician who had never interviewed or treated the plaintiff but had reviewed his medical records and concluded that there was a reasonable medical probability that asbestos exposure caused his cancer. He based this conclusion on his "finding" that the decedent had been exposed to asbestos for thirty-two (32) years and that there was a statistically significant association between asbestos dust inhalation and colon cancer. The district court considered this testimony to be speculative and unreliable and excluded it. The court of appeals affirmed, agreeing that the expert's affidavit did not even create a genuine issue of material fact sufficient to defeat summary judgment.

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19. In re Air Crash Disaster at New Orleans, 795 F.2d 1230, 1233 (5th Cir. 1986).
20. *Id.* at 1234 (emphasis added).
21. 826 F.2d 420 (5th Cir. 1987).
22. *Id.* at 421.
23. *Id.* at 424.
24. *Id.*
25. 839 F.2d 1121 (5th Cir. 1988).

The Fifth Circuit continued its annual assault on junk science the next year in *Brock v. Merrell Dow Pharmaceuticals, Inc.*[26] In that case, the parents of a child born with defects sued the manufacturer of the drug Bendectin, which the mother had taken during pregnancy. The defendant appealed a jury verdict in favor of the plaintiffs. In reversing the jury verdict, the Fifth Circuit, in an extensive opinion, found that the plaintiffs' evidence was not sufficient to support the verdict. Noting that it was abandoning the traditional approach to scientific evidence and questioning the reasoning of medical experts, the court found that no conclusive epidemiological proof existed to show a connection between Bendectin and the birth defects in question. The court also remarked: "Hopefully, our decision will have the effect of encouraging district judges faced with medical and epidemiological proof in subsequent toxic tort cases to be especially vigilant in scrutinizing the basis, reasoning, and conclusiveness of studies presented by both sides."[27]

The culmination of all this came two years later in *Christophersen v. Allied-Signal Corp.*[28] In *Christophersen*, the plaintiffs claimed that the decedent suffered a wrongful death by contracting colon cancer from occupational exposure to nickel and cadmium contained in materials manufactured by the defendants. The district court granted summary judgment in favor of the defendant manufacturers. On appeal, the Fifth Circuit convened en banc and held that the district court properly excluded an affidavit of the plaintiffs' medical expert witness that had been submitted in opposition to the defendants' motion for summary judgment. Absent the affidavit, the plaintiffs had no proof that their decedent's colon cancer was caused by his occupational exposure to nickel and cadmium in the work place.

The *Christophersen* court held that the exclusion of the medical expert's affidavit was proper for two reasons. First, the medical expert did not rely on facts of the same type typically relied upon by other medical experts evaluating toxic torts.[29] Instead, he relied on a single admittedly erroneous affidavit of a co-worker that grossly overestimated the decedent's exposure and did not even identify the type of fumes to which the decedent was allegedly exposed. Second, the medical expert's reasoning was not scientifically valid—*i.e.*, his reasoning was not generally accepted within the relevant scientific (*i.e.*, medical) community. Specifically, his assumption that nickel and cadmium had been associated with colon cancer had no support in medical science or literature and was therefore without foundation.

The Fifth Circuit line of jurisprudence, as well as emerging jurisprudence in other federal circuit courts of appeals, prompted the United States Supreme Court to hear *Daubert v. Merrell Dow Pharmaceuticals, Inc.*[30] The *Daubert* opinion

26. 874 F.2d 307 (5th Cir. 1989).
27. *Id.* at 315.
28. 939 F.2d 1106 (5th Cir. 1991) (en banc).
29. *See* Fed. R. Evid. 703.
30. 509 U.S. 579, 113 S. Ct. 2786 (1993).

affirmed that the trial judge must act as a "gatekeeper" who scrutinizes proffered expert witness testimony and effectively excludes "junk science" from the courtroom. Reduced to its elements, the Court in *Daubert* essentially formulated the following four-step test for the admissibility of expert testimony in federal court:

1. Is the witness qualified to express an expert opinion?[31]

2. If so, are the facts upon which the expert relies the same type as are relied upon by other experts in the field?[32]

3. If so, in reaching his conclusion, did the expert use a method of reasoning that is sufficiently reliable? This is determined by the following factors:
   a. Whether the expert's theory or technique can be (and has been) tested;
   b. Whether the expert's theory or technique has been subjected to peer review and publication;
   c. The known or potential rate of error of employing the technique; and
   d. Whether the theory or technique has achieved "general acceptance" within the relevant scientific community.[33]

4. If so, should the expert's opinion be nonetheless excluded because "its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury"?[34]

Obviously, the answers to questions 1, 2, and 3 must be "yes" and the answer to question 4 must be "no" in order for the expert's opinion testimony to be admissible.

One of the concluding passages in the *Daubert* opinion is particularly noteworthy, as it effectively expresses what is perhaps the overriding rationale for the Court's ruling:

> [T]here are important differences between the quest for truth in the courtroom and the quest for truth in the laboratory. Scientific conclusions are subject to perpetual revision. Law, on the other hand, must resolve disputes finally and quickly. . . . Conjectures that are probably wrong are of little use . . . in the project of reaching a quick, final, and binding legal judgment—often of great consequence, about a particular set of events in the past. We recognize that in practice, a gatekeeping role for the judge, no matter how flexible, inevitably on occasion will prevent the jury from learning of authentic insights and innovations.

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31. Fed. R. Evid. 702.
32. Fed. R. Evid. 703.
33. *See* Frye v. United States, 293 F. 1013 (D.C. Cir. 1923).
34. Fed. R. Evid. 403.

> That, nevertheless, is the balance that is struck by Rules of Evidence designed not for the exhaustive search for cosmic understanding but for the particularized resolution of legal disputes.[35]

Louisiana courts have embraced *Daubert*. In *State v. Foret*,[36] decided just a few months after *Daubert*, the Supreme Court of Louisiana expressly adopted the *Daubert* test for determining the admissibility of expert opinion testimony in state courts. In so doing, the court noted that Federal Rule of Evidence 702, upon which *Daubert* was based, is identical to Louisiana Code of Evidence article 702. Applying the *Daubert* test, the court held that, in the case before it, the admission of expert testimony by a psychologist regarding the credibility of a minor child in a prosecution for the sexual abuse of the child was erroneous. Accordingly, the resulting conviction for child molestation based in part upon that testimony was reversed. Simply put, the court held that the psychologist's opinion testimony about the victim's credibility based on interviews could not be validated by scientific means and therefore was not reliable enough to be admissible.

The courts of appeal have followed the *Foret* decision and have applied the *Daubert* standard as the test for admitting expert opinion testimony into evidence. In *Clement v. Griffin*,[37] the court held that a tire expert's testimony on a defect in a tire was erroneously admitted. The expert's testimony was not shown to be testable, there was no known rate of error for his theory, and his methodology was "suspect." Accordingly, a judgment against the tire manufacturer was reversed. In *State v. Gaudet*,[38] the court held that the trial court properly excluded expert testimony that a voice stress test proved the defendant's credibility, finding that such testimony lacked any valid scientific basis. In *Williams v. General Motors*,[39] the court held that a mechanic's expert testimony about an alleged defect in an automobile was not sufficiently reliable to be admissible. Accordingly, the court excluded the testimony, reversed judgment for the plaintiff, and rendered judgment for the defendant.

The trend was finally interrupted, albeit ambiguously, when the Supreme Court of Louisiana reinstated a $2 million judgment for wrongful death on a product liability claim against an automobile manufacturer in *Mistich v. Volkswagen of Germany, Inc.*[40] In so doing, the court reversed a court of appeal ruling that the plaintiffs' expert had not been qualified to testify as an expert in auto design. The court's opinion contained one brief reference to *Daubert*, which was nothing more than a citation, and appeared to turn as much

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35. Daubert v. Merrell Dow Pharmaceuticals, 509 U.S. 579, 596-97, 113 S. Ct. 2786, 2798-99 (1993).

36. 628 So. 2d 1116 (La. 1993).

37. 634 So. 2d 412 (La. App. 4th Cir. 1994).

38. 638 So. 2d 1216 (La. App. 1st Cir. 1994).

39. 639 So. 2d 275 (La. App. 4th Cir. 1994).

40. 666 So. 2d 1073 (La. 1996).

on the facts of the case as on any rule. Thus, the significance of this most recent consideration of expert testimony remains to be seen.

V. PRACTICE POINTERS

The effective use of an expert witness begins with an understanding of the expert's role. The key lies in the wording of Article 702 of the Louisiana Code of Evidence, to-wit: An expert may testify in the form of an opinion *if* his "scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence . . . ." This indicates that, first of all, an expert witness must be a teacher and that his primary role is to educate the judge or jury. The term "expert witness" has two words, and both are important. An expert who is not a good witness is no more useful to the lawyer employing him than a witness who is not really an expert. Thus, when deciding to retain an expert witness, a lawyer must bear in mind that the individual he retains must possess the necessary specialized knowledge *and* be a good communicator.

Obviously, the trial lawyer can enhance the effectiveness of his expert witness with proper preparation. The following practice pointers can help an expert witness communicate more effectively.

1. *Prepare as thoroughly as possible.* An expert's effectiveness is only as good as his knowledge of the case. An expert who is unable to respond to cross-examination because he has not thought about the questions being asked compromises his side of the case.

2. *Speak in plain English.* Just as the trial lawyer must avoid using legal jargon, the technical expert must likewise avoid the temptation to lapse into "technospeak." A judge or jury can be persuaded only if they understand what the expert is saying.

3. *Use visual aids.* A picture is, indeed, worth a thousand words. With the computer technology that is available, graphs, bar charts, and all types of visual aids are available.

4. *Short answers are better.* A witness who answers questions briefly—and directly—is much more effective than a long-winded expert who drones on and on.

5. *Be intellectually honest.* A witness who concedes what he should concede appears more credible than a witness who comes off as a committed advocate who will say anything to serve his side.

6. *Get to the point.* When presenting an expert, remember that the judge and jury are both living in a world of "sound bites" and are accustomed to having a commercial break every seven and one-half minutes. In qualifying the expert, bring out the credentials that are important and will establish the expert's credibility. On the merits, lay the foundation and get to the expert's opinion without unnecessary delay. You can thereafter bring out additional testimony to support the

opinion, but it is important not to wait too long to get to the punch line. Remember that the average individual (be he judge or juror) has a limited attention span.

VI. CONCLUSION

Now more than ever, a lawyer must be especially careful when hiring an expert. He must scrutinize the qualifications of any expert he is considering to make sure that his credentials are valid. More importantly, he must scrutinize the expert's methods and reasoning processes to make certain they will comply with the *Daubert* criteria. A lawyer who fails to analyze his expert's opinions by these standards prior to offering them risks their exclusion.

The message from *Daubert* and its progeny is clear: "Junk science" is out. The trial judge is now vested with greater authority to exclude any expert opinion testimony that is outside the mainstream of the relevant scientific community with which the expert is identified.[41] Lawyers on both sides are effectively placed on notice that experts on the fringes are likely to be barred from the courtroom. There is no area of litigation in which this is more critical than the trial of toxic tort claims.

The critical task for a lawyer in presenting expert opinion testimony in the trial of a toxic tort claim is to make certain it plays well for the trier of fact. This requires that the lawyer observe the KISS principle (*i.e.*, Keep It Simple, Stupid). W.C. Fields is reported to have said, "[n]o one ever went broke underestimating the taste of the American public." Similarly, no trial lawyer ever went wrong underestimating the intelligence of a judge or jury. An expert must be understood if he is to persuade, and talking over the judge's or jury's head wastes a critical opportunity to persuade.

41. For an excellent discussion of the responsibilities of a trial judge to assess scientific evidence in light of *Daubert*, see *Developments in the Law—Confronting the New Challenges of Scientific Evidence*, 108 Harv. L. Rev. 1481, 1509-57 (1995).