# Law and Science

*Carolina Academic Press*
*Law Casebook Series*
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## Cases and Materials

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Carolina Academic Press
Durham, North Carolina

ISBN: 0-89089-950-9
LCCN: 2001088040

Carolina Academic Press
700 Kent Street
Durham, North Carolina 27701
Telephone (919) 489-7486
Fax (919) 493-5668
www.cap-press.com

Printed in the United States of America

*To Summer, Remington and Allan*

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*by D. Allan Bromley*

Reflecting the separation of contemporary legal and scientific communities, articles and books on the general topics of science and the law have typically focussed on science or law and only rarely, if at all, on synthesis of the two.

Prof. Sutton has been able to draw on her background both as a scientist and a lawyer as well as her broad experience in the private sector, in academia and in government (as the Assistant Director of the Office of Science and Technology Policy in the Executive Office of the President of the United States, 1990-1993) to bring together such a synthesis.

In doing so, she has resisted the temptation to include extraneous and unrelated topics and cases — a trap into which many previous authors have fallen.

Following a lengthy introductory essay tracing the relationship and interactions of science and the law from the seventeenth century until the present she has selected the most important of the areas where modern science and law intersect and has provided full documentation of illustrative cases for each. In Chapter One the interdisciplinary relationship of science and the law is considered; in Chapter Two governmental aspects of the two fields; in Chapter Three private sector components of the relationship; in Chapter Four, law, science and the courts; in Chapter Five the author speculates on how the relationships will evolve in the future.

The law student will find this casebook to be well organized, up-to-date, authoritative and accessible. Topics and discussion flow naturally throughout the volume. It is a pleasure for me as a scientist to recommend this book to them. Moreover, I would recommend it with equal enthusiasm to my fellow scientists who increasingly in our technological democracy find themselves confronted with interactions, both minor and major, between their science and technology and the law.

Not only is this an excellent, but also a much needed volume.

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1989-1993

# A Jurist's Foreword

*by the Honorable S. Jay Plager*

*U.S. Court of Appeals for the Federal Circuit*[1]

A bit of perspective on this matter of law and science. Different observers offer different perspectives on what law is, what science is, and how they interrelate. In chapters 1 and 5 you will find commentary on this question by several authors. Some focus on what are seen as fundamental differences surrounding the use of "scientific method;" some see other grounds for why practitioners of the one or the other can or cannot effectively relate to each other. Let me offer an anecdotal perspective from my own experience.

When I was a young faculty member teaching law at the University of Illinois, I was asked by the Dean of the College of Engineering - a school particularly highly regarded on the campus - to participate in a series of seminars involving the faculty of the engineering college and a select group of professors from the humanities and social sciences. The purpose of the seminars, it was explained, was to explore whether some of the ideas and thinking of the non-hard sciences might be made useful to the engineering faculty in enriching and broadening engineering education. The Dean obviously was something of a visionary.

After a period of time I came to understand how different was the way people in the physical sciences were trained to think about problems, as compared, for example, to the way we train people to "think like a lawyer." The physical scientist analyzed a problem in a manner that seemed to me "downward." I mean by that that the scientist would take the mass of accumulated date relevant to the problem presented, then reason down to a specific solution, a solution that met the criteria needed to solve the problem. For the engineer that might be the little black box that turned the lights on and off as required, and for the physicist that might be the formula that proved the hypothesis.

1. Judge S. Jay Plager has served on the faculties of a number of law schools, including the University of Florida, University of Illinois, University of Wisconsin, Indiana University-Bloomington, where he was also dean, and as a visiting fellow at Stanford University and Cambridge University (England). Later he served as Counselor to the Under Secretary of the Department of Health and Human Services in Washington, and then as a member of the Executive Office of the President, first as Associate Director of the Office of Management and Budget, and later as Administrator of the Office of Information and Regulatory Affairs. He was appointed to the United States Court of Appeals for the Federal Circuit in 1989, and became a Senior Judge in the year 2000. He serves on the Budget Committee of the Judicial Conference of the United States, and is a member of the board directors of the Einstein Institute for Science, Health & the Courts, a federally-funded program for making science accessible to the instruments of justice.

Lawyers, on the other hand, and to a large extent persons trained in the humanities and social sciences - I think of law as falling somewhere between those two - are more likely to analyze "upward," to take the stated problem and then search around for alternatives to understand and manage the problem. (One mark of a good lawyer is the ability to find the alternative that maximizes the values, implicit or explicit, at issue, whether they derive from a view of the public interest or the needs of a particular client.)

For the hard sciences, empirical, testable, evidence lies at the heart of the enterprise. Even while incorporating past knowledge, hard science is focused on the future, and on the changes that new knowledge can bring. Law, by contrast, is very much tied to the beliefs of the past, and is largely guided by normative principles, such as fairness and reasonableness, by which human conduct should be governed. In pure science, normative principles have no place (that is not the same as saying scientists are without personal bias); it is the manipulation of data, and the results that derive therefrom, that governs the truth for which science strives. For the law-trained, though the resolution of individual disputes may be fact-driven, there is generally little concern for empirical validation of established legal norms. Truth is a hoped-for approximation of reality, and, like justice, is conclusively presumed to be the outcome of a process by which rules are established and disputes settled.

The difference in professional socialization, in the ways in which different disciplines shape thinking behavior, may explain why the effort in recent years to introduce "law and whatever" into the law school curricula has been more successful when the "and" is a humanity or social science-based discipline, such as economics or history or sociology, than when the effort is to incorporate the lessons of the hard sciences, like mathematics or biology. The resistance to "thinking like a scientist" may also reflect the self-selection process of students in law schools, and of the ex-students who become law faculty. That, however, may be changing.

Not many years ago, the typical law school student body was drawn largely from departments of political science, with a sprinkling of English and philosophy and history. Today in many schools the picture is different. It is not unusual to have students with hard science backgrounds - engineering, certainly, but also microbiology, aeronautical science, even physics. This change reflects in part the changes in law practice, which in turn reflect changes in societal values.

Corporate wealth, in which so many Americans are invested, is found as often in patent portfolios and other form of intellectual property as it is in plants and facilities. Intellectual property law, and particularly patent law with its focus on scientific discoveries and once the province of a handful of boutique law firms in a few cities, is now practiced in most major law firms. These firms either grew their own IP department or bought outright one of the boutique firms. Federal trial judges, often lacking any particular scientific expertise, find themselves wrestling with cutting-edge technology that even the experts have trouble understanding, much less explaining to a judge and jury. And, in 1982, Congress created a unique court of appeals, the Federal Circuit, a court sometimes referred to as the science court, charged with bringing a degree of national uniformity to these issues.

Just as during the last century we saw the ascension of federal law and federally-protected rights and privileges, in the coming century there will be the ever-accelerating ascension of legally recognized and protected scientific knowledge, impacting on every aspect of life. Advanced computer hardware and software, new forms of communications

technology, medical devices and drugs, and genomic manipulation with as yet unseen consequences, all are a part of daily life in America, and not just futuristic speculation. As Alan Bromley, Dean of the Yale University Engineering School noted in his 1998 address to the American Bar Association, "In the early days, it might have been possible for science and the law to remain in splendid isolation, but in today's increasingly technological society, science, technology, and the law are inexorably drawn together, and the time has surely come when we need to better understand one another and how we work."

Legislators will be expected to address the most complex social and scientific interactions, in ways that are beneficial with a minimum of unintended consequences. Courts in their role as peaceful resolvers of disputes, as well as in their role as defenders of the rights of individuals to freedom and property, will be required to understand science, what it is, and what it means. The Supreme Court has assigned to judges "the task of ensuring that a [scientific] expert's testimony both rests on a reliable foundation and is relevant to the task at hand;" the court explains that "[p]ertinent evidence based on scientifically valid principles will satisfy those demands." *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993). Recognizing the problem in assigning this responsibility to judges trained in law, and not in science, one Justice has written, "This requirement will sometimes ask judges to make subtle and sophisticated determinations about scientific methodology and its relation to the conclusions an expert witness seeks to offer - particularly when a case rises in an area where the science itself is tentative or uncertain . . . Yet, as *amici* have pointed out, judges are not scientists and do not have the scientific training that can facilitate the making of such decisions." Breyer, J., concurring in *General Electric Co. v. Joiner*, 522 U.S. 136 (1997).

Nevertheless, as every judge knows, the fact that a case presents difficult issues, or the judge feels less than adequately prepared to sort through them, does not excuse the judge from making a decision in a case, the best he or she knows how. Proposals have been made to furnish judges with "neutral" scientific advisors, in addition to the disputing experts the litigants provide. More fundamentally, law schools are beginning to offer courses designed to equip future lawyers and judges to work effectively in the law/science regimen, and continuing legal education programs are focusing on these issues. New organizations like the *Einstein Institute for Science, Health & the Courts*, headquartered in Washington, provide specialized training for state and federal judges in current gene research and biotechnology, and the related social and legal issues these developments portend for the law.

Lawyers who can participate effectively in this new order, who can incorporate into their thinking and workproduct both the disciplines of law and of science, will be essential players in the coming era. The challenge is great, but so will be the rewards, for the individual as well as for the society.

Given the complexities of cutting-edge science, the evolving interrelationships between science and law, and the difficult problems they create for each other, it is not surprising that there are relatively few first-rate teaching materials available. It is gratifying to have Professor Victoria Sutton's comprehensive contribution to the field.

# Preface

As this casebook goes to press, I am keenly aware of the changes that are taking place at a rapid rate in the interdisciplinary area of law and science. Recognition of the growing importance of understanding this relationship and developing strategies for both science and law to cope with these changes and rapid growth is more and more widespread. The hope is that this casebook, will go toward perpetuating and encouraging this dialogue.

The design of the casebook is based on the typical law school model of learning—the case-based method. Concepts in science are integrated with the legal issues, usually presented with a brief introduction to the science for each section. Because this is an interdisciplinary area, explanations of the science often found in the footnotes of cases, have been selectively included with the cases, unlike many cases edited for other casebook use. The hope is that this explanation will illustrate both the concepts in science, as well as demonstrate the need for the court, law clerks, and attorneys to have an understanding of the science involved with the legal issues of the case.

But the case-based approach should not discourage science and science policy students from using this casebook as a tool for gaining insight into legal issues that may affect them. The cases selected, were specifically chosen because they include issues important to both science and law, in the form of science principles and legal issues. For that reason, many areas which may involve law and science, but involve predominately moral and ethical issues as the center of their analysis, are not included here.

The overview of Chapter One is an introduction to a variety of issues in law and science. The Chapter begins with a discourse on the history of science and law as an interdisciplinary subject from the late 1600s up until 1863—the era of modern science. In the process, the student recalls some of the most famous scientists in history together with the legal history and legal minds of these centuries. Using cases and principles likely familiar to the second-year and third-year law student, these cases are examined for the science underlying the case, and analysis of the integration of these disciplines is examined. The first of these cases addresses statistics and their application in law.

Chapter Two introduces the student to the role of government in science and the institutional mechanisms by which science and law co-exist. The Executive Branch, the U.S. Congress and the President are specifically examined as to their interactions with the scientific community. Government's involvment in the conduct of scientists and other professionals is also examined. Regulation of science is demonstrated in the area of biotechnology and the roles of state and local governments are also included.

Chapter Three addresses the private sector's interaction with law and science, and includes individual rights in both a civil and a criminal context. Science, law and religion as well as human tissues and disclosure issues are included. Rapidly changing techno-

logical advances are considered in terms of what impact this might have on the Constitutional "expectation of privacy."

Chapter Four, the longest of the chapters, addresses the courts and the interaction with law and science. Scientific evidence is examined in a comprehensive approach to the subject, and specific areas of science are examined — DNA evidence, toxicological and epidemiological evidence, toxic tort litigation and social science evidence. The chapter concludes with a practical examination of trial practice, which would provide sufficient background to enable students to use a trial practice exercise to apply the concepts learned throughout the casebook and particularly in this chapter.

Chapter Five, concludes with a look at some of the future issues in law and science and how these might be addressed. The inclusion of these possible future issues and concepts is intended to provoke questions and raise new thoughts and ideas about the issues which may present themselves to new practitioners.

I am grateful to my Dean, W. Frank Newton, Texas Tech University School of Law, who provided comments, ideas as well as encouragement that such a casebook was needed. I am also grateful to Professor D. Allan Bromley, Yale University, for his comments and ideas on science and science policy, throughout.

I am grateful to the many law students whose ideas and questions were instrumental in shaping this book. These include Kristopher Lance Anderson, Tina Barnes, Jim Sharon Bearden, Carrie Davis, Brie DeBusk, Patricia Dyer, John Granberg, Elizabeth Hundley, Matthew Hurt, Jacqueline Johns, Jason Kerr, Jami Ladue, Deborah Miller, John Z. Murphy, Christopher Pepper, Jerry L. Phillips, Richard Ruble, Stacy Santellana, Lee Scott, Karla Snead, Marjory Stewart, David Timberger, Michael Valachovic, Jody Wireman, Steven Wong, Jason Bujnosek, Jarrod Busby, Brian Croyle, Erin Delaney, Ilkay Dogru, Amy Dunn, Cameron Gulley, Jeannine Haws, Mindy Medford, Bart Reeder, Chip Searcy, Lisa Trevino, and Stephanie Warnock. I am particularly grateful to Stephanie Warnock, BSN, RN for her contribution to the research on issues in stem cell research and cloning discussed in Chapter Three.

Victoria Sutton

Lubbock, Texas
January 2001

# About the Author

Victoria Sutton is both a scientist and a lawyer, enjoying careers in both fields over the years. She graduated from American University, Washington College of Law with a Juris Doctorate degree *magna cum laude*; a Master's Degree in Public Administration from Old Dominion University and she graduated from the University of Texas at Dallas with a Doctorate of Philosophy in Environmental Sciences. Her undergraduate degrees are a Bachelor of Science in Zoology and A Bachelor of Science in Animal Science, *cum laude*.

Currently, she is Associate Professor of Law, Texas Tech University School of Law, and also serves as Adjunct Professor in the Texas Institute for Environmental and Human Health, Texas Tech University. She previously served in the Bush Administration from 1989 to 1993 first at the U.S. Environmental Protection Agency and then as Assistant Director of the Office of Science and Technology Policy, Executive Office of the President. She subsequently held the position of Executive Director of The Ronald Reagan Institute for Emergency Medicine, George Washington University; and Research Associate Professor at the Uniformed Services University for the Health Sciences in Bethesda, Maryland, following her White House service. Prior to her service in government and academia, she worked in the private sector as Executive Vice President of a marine coatings manufacturing company.

During her time in Washington, D.C. she also worked for Judge S. Jay Plager, Circuit Judge for the U.S. Court of Appeals for the Federal Circuit; as well as the Department of Justice, Indian Resources Section. She also served on the National Academy of Engineering, Committee on the PNGV (New Car Initiative).

Professor Sutton is a member of the District of Columbia Bar and of the Federal Circuit Bar.

# Acknowledgments

The editors gratefully acknowledge permission to reprint the following articles:

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