

LAW AND THE
SOCIAL ROLE OF
SCIENCE

EDITED BY HARRY W. JONES

*Based on the proceedings of a conference under
the auspices of The Rockefeller University and the
Walter E. Meyer Research Institute of Law*

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ALMOST FOUR CENTURIES have passed since Francis Bacon proclaimed in his *Grand Instauration* that "a way must be found for the human understanding entirely different from any hitherto known." Bacon was a lawyer, not a professional scientist, but his words are wonderfully apt as a characterization of contemporary scientific method. Modern science is, indeed, an "entirely different" way of human understanding. Those of us who are not men of science feel ourselves put to shame by the precision of scientific thought and are stunned by the boldness of the scientific imagination. Science has transformed the world view of the twentieth century.

The technological revolution of our time reaches further and is vastly greater in its social impact than the industrial revolution of the eighteenth and nineteenth centuries. Even to compare the two is like comparing atomic energy to the internal combustion engine or the gas turbine. But the history of the industrial revolution carries a profound lesson for our scientific era: better machines do not necessarily bring about better lives for men generally.

Natural science, in its social role, is not an island entire unto itself. We must also look to the social sciences for guidance if we are to reach sound decisions concerning the pace at which revolutionary technological innovations

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T R E A T Y

banning nuclear weapon tests
in the atmosphere, in outer
space and under water

The Governments of the United States of America, the United Kingdom of Great Britain and Northern Ireland, and the Union of Soviet Socialist Republics, hereinafter referred to as the "Original Parties",

Proclaiming as their principal aim the speediest possible achievement of an agreement on general and complete disarmament under strict international control in accordance with the objectives of the United Nations which would put an end to the armaments race and eliminate the incentive to the production and testing of all kinds of weapons, including nuclear weapons,

Seeking to achieve the discontinuance of all test explosions of nuclear weapons for all time, determined to continue negotiations to this end, and desiring to put an end to the contamination of man's environment by radioactive substances,

Have agreed as follows:

Article I

1. Each of the Parties to this Treaty undertakes to prohibit, to prevent, and not to carry out any nuclear weapon test explosion, or any other nuclear explosion, at any place under its jurisdiction or control:

(a) in the atmosphere; beyond its limits, including outer space; or underwater, including territorial waters or high seas; or

Article IV

This Treaty shall be of unlimited duration.

Each Party shall in exercising its national sovereignty have the right to withdraw from the Treaty if it decides that extraordinary events, related to the subject matter of this Treaty, have jeopardized the supreme interests of its country. It shall give notice of such withdrawal to all other Parties to the Treaty three months in advance.

Article V

This Treaty, of which the English and Russian texts are equally authentic, shall be deposited in the archives of the Depositary Governments. Duly certified copies of this Treaty shall be transmitted by the Depositary Governments to the Governments of the signatory and acceding States.

IN WITNESS WHEREOF the undersigned, duly authorized, have signed this Treaty.

DONE in triplicate at the city of Moscow the fifth day of August, one thousand nine hundred and sixty-three.

For the Government
of the United States
of America

For the Government
of the United Kingdom
of Great Britain and
Northern Ireland

For the Government
of the Union of
Soviet Socialist
Republics

Dean Rusk Home A. Sparrow

Twentieth century law-science confrontation: these are the first and final pages of the Nuclear Test Ban Treaty—a significant first step towards regulating the application of science and technology among nations—signed in 1963 by the United States, the United Kingdom, and the Union of Soviet Socialist Republics.

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LAW AND THE

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SOCIAL ROLE OF

SCIENCE

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INTRODUCTION

ALMOST FOUR CENTURIES have passed since Francis Bacon proclaimed in his *Grand Instauration* that “a way must be found for the human understanding entirely different from any hitherto known.” Bacon was a lawyer, not a professional scientist, but his words are wonderfully apt as a characterization of contemporary scientific method. Modern science is, indeed, an “entirely different” way of human understanding. Those of us who are not men of science feel ourselves put to shame by the precision of scientific thought and are stunned by the boldness of the scientific imagination.

Science has transformed the world view of the twentieth century. The mystery of science deepens, as scientific thought becomes ever more abstract and deductive, but the element of mystery only adds to the awe with which the achievements of science are regarded by the scientifically untrained. Scientific procedure, particularly as exemplified in contemporary physics, has become paradigmatic of the human intelligence at its best; the highest compliment that can be paid to a historian, a sociologist, or a legal scholar is to say that his work is genuinely “scientific.” This is but one manifestation of the social role of science.

The continuing advance of scientific understanding has led to the creation of powerful tools for the exploitation of natural forces and the control of human environment. If these new tools are used wisely and humanely, the human condition can be enriched, materially and spiritually, to an extent never envisioned by the most utopian of past social philosophers. This is true, even and particularly, of the dread atom. Nuclear energy, harnessed for peaceful uses, can in time bring about the industrial development of power-poor areas throughout the world. Space technology, now oriented largely to weaponry and possible military purposes, can revolutionize existing systems of transport,

communications, and weather control and provide great new tools for scientific research and for the human adventure of exploration. The instruments of scientific technology have no will of their own, no in-born inclination either to good or to evil. They are servants of man, and everything depends on the use man makes of them.

The technological revolution of our time reaches farther and is vastly greater in its social impact than the industrial revolution of the eighteenth and nineteenth centuries. Even to compare the two is, perhaps, like comparing atomic energy to the internal combustion engine or the gas turbine. But the history of the industrial revolution carries a profound lesson for our scientific era: better machines do not necessarily bring about better lives for men generally. The industrial revolution was achieved at a heavy cost in social misery: dehumanizing working conditions, oppressive child labor, and a remorseless toll of uncompensated industrial accidents. In the United States, as in the "advanced" countries of Western Europe, the triumph of industrial technology was accompanied by a bleak failure of the older social technology of government and law.

Science, in its social role, is not an island entire unto itself. It is to the social sciences, not the natural sciences, that we must look for guidance if we are to reach sound decisions concerning the pace at which revolutionary technological innovations are to be introduced in our complex society and the conditions to be imposed on their introduction. There are crucial decisions, too, as to the extent to which government should support scientific and technological research and as to the form—outright grant, contract, or preferential tax treatment—in which this support should be extended. In our system and our day, these and others like them are political decisions, and they will be reached and implemented through government's instrument, the law.

The nine reports brought together in this book were prepared for a conference on *Law and the Social Role of Science* held at The Rockefeller University on 8 and 9 April 1965, under the joint auspices of the University and the Walter E. Meyer Research Institute of Law. The moving spirit of the conference was Donald R. Young, a great social scientist and present Visiting Professor at The Rockefeller University, who has believed for a long time that scientists and lawyers are in-

sufficiently aware of the many ways in which science and law touch and affect each other, particularly as concerns the social role that is inescapable for science and central for law.

It was impossible, at a two day conference, to take account of more than a few illustrative aspects of the manifold science-law relation. A book ten times as long as this one could not deal exhaustively with the impact of science on law or of law on the social role of science. To supplement this book's necessarily limited coverage, readers may turn to the admirable bibliography of law and science materials prepared by Morris L. Cohen and Betty J. Warner of the University of Pennsylvania Law School in Part III.

Of the nine reports which make up this book, seven are written by lawyers, one by a social scientist, and one by a lawyer in collaboration with a social scientist. It is not to be inferred from this that lawyers of the present day are as ready as Francis Bacon was to volunteer proposals for the renovation of the sciences. We lawyers are ever mindful of Harvey's charge that Bacon "wrote of science like a Lord Chancellor." But this is no time to preserve the traditional self-segregation of lawyers from scientists or of natural scientists from behavioral scientists.

"All philosophical Experiments that let Light into the Nature of Things," wrote Franklin, "tend to increase the Power of Man over Matter, and multiply the Conveniences and Pleasures of Life." This can be so, but only when we begin to understand the problems of man in society as clearly as modern science has begun to apprehend the nature of the physical world. In an age of necessary intellectual specialization, natural scientists and scholars of society cannot understand each other's business, but they can strive for the kind of interdisciplinary collaboration that will enable them to perceive each other's values and aspirations. Conceivably we will discover, in the process, that our respective adventures are not entirely dissimilar. For in law, too, as Brandeis admonished us, "If we would guide by the light of reason, we must let our minds be bold."

HARRY W. JONES

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LAW AND THE SOCIAL ROLE OF SCIENCE

Certain significant and typical areas of public policy in which the interests and capabilities of scientists and lawyers converge are discussed in the five reports that make up this section. David F. Cavers introduces the discussions with a far-ranging and perceptive canvass of the "points of confrontation" of science and law.

Taking up one of these confrontations, Arthur W. Murphy analyzes the policies and procedures of the federal government's research and development program. Bernard Wolfman follows with a critical examination of the appropriateness of using the federal tax system as a means of providing government support of science.

The last two reports illustrate the range and variety of the science-law encounter. Joe H. Munster, Jr., and Justin C. Smith examine the problems, present and prospective, that are involved in the administration of large-scale scientific and technological research projects by universities and other non-profit institutions. The ever-recurring tensions between scientific and humanitarian approaches to research experimentation on persons and animals are discussed by Ovid C. Lewis in the final report.

I WHERE LAW
AND SCIENCE MEET



Law and Science: Some Points of Confrontation 5

DAVID F. CAVERS

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President of the Walter E. Meyer Research Institute of Law

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OVID C. LEWIS

Associate Professor of Law, Western Reserve University

Extensive footnotes for the five essays
in Part I appear on pages 205–219.

The illustration overleaf shows Sir Francis Bacon (1561–1626) who, in the words of Lord Adrian, was “the great writer and great lawyer and great herald of the scientific age.”

Law and Science:

Some Points of Confrontation

DAVID F. CAVERS

COULD I FORECAST the changes in our society that progress in science will bring by the year 2000, the new points of confrontation between law and science that I could then envisage would be far more than I could hope to sample here. Accordingly, I shall content myself with present-day confrontations, though some of these may not as yet be face to face. Moreover, though my title may seem rather bellicose, my purpose is not to pit law against science. I seek simply to sort out and characterize some of the diverse situations in which law and science must take each other into account.

“Law” and “science,” of course, are lay figures. On them I shall drape such meanings as the context requires. Thus, when I refer to law, I may mean some or all the legal rules and principles in our legal system, or the processes for their employment, or the great official and professional apparatus engaged in those processes. I may even include the law-shaped processes of government.

When I refer to science, I may mean the body of knowledge—or system of hypotheses—concerning the structure and processes of nature, or that body of applied knowledge we call technology, or the processes whereby both bodies of knowledge are acquired, or the array of scientists and engineers who are learned in them. However, I shall exclude the social sciences; my hands are already overfull.

In a sense, my paper is introductory, but I have not sought to preview the points developed in the papers to come. Instead, noting the diversity of ways in which law and science are interacting, I have tried to identify some categories, giving an illustration or two for each of

them. These illustrations also exemplify different types of problems which have been solved or still call for solution. For these purposes, I shall touch on points of confrontation under five headings:

- 1 Points at which the law, in discharging its traditional adjudicatory function, must draw on scientific knowledge to reach its decisions.
- 2 Points at which scientific developments are compelling us to reexamine the adequacy of established legal doctrines.
- 3 Points at which scientific developments have created new hazards that have led the state to intervene, thereby creating new points of confrontation.
- 4 Points at which government, acting through the legal mechanisms of appropriation, executive order, and contract, must choose scientific objectives, ration scarce research resources, and seek to maximize the contributions of the scientific community.
- 5 Points at which scientific developments are bringing us into new contacts with our neighbors on this planet, thus creating the need for new legal relationships.

The Adjudicatory Function

In this arena of confrontation we are on an old battleground. The process of drawing on scientific knowledge in adjudication reveals that our adversary system of litigation and the scientific method and the temperament of scientists are incompatible. We in the Anglo-American legal tradition seek to resolve conflicts in human affairs by placing on each party the burden of making his best case and by leaving to the umpire (judge or jury) the task of choosing between them. This adversary system casts the expert witness in a partisan role. Counsel tries to extract a slanted picture from the witness, and, on cross-examination, opposing counsel seeks to slant the picture the other way. To the man trained to objectivity, this is a perversion of a quest for truth and justice. That some of his colleagues have adapted successfully to its pressures makes the situation all the more obnoxious to him.

This confrontation has grown more frequent and more obnoxious with the growth of personal injury litigation, although it manifests itself in many other fields, notably patent law.¹ Specialization in the bar has produced lawyers who are both very knowledgeable in physiology and medicine and adept at squeezing every dramatic element out of the case of an injured body. Six-figure verdicts attest to the effective-

ness of their techniques. Medical resistance to these tactics in malpractice cases has given rise to what a California court has termed the "so-called 'conspiracy of silence.'"²

In another arena, adjudication depends on scientific testimony for a crucial determination. In the issue of criminal responsibility, for example, psychiatrists take the stand as experts for the state and for the defendant. Disagreement with the standard to be employed is often added to distaste for the adversary process. Fidelity to the century-old M'Naghten rule³ with its so called "knowledge of right and wrong" test is being challenged by the Durham rule, developed in the District of Columbia, which calls on the jury to decide whether the accused's "unlawful act was the product of mental disease or defect."⁴ A rival to this test is that proposed in the Model Penal Code which asks whether, "as the result of mental disease or defect," the accused lacked "substantial capacity either to appreciate the criminality of his conduct or to conform his conduct to the requirements of law."⁵

Our efforts to answer the question of criteria are causing a backlash; doubts are rising over the recognition of insanity as a defense.⁶ New formulations of the test, however, would enable the psychiatrist to give evidence that comes closer to his own conception of the problem. Despite this, tension will continue in both the criminal and civil courts as long as the scientist is cast in a partisan role, subjected to restraint in articulating his own views, and made a target of the opponent's counsel.

Is there a solution? In the past fifteen years, there have been experiments in New York and elsewhere in the use of the impartial expert who, in the case of personal injury claims, is selected by the court from a panel provided by the medical societies, and called to the stand by the judge. Use of the impartial expert in these cases has staunch champions and sharp critics;⁷ a measured judgment given in conversation by Professor Maurice Rosenberg, for a long time head of Columbia's Project for Effective Justice and now Director of the Walter E. Meyer Research Institute of Law, is that use of the impartial expert has contributed moderately to judicial efficiency by reducing somewhat the volume of large injury claims going to trial and, when used, has improved the quality of the trials. Resort to the practice seems to have

been uneven where it has been authorized. Some judges and many plaintiff's counsel view it with disfavor. Selection, they argue, is difficult; impartiality, an elusive virtue. I am reminded of that chairman in Paul Freund's story who, when introducing the moderator, said, "He leans neither to partiality on the one side nor to impartiality on the other." Moreover, the expert may be impartial between the parties, yet a partisan in terms of the scientific question in dispute. As the court's witness, he may overimpress a jury. The lawyer-critics challenge the tactic as an invasion of the jury's province.⁸

In serious criminal cases, Massachusetts and a few other states provide for an early examination of the accused by a state-appointed psychiatrist who may later take the stand.⁹ A larger number of states, and the Model Penal Code, prescribe pretrial examination by a court-appointed examiner if an issue of responsibility is raised; under the Code and in some states this can entail hospital commitment.¹⁰ The examining psychiatrist may be called to testify, and the Code would accord him the privilege of describing his examination of the defendant and of explaining his diagnosis and opinion,¹¹ a privilege which would also be extended for all fields of law by the Model Expert Testimony Act and the Uniform Rules of Evidence.¹² Though these models have as yet become law in only a few states, a trend toward this sensible relaxation of evidentiary rules seems to be under way.¹³

I suspect, nonetheless, that the scientific expert could be fully reconciled to the demands of the law only by our adoption of the inquisitorial procedure of European legal systems.¹⁴ There the judge dominates the trial; the expert's task is to advise him. The judge will select his own expert, though usually the parties are also entitled to call experts of their choice. In some countries, cross-examination is restricted by or must be conducted through questions proposed to the judge. One can readily envisage the deference accorded the Herr Doktor Professor who takes the stand. However, though this system may please the expert witnesses, it has not escaped criticism in this country,¹⁵ and I see no prospect that it will lead us to abandon our own accusatory and adversary processes. Though our confrontation here may be said to pose only a problem of procedure, it is one that cuts deeply. Its stresses may

be mitigated, but an accommodation of the conflicting interests of law and science in this arena is not close at hand.

Reexamination of Legal Doctrines

Our common law has been able to adapt with amazing success to the technological changes of the past one hundred years. Much legal change has been effected by molecular adjustment—the expansion or contraction of received doctrine. Now and again, of course, developments compel more radical departures. Usually these have been legislative, a conspicuous instance being the workmen's compensation laws; another, the zoning laws. I shall turn, however, not to the past for examples but to the future, and venture into the domain of electronics.

My first example relates to the legal protection of privacy. For this purpose, the law has a whole galaxy of rules from the Fifth Amendment to the law of trespass to the recovery of damages for invasion of the right to be let alone. However, these assume that a breach of privacy is an overt phenomenon—a question one is coerced to answer, an entry into one's castle, a reading of one's mail, the tapping of one's telephone, or the broadcasting of facts about one's past. Now we suddenly observe that the degree of actual freedom from observation which one enjoys depends on whether anyone else cares enough to look or listen. The curious may equip themselves with those extraordinary electronic gadgets already on the market which enable the possessor to penetrate all but the most carefully debugged fastnesses.¹⁶ He can render the private life of the object of his attention an open book—or a sound tape. Moreover, Donald Michael has recently warned us that our privacy may be threatened in another quarter by the computerizing of personal information on a scale and with an accessibility that makes the dossiers of the Federal Bureau of Investigation and the House Un-American Activities Committee seem rudimentary by comparison.¹⁷

How the law should respond to this confrontation is a problem not of procedure but of basic policy; guidance for its solution is not easily

found in the law books. Two Congressional committees have been looking into the matter,¹⁸ and the Association of the Bar of the City of New York has been conducting a study of the privacy problem in depth.¹⁹ Appropriately, since the problem is as old as man's first caves, one dimension of this study is historical. How, for instance, was privacy valued and protected in the Athens of Pericles or in the Rome of the Antonines?

Let me mention another group of new problems which electronics and the computer will soon compel the law to confront. Where, if anywhere, in the law of intellectual property—the laws relating to copyrights, patents, the protection of “literary property,” and industrial know-how—are programming for computers and the retrieval of computerized information to be fitted? A computer program may be of value to more persons than the initial programmer. Should it have the protection of copyright or be patented when it involves an adjustment of, say, an analog computer itself? Do we risk allowing progress in the computerizing of knowledge to be subjected too strictly to proprietary restraints? On the other hand, do we risk giving a premium to piracy and denying rewards to creativity? Also serious is the problem which emerges as we turn our libraries into repositories of machine-readable material, duly indexed, digested, and susceptible of rapid reproduction. What control should the copyright holder have over the uses of the copyrighted material in this store? Here is another array of problems of basic policy. As yet they have been accorded little disinterested study. Existing law provides no pat solutions.²⁰

New Hazards Requiring New Safeguards

Most risks which science has been creating have been accompanied by new scientific measures to minimize the dangers. People hurt by the failure of these safeguards have been afforded financial protection by the law of torts, reinforced sometimes by a simple licensing system and by regulations prescribing basic standards of good practice. Often, these tasks of protection have been left in private hands; the Underwriter's Label has probably done more than law has to preserve us from the electrical equipment we use with such carefree ignorance.

However, there are scientific developments of such complexity and such potentialities for both good and ill that the state has refused to rely on the entrepreneur and his scientific advisers. It has intervened to give its own assurance to the exposed public, and this in turn has led to confrontations on issues of great difficulty. I shall draw examples from two fields: drug control and regulation of nuclear energy or, more specifically, the licensing of power reactors.

The sweeping revision in 1938 of the 1906 Federal Food and Drug Act made one sharp departure from the earlier practice of drug control. Moved by more than one hundred deaths from a lethal new drug, the Congress required that henceforth the producer of any drug not generally recognized as safe submit to the Food and Drug Administration (FDA) an application reporting the drug's formula and the tests on which its maker relied to prove its safety. After a stated period, absent adverse FDA action, the application would become effective and the drug, properly labeled, could be freely marketed.²¹

This provision blocked the sale of many drugs whose dangers were not offset by their therapeutic value, but insufficient funds, inadequate staffing, sometimes industry pressure, and some shortcomings in the law itself all combined to weaken the protection it afforded. Though the Kefauver hearings a few years ago brought this sharply to light,²² we probably owe the strengthening of this law to the near miss we experienced when, by delaying tactics, Dr. Frances Kelsey of the FDA prevented the widespread distribution of thalidomide, the tranquilizer with the fearful teratogenic capability that caused the birth of thousands of deformed babies in Europe.²³

The 1962 Drug Amendments, put fully into effect only in the last year, require the FDA's affirmative approval of both the safety and the efficacy of any drug not already generally recognized as safe and effective.²⁴ New regulations prescribe detailed procedures and reporting requirements for the preapproval use of new drugs in clinical investigation.²⁵

The new law, whose requirements I have not stated in full, poses this question: Since a given drug can be at once a source of danger and a valuable remedy, at what point does the drug's danger so exceed its value that its sale should be forbidden? That question, however, raises

another one: Is this determination properly a matter for law or for medicine?

The American Medical Association (which views the new law with less resignation than does the pharmaceutical industry) holds that the question should be left to the individual physician, guided by his professional bodies.²⁶ Today, its ultimate resolution, short of the courts, lies with a layman, the Commissioner of Food and Drugs. A full public hearing procedure has been provided for the review of his decisions and for their appeal to the courts, but this is not used.²⁷ Should some less formal review by an advisory panel be provided?²⁸ Should authority to decide be delegated to medical members of the FDA staff? Or is the best solution to leave the law as it stands and hope for a continued build-up of the FDA's medical and scientific staff as now seems to be taking place? The key problem here is what should the qualifications be of those who have the responsibility for decision?

Similar problems are posed by earlier amendments which authorize the setting of tolerances for pesticide residues and for chemical additives in foods, and the approval of color additives for use in or on foods, drugs, and cosmetics.²⁹ Rather than examine these exacting though less dramatic confrontations, I shall turn to another situation involving the question of the decision-maker, which has its origin in the 1954 Atomic Energy Act's requirement that the Atomic Energy Commission license power reactors, a multistage process beginning with an application for a construction permit.³⁰ More than two decades of research have been devoted to diverse scientific questions of great difficulty posed by the evaluation of a reactor plant and its site from the standpoint of safety.³¹ The task rests initially with a special unit of the AEC's staff. Its scrutiny is then followed by a review by a statutory fifteen man body of scientists and engineers, the Advisory Committee on Reactor Safeguards. After subcommittee studies and an informal but private hearing before the full committee, it makes public its recommendations to the AEC in a brief letter. When the reactor plans have cleared these hurdles, a public hearing is held even though no contestant has appeared. This session is ordinarily held before a three man Atomic Safety and Licensing Board that draws two of its members from a panel of scientists and engineers. Next, the Commission, itself a body which usually

includes one or more scientists, reviews the Board's decision. Changes in the reactor's design during construction and, finally, the issuance of an operating license compel further reports and hearings.³²

This licensing procedure has been criticized as slow and redundant. Yet the number of cases is still relatively low, and the stakes are high. To answer the question of how much risk is too much risk, I think the resources of both science and law are needed and are being effectively applied; each profession has been given an appropriate role. Though the procedure may need simplification, the basic problem of allocating responsibility for decision seems to me to have been solved.

Government-Sponsored Programs

My description of this arena of confrontation removes from consideration the major influence that the federal government, by virtue of its power of taxation, can and does exert on research and development, apart from government-connected programs. Tax law and policy are arcana from which I shrink, leaving them to my colleague Bernard Wolfman who is an adept.³³ When taxation is involved, everyone expects to hear about law and from lawyers, but where is the confrontation of law and science when the subject relates only to government-sponsored programs?

This question overlooks both the role of law in providing an institutional framework for action and a body of controls to guide it, as well as some of the traditional skills of the lawyer's calling.

To adhere to the objectives identified in its scientific policy decisions, the federal government depends on an intricate system of legal controls embodied in statutes, executive orders, and regulations and, in dealing with persons outside its ranks, relies for its controls on a complex of contractual arrangements, among the most important of which are those governing patent rights. These controls render the lawyer an indispensable party to the implementation of those vast governmental programs of scientific research and development which have been multiplied by the exigencies of the postwar world. The lawyer's function is not simply that of a draftsman. More important, as Spencer Beresford has recently argued,³⁴ is his function as mediator between

scientists and members of Congress and other lay decision-makers in governmental office. As mediator, the lawyer will also have a hand in planning, since effective mediation entails skill in negotiation in order to develop viable compromises. At its best, the mediator's task also calls for an ability to sense the social, economic, and political implications of a scheme as it is developed.

As lawyers discharge this function, it may be, as Beresford suggests, that "the biases and habits of mind" of scientists and lawyers will turn out "to be (in some sense) complementary."³⁵ However, the lawyers' missions may with increasing frequency oblige them to champion one group of scientists against another. The allocation of funds among the sciences has been very uneven; scientists connected with war, space, and atomic energy have been able to think in terms that dwarf even the dreams of those in most other fields. Thus, the Joint Committee on Atomic Energy not long ago published with commendation a report, *Policy for National Action in the Field of High Energy Physics*, which proposed a research program building up over ten years to an annual cost approaching one-half billion dollars.³⁶ Meanwhile, research programs in less spectacular fields, such as the control of air and water pollution, must be content with a tiny fraction of such sums until these under-supported fields can gain effective spokesmen and strategists.³⁷

Though the design and administration of the controls which harness science to the accomplishment of a diversity of governmental goals may pose novel and difficult legal problems, the underlying, distinctive problems caused by confrontations in this arena appear to be problems of communication. Unless the policy-makers and the scientists can be brought to a degree of common understanding, it is likely that purposes will conflict and controls will be either ineffective or entangling.

International Legal Relationships

Scientists, in developing nuclear weapons, appeared for a time to have created a Frankenstein monster and, as fall-out from bomb tests began to build up alarmingly, the demand for restraint grew to a point where it could no longer be ignored. Out of the worldwide pressures for the cessation of tests came the test-ban agreement.³⁸ The risk of militariz-

ing outer space has led to efforts for its demilitarization. Though these efforts will probably have to await terrestrial disarmament for their full realization,³⁹ the principles of governing the peaceful uses of outer space, which were recognized in December 1963 as the basis for further agreements in a unanimous declaration by the First Committee of the United Nations General Assembly, mark a long step forward.⁴⁰ They suggest that, once moon landings become commonplace, we shall find the lunar powers willing to bring that satellite under as peaceful and sensible a regime as Antarctica, an exemplary instance of international cooperation in the pursuit of scientific aims.⁴¹ Still another instance is the global pattern of arrangements devised for the use of Comsat's communication system,⁴² one that may require modification someday if a system centered on the communist states comes into being.⁴³

In this arena, where international rivalries breed tensions, the relations between law and science within any one nation may remain relatively amicable and cooperative, since the scientists and lawyers of each nation are likely to be working together to devise plans to serve their own national interest and the interest of science as they view it. The problems to which each scientific enlargement of man's domain has given rise have called for new legal instrumentalities and new legal relationships to advance and secure the common interests of all the nations. Law and science must confront together these challenging opportunities for creativity.

Though my survey of points at which law and science are in confrontation is incomplete and my examples few, I hope this sampling demonstrates that in the years to come the lawyer and the scientist will have to resolve many problems of concern to both: problems of procedure, old and new; problems of substantive policy; problems of allocating responsibility; problems of communication; and problems of cooperation in the design of new means to serve man's new global needs. With this in prospect, it is high time that we learn to work together, so that we can get on with these jobs.

Law and Research

Supported by Government

ARTHUR W. MURPHY

AT FIRST I visualized my role here as describing the special legal problems posed by government-supported research programs. As I thought more about it, the distinctively legal questions seemed few and not particularly novel. To be sure, the government-sponsored project involves nice questions of contract law, but the legal problems posed are not materially different from those of government procurement generally. Somewhat desperately, therefore, I looked to teachers in the field of Government Contracts, lawyers in agencies involved with science and technology, and lawyers for contractors active in the field. All gave me the same response: lots of policy questions but not really any *legal* problems of consequence.

Needless to say, the line between law and policy is very fine; every legal rule reflects a policy choice. For our purposes, however, the distinction can be made in broad terms as described by Professor Cavers in the previous paper in this volume. Like Professor Cavers, I am concerned with the "system of controls and institutional framework designed to effectuate policy decision once reached" rather than with the policy decisions themselves. As you will see, I have not entirely succeeded in so restricting myself.

We start with the central fact of the explosion of government involvement in research and development¹ activity. The quantitative growth of involvement from the thirty thousand dollars appropriated for Samuel Morse in 1842 to the fifteen billion dollars appropriated in 1964 is staggering. As with other twentieth century phenomena, the rate of growth in recent years is even more staggering. The annual

government expenditures of 1964 (fifteen billion dollars) approach the five-year expenditures of 1950 to 1955 which, in turn, equal the entire research and development expenditure of the previous 150 years of our national existence.²

The change has been qualitative as well. Whereas research and development was a relatively minor factor prior to World War II, the government now spends about sixty-five per cent of the total amount spent in this country for research and development. Significantly, eighty per cent of those expenditures are made through nonfederal institutions, primarily private industry and universities.³

As might be expected, the subject of government research support has been of great interest to the executive and legislative branches. In 1962, at President Kennedy's request, the Bureau of the Budget made an extensive study of the impact of federal research and development activities.⁴ The Senate Committee on Government Operations has held hearings on "Federal Budgeting for Research and Development."⁵ The House of Representatives has appointed a Select Committee on Government Research (the Elliott Committee), which recently submitted an extensive report on its findings and recommendations.⁶ One thing emerges plainly from all this discussion. For the foreseeable future, it is not likely that the present course will change. Not only will government expenditures for research and development continue at a very high level, but the practice of operating mainly through nonfederal agencies will continue. Although need for closer supervision is often expressed, no one has been disposed as yet to change the basic pattern. For example, the Bureau of the Budget's Report to the President expresses at the outset the belief that "the present intermingling of the public and private sectors is in the national interest because it affords the largest opportunity for initiative and the competition of ideas from all elements of the technical community."⁷

The interrelation of science and government is not, of course, due solely to the desirability of "government-private partnership." A certain amount of intermingling would occur in any event. This age is a scientific one, and scientists must have a large voice in the decisions we make. Even if the nonscientist preserves his preeminent position in government, he must rely in large part on the scientific community for

guidance. "In the conditions of our age, or any we can foresee, Renaissance man is not possible."⁸ In any event, the law of supply and demand sets certain physical limits on the way we structure our scientific endeavors. For the foreseeable future the government could not operate on an in-house basis even if it were desirable.

From the scientist's point of view, reliance on the government is mainly due to the fact that research is becoming more and more expensive, as Professor Hoyle has eloquently stated.

The basic facts [on which the quantum theory was based] could be acquired for an expenditure of a few hundred dollars. . . . Today, although conceptually the problem is very similar to old-fashioned spectroscopy, economically it is completely different. To carry out any worthwhile experiment in this field of physics costs millions of dollars, not hundreds. And easily within the foreseeable future the subject will reach the stage when experiments will cost hundreds of millions of dollars.⁹

I do not know if the situation is as bad in other fields, nor can I pass judgment on Professor Hoyle's indictment of "dinosauric bigness" and the associated evils of "big science." One cannot disagree with his conclusion that "some degree of connection between scientist and government is probably necessary."¹⁰ It seems quite clear that scientists will continue to seek money for research and that heavy reliance will be placed on the government as a source.

Much has been said about: 1) the dangers of the "scientific-technological elite" as President Eisenhower forewarned, 2) the dangers to our governmental structure of "contracting out" vital governmental functions to persons not responsible to normal governmental discipline,¹¹ 3) the possible conflicts of interest where scientists attempt to serve two masters, and 4) the impact on our university life of the teacher too much involved in government research to teach. All these are important questions posed by the interrelation of science and government. I will confine my discussion, however, to problems which arise in the contracting process. How can we accommodate the needs of the scientist with the public interest in how its money is spent? How can we satisfy the requirements of accountability without strangling the scientist? Here it might be well to separate research from development. Whether, viewed broadly, it is meaningful to separate the two, we need

not try to answer.¹² In the case of government contracting, the broad categories of “support of basic research” on the one hand and “mission-oriented research” on the other are reasonably discernible. In the remainder of this paper I will be talking for the most part about the basic research programs.

Wide dissatisfaction with the administration of the federal research grant program clearly exists. The dissatisfaction, like the performance, is not uniform; some agencies are better than others. Frustration, however, seems to be the over-all feeling. The most recent evidence on this point is based on answers to a questionnaire sent by the Elliott Committee to some 1400 universities and colleges. The questionnaire invited comment as to each agency involved on various aspects of the grant program: administrative red tape, reporting requirements, budget details and negotiations, length of decision-making, and fairness of the selection process. The responses indicated the following major areas of concern.

- 1 Lack of uniformity or consistency in grant requirements and forms among the departments and agencies which make grants.
- 2 Ambiguity and excessiveness of size of manuals and instructions accompanying grant forms.
- 3 Delays in making decisions.
- 4 Apparent shift away from small grants.
- 5 Multiplicity and frequency of financial reports required and controls exerted.
- 6 Brevity of grant periods.
- 7 Inadequacy of liaison between agency and institution.¹³

The problem of small grants, which seems to be the major area of failure, is summarized by the Elliott Committee:

The recommendations of many universities, both large and small, that *small grants* be reemphasized as a part of the total research and development picture, in some cases was in the form of a fervent plea. One reason for this is that small grants are more likely to be undertaken by smaller institutions and all institutions could more equitably compete for small grants than is now possible with the greater incidence of large research projects. In other words, the small grant might well be one meaningful answer to the persistent complaint of concentration of research and development grants in particular large institutions.

The second reason for reemphasizing small grants is one which would benefit institutions across the board. Even representatives of large institutions have indicated to the committee that they have found themselves in the following peculiar position under the current setup: A capable researcher at a given institution has a project he feels is important, but which will not, in fact, involve a long time period or a great expense. When the university, on his behalf, approaches a Government agency for support of the project, the answer is likely to be that the project is too small to bother with; that if the researcher will expand the project, broaden its scope to include additional items, extend the time limit, and consequently increase the overall amount necessary to complete the project, then the agency might have time to give consideration to it. Or the agency might tell the institution, "Don't bother us about such small items; come to us when you need big money for something."¹⁴

If the Elliott Committee is correct in its assertion that, "stripped to its essentials, the research grant is in reality a means of supporting a man in his work,"¹⁵ the failure in the area of small grants is a serious flaw in the program.

No doubt a part of the criticism is ritualistic. We all long for the good old days—even if they never existed. It certainly seems, however, that the criticism, in large part, stems from the failure of scientists to appreciate the problems of the administrator and his lawyer. Granted that it is difficult for the scientist to define precisely the results he hopes to achieve (the requirement of specificity is in a sense inconsistent with the concept of basic research), the need of the administrator for as complete and accurate a description as possible is real and must be accommodated. Although it is undoubtedly true that the scientific merit of the proposal is dependent upon the activities of the proposer, it would be intolerable to have a system in which the name of the proposer was all that mattered. Some small colleges, indeed, feel that the system discriminates unfairly in favor of large schools, and at least one suggestion was made to the Elliott Committee for anonymous evaluation based only on the job description. The suggestion was rejected.¹⁶

On the most elementary level the government administrator needs an adequate "record" because his decision will be subject to review by his boss, by review boards, and perhaps ultimately by Congress. If the review process is not to be repeated *de novo*, this record must be reasonably complete. Moreover, the administrator must protect himself and

his superiors against hostile reviewers. The problem, however, goes even further than that.

This is perhaps a good time to raise a point of fundamental misunderstanding by scientists and others concerning the work of the legal system. Lawyers are, of course, interested in whether matters are handled fairly, and our legal devices are framed to achieve fair results. Our concern, however, does not end there. We are also interested in how things appear. This concern with the appearance of regularity, important throughout the government contracting process, is most important in connection with the much discussed problem of conflict of interests. I am skeptical of the idea that a person who has an involved interest is *likely* to be impartial, although I believe such impartiality is possible. I fully realize that in many cases a “better” decision can be reached by an informed person with such an involvement than by an uninformed, uninvolved judge. Granting that is not to concede the argument. In the long run, we are concerned with more than the individual decision. We are concerned with the integrity of the process itself, and unless a proceeding has the appearance of fairness, it may be impossible to preserve its integrity.

I do not mean to suggest that the stated criticisms of the contracting program are without foundation. In their approach to the problem of framing a proposal for a grant, too many lawyers (and nonlawyer administrators) seem to believe that in specificity there is security. The notion (perhaps best exemplified in the Internal Revenue Code of 1954) that elaboration brings clarification and certainty¹⁷ has many adherents among government contractors. Many, undoubtedly, carry it to extreme lengths. I am told—whether the tale is apocryphal or not I do not know—that in the case of one agency some applicants do the research first and make the application later. Knowing what he has found, the applicant is able to satisfy the contracting officer’s craving for specificity.

Simplicity is probably unattainable in the research and development program, but much can be done to remedy the existing situation. It would be possible, for example, to reemphasize the distinction between *grant* and *contract*. Public Law 85-934¹⁸ declares that in cases where it is the “desire of the government to stimulate and support

fundamental research in a given field,” use of the grant form of support has the advantages of “avoiding detailed contract regulations—vouchering of expenses—progress reports and proof of work—which exercise a deadening effect on the initiative of the scientist.”¹⁹ For a variety of reasons, the sharp distinction between the grant form of support and contract form of support has not been preserved as a working principle of administration. The Elliott Committee found that the distinction had “ceased to have any meaningful application,”²⁰ and, indeed, that the advantages of the grant form of research support “have been drowned in a morass of administrative detail.”²¹ It may be that the distinction could never have been as sharp as hoped for, but there is certainly no need for the basic research contract to be made the same as the procurement of hardware contract.

Another step might be very useful. To a considerable extent, the problem of specificity (like other problems of administration) increases, probably geometrically, with the number of levels of review. One suggestion to, though not by, the Elliott Committee was that grants up to \$2000 be awarded at the discretion of a single official. This suggestion, although probably too modest, has considerable merit. Should not a streamlined procedure for the grant and the follow-up be possible for larger amounts, \$10,000 or \$25,000 for example? Finality of decision would be vested in one official with review sharply limited to cases of abuse of discretion. Such a procedure might have incidental benefits, such as making possible larger research participation by small colleges and universities, and, since it would reduce the number of occasions for review, it might reduce the incidence of conflict of interest where outside panels sit in judgment on research proposals.²²

Improvement is all that we can hope for. To paraphrase Dean Price, we cannot “get back into the garden of Eden.”²³ Where large sums of money are involved, red tape will flourish. Indeed, it may be that in some instances we need more rather than less formality. As equipment becomes more expensive, as research budgets are—as they will be—subjected to greater scrutiny, and as a larger portion of our national budget goes to science, it seems that we should regularize the process. I do not mean to discuss the staffing of the Executive or the Congress for decision-making. I do, however, suggest that, at least for

decisions involving large expenditures, we might resort to some of the techniques of our legal process, particularly our system of adversary presentation.²⁴

I realize that the concept of the adversary system is not one to warm the hearts of the scientific community. Scientists tend to associate the adversary system with the cross-examination of physicians in personal injury actions—as Professor Cavers mentioned in the preceding paper. I would not for a moment urge that the rigid procedures of a tort suit be introduced in determining the kinds of questions we have been discussing here. But, as Professor Lon Fuller has noted, a broader concept of the adversary system is applicable “by way of analogy and with many qualifications,”²⁵ to decisions outside the courtroom.

An effective consensus cannot be reached unless each party understands fully the position of the others. This understanding cannot be obtained unless each party is permitted to state fully what its own interest is and to urge with partisan zeal the vital importance of that interest to the enterprise as a whole. At the same time, since an effective consensus requires an understanding and willing cooperation of all concerned, no party should so abandon himself in advocacy that he loses the power to comprehend sympathetically the views of those different interests. What is required here is a spirit that can be called that of tolerant partisanship. This implies not only tolerance for opposing viewpoints, but tolerance for a partisan presentation of those viewpoints, since without that presentation they may easily be lost from sight.²⁶

At the least this would seem to require that those who make the decision are exposed to partisan presentation rather than “agreed recommendation”²⁷ and that the exponents of each point of view are present “at the same time with the right to be heard and the right to hear one another.”²⁸

In closing, I shall refer once more to the “intermingling of the public and private sector” in government-supported research. As noted in the Bureau of the Budget Report,

A number of profound questions affecting the structure of our society are raised by our inability to apply the classical distinctions between what is public and what is private. For example, should a corporation created to provide services to Government and receiving 100 percent of its financial support from Government be considered a ‘public’ or a ‘private’ agency? In what

sense is a business corporation doing nearly 100 percent of its business with the Government engaged in 'free enterprise'?"²⁹

Usually we think of these problems in terms of the increased responsibility to the public that the private sector has to bear because of the "public" character of its work. But just as the private sector must recognize its public responsibilities, the government must accept the consequences of carrying on governmental activity through private actors. One example of the failure of the government to accept these consequences is the indemnification of government contractors against risk of liability for catastrophic accidents. Although the inadequacy of existing programs to cope with the accident potentiality of modern technology has been recognized for years, no program of indemnification has as yet been adopted, except in the case of nuclear activities.³⁰ Even there, contractors were covered largely as a by-product of efforts to encourage private participation in the nuclear power program. To be sure, this question chiefly concerns industrial companies developing hardware, but there are occasions when the indemnification question involves basic research—weather modification activities, for example. Although there are many reasons for the reluctance of administrators to propose, and Congress to enact, adequate programs of indemnifications, it seems clear that a substantial contributing factor is the traditional view that indemnification is a "subsidy" to the private contractor, and therefore a proper subject for bargaining.³¹

In the last analysis, as Professor Cavers has said in the previous paper, "the underlying, distinctive problems caused by confrontations in this arena appear to be problems of communication. Unless the policy-makers and the scientists can be brought to a degree of common understanding, it is likely that purposes will conflict and controls will be either ineffective or entangling." The important problem of "communication" in relation to governmental support of research does not involve information as much as it involves an inability or unwillingness to understand the needs of the other party. If the scientist will realize that some bureaucracy must accompany the use of any federal funds, and if the administrator will keep in mind the objectives of governmental support of research, a good start will have been made toward bridging the communication gap.

Federal Tax Policy and the Support of Science

BERNARD WOLFMAN

FEDERAL TAX POLICY AND THE SUPPORT OF SCIENCE poses for me a basic issue which may not appear to be central to those whose orientation differs from mine. To some, the subject may call for inquiry into how far our federal tax laws encourage scientific endeavor. Others may see in it the question of whether our federal tax laws impede scientific activity and, if so, how the impediments may be removed. Still others may interpret it in terms of whether our tax policy-makers have given insufficient recognition to the advancement of science as a national goal. The premise underlying the interpretation of this issue is that science, given its proper recognition, will command the increased interest and support from tax policy-makers which it deserves.¹

I can understand these approaches and others like them, but they are not mine. As I view it, the problem is one of inquiry directed to delineation and exposure of the circumstances that might call for a special relationship between federal tax law and science. This focus does not encompass the broader, different question of the extent to which the federal government should support science. It involves instead the suitability of the tax system as a vehicle to provide the support. It requires a determination of the conditions that may justify the use of federal tax law to stimulate or reward scientific pursuit and achievement.²

The fact is, of course, that the federal tax system has been used for years as a way of providing financial support for science. In many respects tax support of science resembles a direct federal expenditure; in many respects, it differs. Like a subsidy, tax relief shifts the financial

burden from the recipient of the benefit to the rest of the population. The tax vehicle does not lead to a new source of funds; it does not move from a limited to an unlimited source of funds for ventures which the federal government seeks to support. The pie (to change the metaphor) is essentially the same; tax relief is a different, sometimes preferable, usually duller, knife with which to slice it.

A federal expenditure rarely takes the form of a *carte blanche*, for its purposes are specified. Before disbursements are made, administrators must be reasonably satisfied within guidelines laid down by Congress that the beneficiaries of a grant, subsidy, or contract will use the appropriated money for the purposes specified. Recipients may be required to report to federal agencies on their progress and ultimate results, and funds may be made available only in installments, as work progresses, and as reports are received and reviewed. More often than not, right or wrong, Congress directs federal expenditure to particular objectives only when it believes the probability of attainment is more than just speculative. In contrast, the specific objectives for which tax relief is granted are left largely to private individuals to fashion and seek. Moreover, tax relief allows substantial opportunity for diversity, experimentation, and either speedy or deliberative action, with federal direction or supervision virtually nonexistent.

The issue then is the choice, or criteria for the choice, between two approaches for securing the federal government's financial support for science—expenditure versus tax relief. The choice may not always have to be one or the other, but it must at least be how much of one and how much of the other.

The Concept of a Tax “Preference”

Last year Congress budgeted fifteen billion dollars for expenditures in support of scientific activity.³ The techniques of expenditure—grants, subsidies, contracts, and loans—are well known. The preferential tax provisions that provide support for science are less familiar. I will therefore review several of these provisions as a basis for comparison and to help identify guidelines that are relevant to the choice be-

tween expenditure and tax relief. But first I want to explain my understanding of a "preferential" or "special relief" provision.

Reference to a tax provision as "preferential" or "special" does not connote opposition to the social or economic objective which Congress supports through the tax law. It does mean that the provision deviates from a norm. Implicit in the reference is the idea that the income tax has an essential integrity; that there is a fundamental standard for determining the tax base and the applicable rates; that maintenance of the standard (restoration where it has been eroded) is important to society and high on its scale of values; that the proponent of a measure which deviates—which creates a preference—has a burden of proof which goes as much to the use of the tax system as the means of accomplishment as it does to the measure's specific social or economic objective.⁴

Let me illustrate with examples from the income tax of provisions which I classify as "preferential," although they may support objectives (in science and elsewhere) for which there is a broad consensus: Education is good; the law exempts scholarships and fellowships from tax.⁵ Financial support of state and local governments is good; Congress has exempted the interest on their bonds from the federal income tax.⁶ The erosion of land used in farming is bad; Congress allows income tax deductions for expenditures designed to prevent erosion.⁷ Investment is good; gains from the sale of many investments (so called long term capital gains) are taxed at rates lower than those applicable to income from personal services.⁸ Individuals with inventive genius are valuable national assets; profits which they reap from the sale of their patents are taxed only at the reduced rates applicable to long term capital gains.⁹ Scientific achievement is desirable; certain prizes and awards given in recognition are tax exempt.¹⁰

The merit of each of those provisions is debatable. But wise or unwise, each represents a departure from standard. The standard, though eroded, is still visible in the maze we call the Internal Revenue Code. From the beginning, the income tax has been aimed primarily at net income—the amount left after the taxpayer deducts the sums which he has expended in the pursuit of his business activities from the money

he takes in. It is true that “gross income” and the deductions attributable to the expenses of earning it are unrefined at the fringes. Some receipts (like gifts) and economic benefits (like the imputed income from home ownership) have been excluded from the tax base. Controversy continues as to the deductibility of expenses which have a business nexus (like those for travel and entertainment) but smack heavily of consumption. Nevertheless, the standard of net income has persisted.

The rates which apply ordinarily in determining a taxpayer’s income tax liability are taken from a scale which, in the case of an individual taxpayer, is graduated according to the amount of his taxable income, with the rates progressing to higher levels as that income increases.

The concept of “special relief” or “preference” means to me a deviation from a relatively neutral net income base, or the application of rates which are tailored according to the source from which income is derived or the purpose for which it is spent. This does not imply disagreement with the social or economic objectives of the preference nor does it imply obstinate, inflexible insistence that the objectives should not be sought through the taxing mechanism. It does mean that there is a departure from standard.

Tax Preferences Favoring Science

My ultimate inquiry concerns the conditions which warrant departure from standard in support of science. To this end let us now turn to some of the preferences in the federal income tax which favor science either by deviating from a net income base with special exclusions and deductions or by providing reduced rates or even total exemption.

DEDUCTION FOR CONTRIBUTIONS

To some extent individuals have been allowed deductions for “charitable contributions” since 1917; corporations have been permitted the deduction since 1936.¹¹ This deduction provides a tax benefit for those who choose to spend a portion of their disposable income for charitable purposes. Scientific organizations, as well as charitable and education-

al organizations, are among the familiar groups to which such deductible "charitable contributions" may be made.¹² All these organizations must be "nonprofit" in the sense that their earnings must not inure to any person in a proprietary sense,¹³ but neither the statute nor the Treasury Regulations define the term "scientific." The Regulations encompass any organization whose activities are "carried on in furtherance of a 'scientific' purpose" and expressly reject any distinction between an organization whose research is "applied" or "practical" as opposed to "fundamental" or "basic."¹⁴ The Regulations require only that the activities be "in the public interest," and not "of a type ordinarily carried on as an incident to commercial or industrial operations. . . ."¹⁵

Although the Treasury Regulations show virtually no interest in an organization's program content, they do delineate activities which are not considered to be "in the public interest."¹⁶ Familiar with the ingenuity employed by taxpayers in their efforts to qualify for the grace of a tax-sheltering provision, the Treasury has attempted to build a defense perimeter against expected claims for "scientific" classification brought by organizations which, though engaged in research activities, may exist more to serve commercial or private interest than the so called public interest. Recently the Internal Revenue Service reviewed the case of a nonprofit organization engaged in research which was directed toward the development of labor-saving equipment in the field of agriculture. Finding that the commercial interests being served were paramount, the Service ruled that the organization did not qualify as a "scientific" organization.¹⁷ This, not worthiness of project, is the kind of issue which the tax statute and Regulations require Internal Revenue Service personnel and ultimately the courts to resolve.

The deduction for contributions to scientific organizations has the effect of reducing a taxpayer's taxable base by the amount of his contribution. Taxpayers benefit in direct proportion to the marginal rate of tax applicable to their highest income bracket. In other words, a taxpayer with at least one hundred dollars of income otherwise taxable at the seventy per cent rate will pay only thirty dollars of his "own" money by making a one hundred dollar contribution. The taxpayer

whose marginal rate is only twenty-five per cent must pay seventy-five dollars of his "own" money to make an identical contribution. Despite the federal government's financial contribution, the use of funds is limited to a federal scrutiny no more pointed than that suggested by the Regulations' attempt to draw a perimeter around the term "scientific." It is the individual contributor and the managers of the organization to which he makes his contribution who determine the particular objectives to which his funds are devoted.

The deduction for contributions is perhaps the most significant of the preferential provisions benefiting science. Its principal advantage is in providing a subsidy free of governmental red tape and restraint. Its chief disadvantages lie in the unevenness and relative arbitrariness of the subsidy and in the fact that the amount of the subsidy is greater for the high income taxpayer than for the low. Affluence more than interest, ingenuity, or worthiness determines the extent of federal support.

THE TAX EXEMPTION OF SCIENTIFIC ORGANIZATIONS

The income of scientific organizations to which deductible contributions may be made is exempt from federal income tax.¹⁸ Thus, one hundred per cent of the income of such scientific organizations may be available for use in their scientific endeavors. This tax exemption is, however, somewhat circumscribed. In 1950 it was made inapplicable to the income which an organization derives from "unrelated" business activity.¹⁹ Since the primary purpose of this 1950 amendment was to mitigate the advantage a nonprofit organization has when it competes with taxable business enterprises, Congress had to determine whether a scientific organization's profits from contract research should be treated as income from "unrelated" business. It made its determination by drawing distinctions which, in one instance, depend on the source of the organization's research income; in another, on the nature of the organization performing the research; and, in a third, on the nature of the research conducted.

All the contract research profits of an exempt scientific organization remain free of tax if the research is undertaken for government or an agency of government.²⁰ The contract research profits of a college, university, or hospital are exempt, irrespective of the source of the in-

come.²¹ The research profits of all other scientific organizations which are not derived from a governmental source are taxable unless, according to the statute, the research is “fundamental” and “the results . . . are freely available to the general public. . . .”²² In their meager effort to define “fundamental” research, the Treasury Regulations explain only that it is to be distinguished from “applied” research, and that it excludes “research carried on for the primary purpose of commercial or industrial application.”²³

What might the justification be for distinctions like these? Do they reflect a congressional judgment that “fundamental” research is to receive special encouragement? If so, why is this distinction eliminated in the case of a university? And why in the case of all scientific organizations is the distinction eliminated if the research contract is let by a government agency?²⁴

Without great difficulty one can rationalize these distinctions.²⁵ Once in a tax statute, however, they tend toward permanence. Their rationalization, whatever it may be, may not answer the question of whether such distinctions, reflected in a congressional judgment made in 1950, have continuing validity in 1965. As the distinctions age, they become encrusted, not with new data from the scientific community, but with the interpretive rulings and decisions of the accountants, lawyers, and judges who, in an adversary context, must administer the statute.

SCHOLARSHIP AND FELLOWSHIP GRANTS

The Internal Revenue Code provides in some detail for the exclusion from an individual's income of certain scholarship and fellowship grants.²⁶ These are by no means limited to those for scientific studies, but such studies are clearly within the ambit of coverage. In the case of a student working towards an academic degree, the excludable amount is unlimited; in other cases it is limited. In no case, however, is the exclusion restricted to those pursuing particular courses of study, nor is there a limitation based on the size of the recipient's income from other sources.

Should all scholarships and fellowships, like all “gifts,”²⁷ be excluded? Should none be excluded on the ground that the financial

benefit of the exclusion is not directed and limited to those who need it, or to those educating themselves in specified fields such as science? Should qualification for financial aid to education—scientific or other—be determined by the Internal Revenue Service and the courts, as with all the other special tax relief provisions, or should the aid consist only of subsidies administered by an agency like the Office of Education or the National Science Foundation?²⁸ Internal Revenue Service administration has required decisions in a growing number of cases to determine not whether aid is needed or the pursuit worthwhile but whether a so called “fellow” engaged in research activity is in effect just working at a job, and should therefore be taxed on his earnings despite their camouflage under a “fellowship” label.²⁹

RESEARCH AND EXPERIMENTAL EXPENDITURES

Ordinarily, the businessman must compute his taxable income without a deduction for his capital expenditures.³⁰ Those expenditures reduce taxable income through annual depreciation or amortization charges which are deductible over the productive life of the assets which they have purchased.³¹ In some cases, however, the cost of capital expenditures (like those for goodwill) is recoverable only when the acquired asset or the business of which it is a component is sold.³²

The businessman with a laboratory, however, is one with a preference. He is of course entitled to the accelerated depreciation³³ and investment credit³⁴ made generally available in recent years to taxpayers. In addition, however, he has been given the privilege of treating his intangible research and experimental costs, regarded traditionally in many cases as nondepreciable capital expenditures, as either current operating expenses, deductible when incurred, or as capital items to be written off over a five year period.³⁵

The statute provides this departure from standard in the case of “research” and “experimental” costs without defining them. The Treasury Regulations have attempted to limit the preference to “research and development costs in the experimental or laboratory sense,” excluding explicit research expenses incurred in connection with “literary” and “historical” projects.³⁶ Thus, several judgments have been

made: Congress has decided that research and experiment are to be encouraged or rewarded, and that granting tax deductions not available to businessmen who spend money in other ways to reap their profits is the way to do it. The Treasury Department, on its own, has decided that the term "research" includes inquiry into new scientific developments, but does not include research into scientific history.

The tax lawyer understandably questions the authority of the Treasury to distinguish laboratory from book research; he and others may doubt the wisdom of the distinction. One might also question the congressional judgment that provides relatively permanent support for laboratory research that includes development of a more exotic lipstick, a frothier beer, or a less frothy detergent, but continues to deny any deduction, by way of amortization or otherwise, for the purchase price paid, for example, by an expanding concern in the space science industry for the goodwill of a successful company engaged in electrical systems research and production.

A deduction serves only to reduce income that is subject to tax. The communications firm which is operating at a loss even without a write-off for laboratory research costs receives no current financial benefit from the special deduction. If the congressional purpose is to aid scientific development, and if the work of this firm would make a scientific contribution, it may be just the kind of firm that should be receiving aid. The tax preference, in such a case at least, fails to achieve its goal.

If the object is to encourage needed scientific development, the laboratory research write-off raises the question of whether this kind of special tax relief can come as close to doing the job as federal expenditure. If the object of the write-off is not to benefit science as such, but rather to provide a fast recovery for the cost of intangible assets, then the limitation to research and experimental expenditures is arbitrary. The general rule which defers the recovery of many intangible capital costs until a business is sold undoubtedly requires reexamination. Relaxation or reversal of the rule only in special cases, such as those involving laboratory expenditures, serves to cloud the fundamental issue of tax equity and to relieve the pressures that would help create the interest necessary to effect broadly based study and change.

PATENTS AND COPYRIGHTS

The statutory write-off for research and experimental costs benefits only the successful commercial enterprise. Particularly in light of the exclusion of historical and literary research, the professor and research scholar working outside the laboratory are beyond its pale.³⁷ The individual who invents, however, is given a very different, favored treatment.

Ordinarily, individuals are taxed on income from their personal service and business activity at rates ranging from fourteen to seventy per cent.³⁸ Special rates, with a maximum of twenty-five per cent, are applicable to the gains realized from the sale of investments held for more than six months.³⁹ The preferential rate applicable to these capital gains is rationalized usually as a device which is necessary to encourage investment or to alleviate the impact of graduated rates on asset appreciation that may have accrued over a long period of time.

In recent years, Congress has expanded the classification of assets that qualify for the preferential capital gains tax rate. In 1954 it utilized the capital gains approach to extend its bounty to inventors. When his genius has been sufficient to justify the issuance of a patent, the royalty-type income which an inventor realizes on exploitation of the patent is now taxable at the lower capital gains rates.⁴⁰ To the extent of the federal revenues lost in the rate differential, inventors—scientists—have benefited. The questions that are raised are obvious. Do people need this encouragement to produce a valuable, patentable invention? Even if they do not, should they be rewarded in this special way if they do produce one? If encouragement and reward are desirable, why is a special tax rate preferable to direct federal grants?

The creative individual whose talents produce a copyright is afforded tax treatment polar to that of the inventor. Concerned that the term "capital asset" might, even without special legislation, be construed to permit an author to secure the benefit of capital gains on the sale of his copyright, Congress has amended the law to deny explicitly capital gains treatment in such a case.⁴¹ This distinction between the patent and copyright holder is not without analogue in the Treasury's distinction between research in the laboratory and research of an historical or literary nature.⁴²

Even if there is justification for a federal allocation of funds to the financially successful inventor (a proposition universally denying such justification may not be self-evident), I have difficulty understanding what might justify using capital gains taxation to achieve this objective. Its use creates the appearance of arbitrary preference, and it may be just that.

Striking a Balance

My sampling of the tax provisions which favor science is not exhaustive. I hope, however, that it will suffice as a backdrop against which to examine criteria which may help make the choice between federal expenditure and tax relief less haphazard.

In every case which calls for federal aid to science, I suggest that the choice of vehicle should be made only after Congress recognizes and seeks to accommodate the demands of at least three interests which may be in tension: 1) society's stake in an income tax system with an essential integrity; 2) society's stake in preserving substantial areas of activity in which private initiative and management are given relatively free reign; and 3) society's stake in having federally allocated funds reach their objectives as directly and inexpensively as possible. Let us look at these sometimes competing, sometimes complementary interests, and then see if it is possible to strike a workable balance.

THE THREE INTERESTS

1. *The Integrity of the Tax System.* An income tax system with an essential integrity is one which is geared as closely as practicable to the determination of economic net income, with rates applicable to that income without regard to its source. Such a system treats taxpayers with equal income equally. It leaves to the forces of the market the allocation of resources. When the market place does not operate as desired, the system leaves to democratically elected representatives the reallocation to be made. Reallocation for welfare, to encourage scientific development, to provide incentive, to serve as a reward, would be channeled through appropriations. The reallocation that preferential tax rates, exemptions, and deductions create is eschewed because it is less directed, more likely to be arbitrary, and less susceptible to meas-

ure and change. Concern for preservation of the tax system's integrity suggests recognition of the fact that reallocation of resources through tax preference creates a sense of privilege for some, undue burden for others. The sense of fairness and equity that is implicit in a simple tax system with an integrity of its own is diminished with each preference granted. A tax system with integrity is less costly to operate, for it needs fewer administrators in government and fewer tax planners outside.

2. *Freedom and Encouragement for Private Action.* Ours is a society which values highly, even depends upon, private initiative and follow-through. We seek free competition in ideas as in prices. Maximum freedom and privacy for the individual, a minimum of governmental restraint, direction, and scrutiny—these are the ideals. The collective goals of society should be achieved with a minimum interference with these ideals and, to some extent, can be achieved only by fostering them.

3. *Care and Efficiency in the Use of Federally Allocated Funds.* When government makes an allocation of funds, its citizens are entitled to know the amount of the allocation, why it has been made, and that those who authorize the allocation are satisfied that it is reasonable in view of the probabilities that it will achieve its goal. They are entitled to a minimum of waste and the optimum in expert direction in the deployment of the allocated funds. As Professor Murphy has said in the preceding discussion a system for federal allocation of funds to the proponent of a research project is “intolerable . . . [if] the name of the proposer is all that matters.”

SYNTHESIS AND COMPROMISE

The fact is, of course, that the integrity of our income tax has never been complete. Its history in Congress has been one of repeated impairment. The oil, gas, and mineral interests and the investors in real estate and securities have been the principal beneficiaries of these impairments. It is therefore not surprising that those in science and other less favored areas have sought their own preferences. They may have come to see the income tax as a grab bag of favors, available to the group with the most effective lobbyist. The tax route is preferred in no

small part by many of its beneficiaries because it is less open, not carefully measured, not reflected in the federal budget, and not subject to periodic congressional review. Some beneficiaries of tax preference do not accept the preference concept. They view themselves merely as retaining what is theirs, and they therefore perceive no inconsistency in declaiming publicly against federal handouts and subsidies.

The advantages which the tax system has over a system of grants and subsidies lie chiefly in its freedom from government restraint and interference. Programs need not be approved before a deduction for a contribution is allowed. The opportunity for diversity and experimentation left open when the charitable deduction and other tax routes are used to provide federal support is just not feasible when federal expenditure is employed. Unfortunately, however, the subsidy in tax relief is obscured and tends toward permanence. The scientific beneficiary enjoys obscurity just as the oil man enjoys the lack of light on the national cost attendant upon his 27½ per cent depletion allowance.

The waste and inefficiency that result from the use of the tax system to provide subsidies are great. Although this method avoids a bureaucracy of federal experts to approve and supervise expenditures, it substitutes tax administrators, tax planners, and a tradition of protracted administrative controversy and litigation. Funds allocated by the tax route may, and often do, go to projects with little merit, at least by comparison with some projects whose claims to funds have succeeded in competition for direct grants. A "proposer" need not furnish the federal government with even his name to receive funds which the tax system allocates. In this respect, we use a system which, by Professor Murphy's standard, is less acceptable than the one he suggests is "intolerable."

When should society bear the cost and waste—the sense of unfairness and discrimination—that attend tax preferences? Only, I suggest, when private decision-making, free of government interference, is most compelling. Church support provides the obvious example. If federally allocated funds are to aid religion at all, the exemption of church income and the charitable deduction are much less likely to interfere with free religious exercise or tend toward an "establishment" than is federal appropriation.

Areas of activity in which we regard initiative, diversity, competition in ideas, and experimentation as important, also lay cogent claim to the tax system as a vehicle for channeling needed funds. The privately supported universities and colleges and many foundations and scientific organizations provide a vital contribution to the welfare and future progress of our society. If all the funds allocated to them through the tax system were reallocated by congressional appropriation, society would probably be a net loser.

Thus a dual system—government expenditure and private contributions stimulated by tax preference—provides a balance, not a perfect one, but one which yields security and direction on the expenditure side, while leaving room for flair, style, and creativity on the other.⁴³ I would doubt, however, that there is any value to expanding the charitable deduction for science beyond the existing thirty per cent of “adjusted gross income” limitation.⁴⁴ If nonprofit science is to receive more than the billions it receives by appropriation and the unmeasured sums it receives under existing tax preferences, I think it wise to subject the additional allocations to the controls which accompany federal expenditure.

Special benefits for science in the businessman’s area should be re-examined. The tax system should treat one businessman seeking a profit as much like the next as possible. Accelerated depreciation, investment credits, current write-offs, if they are appropriate to growth in the economy or to a sense of tax equity, should be available across the board.⁴⁵ If a private business is to receive federal support because of the particular activity in which it is engaged, this support should be justified in individual cases in the open, and the subsidy should be subject to all the controls which are appropriate to a federal expenditure. Private business is entitled to a market reasonably free of “unfair” competition, however, and to this end the provisions which permit some contract research income to go untaxed in the hands of some nonprofit organizations should be reevaluated.⁴⁶

Tax favoritism for the successful inventor has not been justified. If he is to seek reward beyond that which the patent monopoly and his achievements in the market place afford him, he should be made to fight his case in the subsidy arena. If the image of the successful inven-

tor pleading in public for a subsidy appears ludicrous, it may suggest that his case for tax relief needs similar exposure.

Scholarships and fellowships present a more difficult problem. If all such grants were based solely on the recipient's financial need, and if he had no other income of any significance, exemption of the award would be a sensible, efficient way to provide a measure of federal aid to education. In fact, however, many fellowships are granted without regard to need. They frequently substitute nominally for salaries which technical personnel and professors would be earning otherwise.⁴⁷

The unevenness of the benefit which fellowship exclusion provides, the litigation which it fosters, and the waste and inequity involved when the recipient does not need the support, all suggest that the exclusion be restricted. Grants to persons working toward an academic degree, at least a first degree, are likely to be awarded on the basis of need. Their exclusion from income might well be continued. All other fellowship awards should be included in the income base, with appropriate federal aid supplied by subsidy or loan.

Finally, the darkness should be lifted. The considerations which permit our sacrificing some of the integrity of the tax system for the values of private initiative and freedom do not also require that we be kept in ignorance. The sums federally allocated by tax preferences and special relief provisions should be reflected in the federal budget and accounts. This will provide a measure of efficiency even as we stimulate free private choice. And when new benefits are sought—percentage depletion for the inventor, an increase in the allowable deduction for scientific contributions, low rates for the space science company, or deductions to a parent for his child's medical school tuition—we will be able to ask the estimated cost, appraise it in context with the total federal allocations for science, and expect periodic verification and review.⁴⁸

Project Research and the Universities

JOE H. MUNSTER, JR., and
JUSTIN C. SMITH

ON FRIDAY 16 MARCH 1965 the following appeared on the first page of the *Wall Street Journal*. "Think factory business booms. Three universities dot the Pentagon's new list of top defense contractors. MIT places 43d, ahead of such manufacturers as DuPont, Good-year, Republic Aviation. Johns Hopkins, Stanford also rank high."

It is apparent that universities have moved into the field formerly occupied exclusively by commercial scientific endeavor. With the entry of university or other nonprofit research into this area, we have a series of entirely new problems. The treatment here must necessarily be broad brush. Our discussion, therefore, will be restricted to four problem areas: 1) solicitation of research support; 2) recruitment and retention of research personnel; 3) mobility of investigators; and 4) development and exploitation of the research end product.

Solicitation of Research Support

During the next fiscal year more than fifteen billion dollars will be spent on research and development, primarily by the federal government. The vast federal sums involved do not represent a national commitment to science as such. The expenditure is mission-oriented. In other words, the government is interested in purchasing services and prototypes—*applied* research as opposed to *basic* research. Less than twenty per cent of this sum will find its way into basic research and only half of this will find its way into the universities.

Under our system of research procurement, solicitation of support by both nonprofit entities and commercial entities consists either in answering an advertisement or in convincing the sponsor of the need for a particular investigation. The fact that both higher education and nonprofit research laboratories have sought to alter their traditional roles without becoming politically active is the most overlooked development in scientific management during the past two decades. Thus, instead of asking legislatures for appropriations commensurate with their needs, such institutions are selling a service to the government for a price. The end result may be the same but the impact is different.¹

The very essence of our system of support for science is the purchase of effort for a particular purpose, whereas in other countries the support of scientific inquiry is considered part and parcel of general support for higher education as a whole. In America a general grant is still mission-oriented, even when used for the training of personnel in specific areas of concern to the sponsor. In Europe the support of research in institutions of higher learning is considered analogous to the support of ordinary municipal services. For example, the German Federal Republic has embarked on a system of general support for higher education which is operated through the German Research Association; the British have a comparable arrangement operated through the University Grants Committee. Our system is by no means ideal.² Solicitation of research support by institutions of higher learning in America consists of an attempt to sell a product or a service even though the product or service is not that for which the institution is primarily created. It follows that the guideline available to college administrators is that of procurement law³ rather than the law of higher education.

Commercial research organizations have been involved for generations in selling a product and are equipped in terms of accounting and legal counsel to handle the varying problems which arise in the operation of their business. Most educational institutions and nonprofit research laboratories, while technically able to handle the work involved, are ill equipped to deal effectively with either accounting or legal problems.⁴

Notwithstanding this inability and possibly unaware of the pitfalls,

many institutions of higher learning have entered into the sponsored research field to such an extent that they receive directly or indirectly from one-third to one-half of their annual budgets in this way. It has been suggested that nonprofit institutions, by such solicitation of support, have become testing laboratories where graduates pay for the privilege of working—a sort of institutionalized fence painting reminiscent of Tom Sawyer.⁵ In some cases, both the state and alumni have put pressure on their institution to create research parks on university property. Such an institution, by setting up a market for its own research facilities and personnel, is in effect selling a piece of its faculty, facilities, and student body. From an educational standpoint the feasibility of such efforts is open to serious question.

Nonprofit institutions of all categories have traditionally been accorded tax exempt status. Specifically, educational and scientific organizations are exempt from federal income taxes when no part of the net earnings of the entity inure to the benefit of any private shareholder or individual. The basis for this exemption is that such organizations serve the public interest. The present tax laws provide safeguards to prevent an exempt organization from straying into fields inconsistent with its charitable, educational, or scientific purposes. These laws impose a tax on any income derived from regularly operated trade or business that is substantially unrelated to the organization's exempt purposes. It is entirely possible that existing tax exempt entities engaged in research may become so heavily involved in such trade or business, compared with their "educational" status, that the exemption may be lost, or claim made that the institution is now "scientific" rather than "educational."⁶

In soliciting a particular research assignment, a commercial entity is primarily concerned with its own competence to carry out the assignment and with realizing a fair return on its investment. A college or a university uses entirely different criteria. One institution will accept an assignment only if it will ultimately result in Ph.D. dissertations; another will consider proposals only when the project can be described as "pure research." In practice, both institutions appear to be referring to precisely the same thing. Still others regard research assignments supported from outside funds as proper only when the assignment will

afford a means of subsidizing the faculty—a sophisticated sort of moonlighting.

Until twenty years ago, educational institutions of a nonprofit character dealt exclusively in the training of young people. Their accountability to students, i.e. their customers, was severely restricted by judicial opinions. In one such case, a student, not graduated because of poor scholastic standing, had failed to pay his tuition. When he was sued by the institution for the tuition, he counterclaimed on the ground that the university “does not teach wisdom as it claims to do.” The Dean of the college submitted an affidavit in defense to the counterclaim which was quoted by the court:

All that a college can do through its teachers, libraries, laboratories and other facilities is to endeavor to teach the student the known facts, acquaint him with the nature of those matters which are not known, and thereby assist him in developing mentally, morally and physically. Wisdom is a hoped-for end product of education, experience and ability which many seek and many fail to attain.⁷

The court denied the counterclaim with the sardonic remark that “wisdom is not a subject that can be taught.” Many institutions of higher learning fail to realize that their entry into the field of commercial enterprise has placed them in a less privileged category. It is rumored, for example, that one nonprofit research organization has been involved in litigation centering around its failure to make timely delivery in accordance with the terms of a written agreement. Damages were predicated upon disruption of a marketing program which could not proceed until a suitable vehicle was found to render a particular drug soluble and therefore marketable in appropriate form. Here the research institution, like many institutions of higher learning, represented itself as capable of duplicating the type of work usually done internally by the sponsor. While nonprofit institutions in many instances are exempt from tort liability, this exemption should not lull them into a sense of security respecting contract liability. Commercial enterprises are well aware of the danger of representing themselves as able to do something they cannot do; nonprofit research institutions, including universities, have not yet learned this lesson.

Recruitment and Retention of Research Personnel

In medieval times the term “university” did not refer to institutionalized learning. It referred to a group engaged in study of some sort. Initially the university granted no degrees nor did it possess any administrative framework. The first indications of any common purpose are to be found in primitive forms of student government organized to prohibit local burghers from gouging on room and board. Later, the masters sought to control the copying of books and to insure the accuracy of copied works employed by them in their lectures. Masters and students had no allegiance to a particular city and, indeed, often threatened to remove the university from the community whenever town and gown relations degenerated. From these beginnings masters eventually began to identify with their own particular institution. The pendulum, however, is swinging back. With the increased emphasis on research, loyalty to the institution has materially decreased. Loyalty to one’s discipline has replaced identification with the institution. Perhaps this shift of loyalty has in part been engendered by the increasing respectability associated with publication. Nowadays, the scholar publishes in his professional journal, not in the institution’s alumni quarterly.

Some universities have used proximity to lakes and recreational areas as an inducement to faculty. At present, it is not the neighboring lake that is valuable—it is the presence on campus of the “one-of-a-kind” research facility that attracts faculty.

In the days of the medieval university, faculty members were paid by their students and not by the institution. Indeed, the students, often apprehensive lest some able faculty member absent himself indefinitely from the campus, demanded at the beginning of the term that the professor “post bond” to remain until the end of the term. This was an effective deterrent against faculty raiding, and had the salutary effect of giving students the assurance of adequate instruction, at least according to the standards of that time.

The suggestion has been made that we have now come full circle; that today faculty members in selected disciplines may look for their salaries, not to the university, but to federal agencies and sponsors who

are frankly interested in an end product. If we have come full circle, the only thing now lacking is the bond. Even with a bond between the university and the federal agency or sponsor, however, the student would not be assured of contact with today's scholars.

In this setting, solicitation and recruitment of university research personnel is similar to the staffing of any research organization, whether it be profit or nonprofit, scholarly or commercial. The only difference is an artificial personnel classification, the university tenure system. The employment practice of modern business has reduced the significance of this distinction; both in the universities and in commercial ventures, employment classification is based on education and experience.

The adoption by a number of state universities of an insurance and annuity program outside the state teachers' retirement system represents one of the advantages which educational institutions have had over profit-making enterprises. Normally the commercial employee has had no vested interest in his company retirement program. Developments in industry in this respect, however, seem to be paralleling the developments in the education field so that an employee may carry his retirement benefits back and forth from university to industry without loss. There is therefore little distinguishable difference in working for university or industry apart from the prestige of association with an institution of higher learning. Furthermore, while nonprofit entities have enjoyed greater latitude in complying with protective labor legislation, this distinction disappears in the case of federal contracts. These contracts incorporate antidiscrimination clauses, for example, even though they are not specifically mentioned.⁸

Mobility of Investigators

Clark Kerr in his recent book, *The Uses of the University*, described today's universities as academic motels—a temporary stopping-off place for the scholar on the move. The scholar journeys from place to place seeking support—he generates research proposals, consumes funds, and does little or no teaching. Dr. Kerr notes that modern developments in university structure have “given rise . . . to a threefold class structure

of what used to be ‘the faculty’: those who only do research, those who only teach (and they are largely in an auxiliary role), and those who still do some of both.”

The traditional *Lehrfreiheit*—the freedom of the professor to do as he pleases where he pleases—may conflict directly with modern concepts of the ownership of intellectual properties. Whether we like it or not, this *Lehrfreiheit* may rapidly become an extinct concept so far as the supported researcher is concerned.⁹

At the present time, there is no question but that a commercial research entity can inhibit the mobility of its researchers when the use of trade secrets is a material part of their employment, or when they have signed a restrictive covenant in an employment contract. Such covenants, in defining the rights and duties of both parties, help eliminate sources of friction between employee and employer. Whether such clauses would be acceptable in a university community remains to be seen. At the present time, few institutions use such covenants in contracts with their investigators. More and more universities are, however, attempting to define the rights and obligations of their faculty with respect to research grants and outside consulting activity. If the present trend toward a three class faculty continues, it may be to the advantage of the universities to consider inclusion of restrictive covenants in the employment contracts of certain classes of their faculty.

Why should colleges and universities seek such protection? Today, sponsors of supported research are taking an increasingly keen interest in what they are receiving in return for their investment. This is particularly true in the contract area. Consider the restrictions placed on researchers under government-sponsored confidential projects. Few scholars twenty years ago would have foreseen the day when a researcher could be denied access to a university laboratory in time of peace because his loyalty to the United States was subject to question. Times are changing and institutional roles are changing. A significant portion of scientific inquiry is underwritten off-campus, and “he who pays the piper calls the tune.”

It is established law that commercial research entities may control the use of their trade secrets by employees and former employees. This was the holding in *B. F. Goodrich Co. v. Wohlgemuth*.¹⁰ This case caused

much controversy in legal and educational circles because the defendant's total postgraduate experience was with a corporation working on a single sensitive project. At the time the defendant tendered his resignation, there was no market for his postgraduate training save with a competitor working on a similar project. The same government agency sponsored both projects; there was no other market for the product.

The defendant in the Wohlgemuth case was prospectively enjoined from any disclosure of information relative to the manufacturing process involved in the production of space suits as developed by the plaintiff. The troublesome feature of this decision, as we have noted previously,¹¹ is that the meaning of "trade secret" depends on the opinion of some judge at a later time. Equally troublesome is the fact that the law of trade secrets has developed thus far only in terms of the needs and demands of the business community. As universities and other nonprofit institutions engage in activities that approach closer to ordinary business transactions, the courts will probably be less disposed to place university employees in favored categories. If this situation ever arises, the first of the three classes of faculty—the total researcher—may find himself enjoined from using elsewhere the information gleaned from a sponsored project.

In fact, a university that has invested appreciable sums of its own money in research might seek to prevent loss of its investment if the researcher threatens to take his laboratory books with him to a "competing" institution. There is no reason why a university should not be as energetic as a commercial entity in protecting its investment.

To carry this analogy a step further, is an institution that contributes matching funds not in a position to say that as a *cosponsor* of the project it is entitled to a proportionate share in the results? How can the researcher deny such a share to the university if he has publicly acknowledged in the past that the university does not obtain full compensation, in the form of overhead, for "his" grant? Few commercial undertakings would fail to advance such a claim and a court of law would probably support it.

These questions indicate a gray area enveloping both commercial and nonprofit research; we speak specifically of administration expenses and the effect of direct contribution by the university, or con-

tribution by nonrecovery of total cost of administration. Where the research is supported pursuant to a contract, it must be assumed that participation in results will be governed by the terms of the agreement. Universities and other nonprofit institutions, however, have not been particularly aggressive in protecting their financial interests. They tend to think that the funds supplied by the sponsor are in the nature of gifts to the institution. In reality, the contract is identical with those executed by commercial enterprise.

If we assume the above premise—that an institution by both tangible and intangible contributions to a research endeavor has a claim to the fruits—it follows that the institution has a right to protect its interest in the same manner as the sponsor. This right necessarily includes certain concomitant limitations on employee mobility.

These distinctions are, of course, distinctions of fact. So far as the law is concerned, it should make no difference whether the research-administering unit is profit-making or nonprofit-making. Possibly we lack cases involving nonprofit institutions engaged in research for others, because these entities rarely see the translation of an idea into a commercial venture. This is not to say that actions seeking to inhibit the mobility of professorial or hourly employees in nonprofit institutions may not arise in the future.

In short, many problems still remain with respect to projects in which an individual supported by two or more sponsors has what amounts to a conflict of interest. Thus far no cases appear to have arisen. It is not unusual, however, for a faculty member, who is supported by both the institution administering the project and a sponsor, to find his sponsor's patent policy in direct conflict with that of the institution.

Development and Exploitation of End Products

When a commercial venture enters into the field of research, it does so for certain identifiable reasons: 1) to allow it to enter into new areas, or 2) to exclude possible competitors from the field by obtaining sufficiently broad patent coverage. By securing basic patents and declining to grant licenses, the firm may effectively prevent others from en-

tering the area. The one exception is the commercial research entity that is interested solely in doing research for others at a price. In this case, the sponsor merely hires talent because it lacks the facilities or personnel to conduct the research itself, or because the corporation does not want its own employees to have complete knowledge of the direction in which it is moving or of its processes. These reasons, however, are not mutually exclusive.

Universities, on the other hand, historically have displayed little interest in the commercial exploitation of knowledge. Research by universities for others, on a basis which parallels commercial enterprise, is a development of recent years.¹² The landmark in university exploitation of knowledge is perhaps the formation of the Wisconsin Alumni Research Foundation in 1925 to act as the agent for the University of Wisconsin, its faculty and staff, in the management of patents. Close on the heels of this organization came the establishment of the Purdue Research Foundation in 1930, and the Cornell Research Foundation in 1932. At least one authority states that at present there are more than fifty incorporated organizations of this type.¹³ The distinction between the operation of these foundations and the operation of corporate ventures is the foundations' interest in using the patent to produce income via licensing and so on, rather than in maintaining a competitive business posture. Despite two or three notable successes, universities, by and large, have found that setting up their own management foundations has not resulted in significant monetary gain. This may be true for two reasons: 1) discovery is generally the result of fortuitous circumstances and does not occur very often, and 2) supported research, in which the sponsoring entity retains the right to any discovery, has grown on campus. There may be a third and more comprehensive reason. Researchers may hesitate to disclose voluntary discoveries made either in the course of their educational employment or in their supported research. In spite of the enormous sums expended in universities for research, successful university foundations number less than half a dozen. The two most successful appear to be Wisconsin Research Foundation which

obtained a gross royalty income of \$14,000,000 through 1946 from its Vitamin D patents and . . . Rutgers Research and Endowment Foundation which re-

ceived approximately \$7,000,000 under the streptomycin licenses and an additional \$150,000 . . . on Neomycin, including both the domestic and foreign patents.⁴⁴

A majority of colleges and universities have found that there are simply not enough protectable discoveries of commercial significance to warrant the maintenance of what might be called a developmental staff. Some have turned instead to such organizations as Research Corporation for protection and development of commercially practical items. A recent publication of Research Corporation indicates that it has such arrangements with approximately 140 institutions ranging from small liberal arts colleges to state universities.

Agreements with such organizations as Research Corporation are of two types. Under one, the inventor is paid a fixed percentage of the gross income and the balance is divided between the Corporation and the institution. Under the other, the gross income is divided between the Corporation and the institution with the latter making appropriate arrangements with the inventor.

One of the most significant differences, then, between research administered by nonprofit institutions and that administered by commercial entities lies in the manner in which protection and exploitation is handled by the nonprofit institution. In several instances university officials have learned of a scientific discovery on campus only as a result of chance reading in a scientific journal. In less fortunate circumstances, discovery has been passed over as a result of the investigator's failure to appreciate the significance of his work. By and large, few university investigators are sufficiently schooled in patent matters to alert their schools to pending discovery.

Research conducted by other nonprofit entities, on the contrary, tends to have the same climate for protection as commercial undertakings. Of course, neither nonprofit entities nor commercial organizations manage to protect all discoveries. Investigators may overlook the significance of their work regardless of the status of their employer. Universities, however, are less well organized for protection of discoveries than other entities.

Servicing organizations usually pay all expenses connected with the evaluation, protection, and exploitation of the discovery. A certain

portion of the resultant profit is frequently utilized for financing additional research. This financing usually takes the form of a grant to some nonprofit institution serviced by the company.

Quite apart from any question of benefit to either institution or discoverer, the remarks of Dr. Robert E. Wilson are pertinent.

A generation ago most research workers in the medical field and many of those in our universities felt that it was not quite ethical to patent their discoveries, particularly in matters relating to public health. During the past twenty years, however, there has been a growing recognition of three facts: 1) Failure to patent is more likely to delay than to encourage the development and marketing of new products especially if any substantial investment or advertising is required to get them started. 2) Failure to patent leaves new remedies open to widespread abuse by unethical manufacturers and promoters, whereas patenting permits a control of quality and marketing practices which is highly desirable in the case of many new drugs. 3) Failure to patent simply throws away a large potential income from those who benefit from new discoveries, which income might better be collected and used to promote further research in related fields. . . . This is a sound and socially desirable method of financing research work which would be lost if the value of patents were to be greatly reduced.¹⁵

Karl T. Compton, when he was President of MIT, anticipated the above statement when he said¹⁶

Responsibility does not always end with the mere publication of a patentable scientific discovery or invention: The public benefits derivable from patent laws and contemplated by the framers of those laws should not be lost through a failure to solicit patent protection.

In view of these statements it is regrettable that universities, even though they have adequate patent policies, fail to fully inform their faculties that it is desirable to seek prompt patent and copyright protection. We do not imply that nonprofit institutions should support only those areas of investigation which bear promise of commercial recognition. The nonprofit institution by virtue of its character owes an obligation to the advancement of knowledge as a whole. It is in this area of research that nonprofit-administered activity differs most strikingly from its profit counterpart. The distinction is factual rather than legal, however, for the same basic protection is available to both; exploitation is, after all, a matter of interest and energy.

Conclusion

Dr. Kerr, in the foreword of his book, *The Uses of the University*, said that

Universities in America are at a hinge of history. . . . [The university] faces its new role with but few precedents to fall back on, and little but platitudes to mask the nakedness of the change . . . the university needs a rigorous look at the reality of the world it occupies today.

The university must likewise take a realistic overview of what it is doing. The university and nonprofit research centers are selling precisely the same type of product that their commercial counterparts are selling.

The great danger in this entire area of supported research is with respect to educational institutions. We can assume, perhaps optimistically, that research centers, both commercial and nonprofit, do operate with maximum business attention to costs and cost accounting. Universities have not fully adopted such methods for their supported research. If these institutions are not breaking even, then the loss must come from other areas of the educational complex. We tend to forget that a two per cent failure to equal overhead on a \$1,000,000 grant will consume the endowment income on half a million dollars. Failure to protect a commercially profitable discovery may be even more costly, and failure to deliver what was sold, or failure to deliver it on time, costlier still. Nonprofit institutions may have immunity from tort liability but not from contract liability.

As far as our universities are concerned, we have attempted since 1940 to graft a modern business function onto a structure conceived during the Middle Ages. The grafting process has been painful and the resultant hybrid needs careful study. Perhaps it will be barren. Perhaps the progeny will have undesirable characteristics. We will not know until we have conducted a thoughtful, comprehensive examination of the existing plant. We hope some such study will be made, preferably by several groups, so that there may be an interchange of ideas rather than a verification of opinion. With the interchange here, the legal and the scientific communities have made a start. It should be continued.

Restrictions on the Use of Animals and Persons in Scientific Research

OID C. LEWIS

Once grant the ethics of the vivisectionists and you not only sanction the experiment on the human subject, but make it the first duty of the vivisector. If a guinea pig may be sacrificed for the sake of the very little that can be learnt from it, shall not a man be sacrificed for the sake of the great deal that can be learnt from him?

GEORGE BERNARD SHAW, *The Doctor's Dilemma*

SHAW'S SARDONIC treatment exemplifies something of the attitudes and beliefs of the antivivisectionists, that animal experimentation is cruel and useless and engenders a callous disregard for both animal and human pain and suffering.

Although the movement for the humane treatment of animals began in the United States with the incorporation of the American Society for the Prevention of Cruelty to Animals in 1866, it was not until 1883 that the first antivivisection society was formed in the United States, and only in 1910 did the ASPCA focus on vivisection in an effort "to secure passage of legislation which, while not prohibiting entirely such animal experimentation, will penalize all acts which are properly characterized as cruel."¹

Curiously, it was animal not human experimentation that aroused the sympathy of the public and members of humane societies.² How incongruous that the wife and daughter of Claude Bernard, "the father of experimental medicine," were antivivisection leaders! It was not until 1912 that the antivivisectionists raised the issue of human vivisection, which for them included "every experiment upon a living human being for any other purpose than his individual benefit, unless such ex-

periment is positively known to be free from discomfort, distress, pain or danger to health or life; or unless it is made with the full and intelligent consent of the person experimented upon.”³ The controversy was touched off by a report of the Vivisection Investigation League, which accused doctors associated with The Rockefeller Institute of inoculating children and adults with syphilis. After investigation the District Attorney’s Office issued a statement to the effect that the injections were performed to test for the presence of syphilis and as they were “rendered absolutely innocuous by treatment” no one had been harmed.⁴

The antivivisection movement has grown in size and power to such an extent that by 1955 there were in the United States over two hundred antivivisection societies, including five national societies. By 1945 six states had passed laws specifically prohibiting animal experimentation in public schools. Today most states already have statutes prohibiting cruelty toward animals. Do the proponents of legislation specifically barring animal experimentation actually believe that medical progress and the alleviation of human suffering are not worth the cost of animal lives? The antivivisectionist attitude is probably based on identification with and sympathy for animals, especially pets. Indeed, special provisions have been enacted for the protection of dogs and cats. Jung describes his experience as a medical student in the physiology laboratory:

I found the subject thoroughly repellant because of vivisection, which was practiced merely for purposes of demonstration. I could never free myself from the feeling that warm-blooded creatures were akin to us and not just cerebral automata. . . . I realized that one had to experiment on animals, but the demonstration of such experiments nevertheless seemed to me horrible, barbarous, and above all unnecessary. . . . My compassion for animals . . . rested on . . . an unconscious identity with [them].⁵

William James, undoubtedly impressed by the vivisections he witnessed in medical school, writes,

Consider a poor dog whom they are vivisecting in a laboratory. He lies strapped on a board and shrieking at his executioners, and to his own dark consciousness is literally in a sort of hell. He cannot see a single redeeming ray in the whole business; and yet all these diabolical-seeming events are often

controlled by human intentions with which, if his poor benighted mind could only be made to catch a glimpse of them, all that is heroic in him would religiously acquiesce. Healing truth, relief to future sufferings of beast and man are to be bought by them. . . . Lying on his back on the board there he may be performing a function incalculably higher than any that prosperous canine life admits of. . . .⁶

James, pragmatist that he was, thus provides justification in terms of the usefulness of animal experimentation for both man and animal. In like manner Dewey wrote in 1909,

Scientific men are under definite obligation to experiment upon animals so far as that is the alternative to random and possibly harmful experimentation upon human beings, and so far as such experimentation is a means of saving human life, and of increasing human vigor and efficiency. . . . The community at large is under definite obligation to see to it that physicians and scientific men are not needlessly hampered in carrying on the inquiries necessary for an adequate performance of their important social office of sustaining human life and vigor.⁷

Consider for a moment the development of penicillin. Fleming's mold was so potent that even though diluted to 1/800 of its original strength it was still an effective microbe killer. As Dr. Chain observes, "anything so powerful might be dangerous to man. . . ."⁸ Accordingly it was necessary to carry out animal experimentation. At noon, on 26 May 1940, eight mice were injected with lethal doses of streptococci. Four also received penicillin, the remaining four serving as controls. By 3:30 a.m. the last of the control group died. The mice injected with penicillin survived. How valid is the argument against animal experimentation when the lives of four mice are weighed against the lives of millions of humans and animals saved by antibiotics? If an edict banning animal experimentation had been in effect, the risk involved in the development of penicillin would have been taken with humans instead.

Insulin treatment for diabetes mellitus was developed through intensive research on dogs. Cancer research, for which millions of dollars are donated each year, cannot proceed without animal experimentation. Approximately two hundred drugs require the use of animals for standardization and establishment of safety standards. For diagnosis of tuberculosis, rabies, typhus fever, pregnancy, and so on, animals are

required. I think we may take it as established that animal experimentation is a *sine qua non* for effective medical practice and progress.⁹

To allay the fears and complaints of the antivivisectionists, the Committee on Protection of Medical Research of the American Medical Association formulated in 1922 a code of laboratory procedure which was formally adopted by medical schools, research institutes, and health laboratories, and posted where it could be seen by all workers in laboratories.¹⁰ Today there are various codes that apply to animal experimentation. Examples of such codes are the rules drawn up by the Committee on Precautions in Animal Experimentation, which were adopted by the American Psychological Association, and a guide for laboratory animal facilities and care, which was prepared by the Animal Facilities Standards Committee of the Animal Care Panel and adopted by the Institute of Laboratory Animal Resources of the National Academy of Sciences–National Research Council on 28 January 1963. Provisions are made in the codes for aseptic surgery on animals under anesthetization and proper postsurgical care, under the supervision of professionally qualified persons.

In many states legislation prohibiting cruelty to animals makes special provision for *bona fide* animal experimentation.¹¹ In New Jersey, for example, the general cruelty to animals law does not extend to

Properly conducted scientific experiments performed under the authority of the state department of health. That department may authorize the conduct of such experiments or investigations by agricultural stations and schools maintained by the state or federal government, or by medical societies, universities, colleges, and philanthropic institutions incorporated or authorized to do business in this state and having among the corporate purposes investigations into the causes, nature, prevention and care of diseases in men and animals; and may for cause revoke such authority.¹²

I have selected this particular example because a significant case involving the exemption section just quoted is pending before the New Jersey courts. In 1964 John Fugure, an East Orange High School student, entered a national science competition sponsored by the Science Clubs of America. For his entry he conducted a six month experiment which necessitated the injection of cancer virus into the wings of four chickens. His experiment was conducted at least in part at the high

school and with the knowledge and guidance of members of the high school's faculty.

The New Jersey statute against cruelty to animals¹³ provides that any person who shall

- a* Overdrive, overload, drive when overloaded, overwork, torture, torment, deprive of necessary sustenance, or cruelly beat or otherwise abuse or needlessly mutilate or kill a living animal or creature.
- b* Cause or procure to be done by his agent, servant, employee, or otherwise an act enumerated in para. (*a*) of this section.
- c* Inflict unnecessary cruelty upon a living animal or creature of which he has charge or custody either as owner or otherwise, or unnecessarily fail to provide it with proper food, drink, shelter or protection from the weather;

. . . .

Shall forfeit and pay a sum not to exceed \$100.00 to be sued for and recovered, with costs, in a civil action by any person in the name of the New Jersey Society for the Prevention of Cruelty to Animals.

The New Jersey SPCA filed a complaint [by Frank Tomasulo] on 22 June 1964 against the Board of Education of East Orange which alleged violations of this statute in that the Board by "its agents and servants" did "inflict unnecessary cruelty upon a living animal or creature, to wit, chickens . . . and did otherwise needlessly mutilate living chickens by permitting an East Orange student . . . to inject a cancer virus into said chickens . . . without the authority of the New Jersey State Department of Health."¹⁴

Because of the significance of the issues presented, the New Jersey Science Teachers' Association and the National Society for Medical Research moved to intervene as defendants in the suit on the ground that a decision against the East Orange Board of Education would threaten medical and biological research as a whole in New Jersey and throughout the nation. In affidavits submitted in support of their motion, the Science Teachers' Association and the National Society for Medical Research alleged that experiments of the type in question are essential to teach biology effectively and that, if the plaintiff were to prevail, numerous scholarly studies would cease, to the detriment of their programs. Their motion to intervene was allowed.

The potential impact of a decision for the plaintiff in this case is

illustrated by an incident that occurred in 1963. The County Superintendent of Schools for Somerset County in New Jersey circulated the following letter to Head School Administrators on 3 May 1963.

The SPCA has asked me to inform school superintendents that the law covering Prevention of Cruelty to Animals should be brought to your attention as regards to live animals. The laws are so written that it is a misdemeanor to use live animals of any kind in the science demonstration in your schools without the presence of a veterinarian. It states nowhere in the law . . . that high schools are authorized to cause or procure these acts to be done. It places the school boards and teachers in a position where they shall be liable to prosecution.

Will you check to see that none of your schools are using live animals of any kind for dissecting purposes.

In the New Jersey case we are illustrating, the defendants contend that young Fugure's experiments were not of the type prohibited by the statute. They admit that no authorization was granted by the state department of health, but point out that high schools are not among the institutions enumerated in the statutory exemption quoted above. This, they say, is an unreasonable exclusion and consequently the statute is unconstitutional in that it denies the equal protection and due process clauses of the Fourteenth Amendment.

The judge, in deciding this latter issue, will rely heavily on the testimony of medical research experts. How necessary is this type of experimentation for the medical research program as a whole? Would an adverse decision reduce the incentive and development of potential medical research scientists? Are these experiments valuable in and of themselves? Have the standards of reputable medical researchers been followed? Is such an experiment an act of cruelty within the meaning of the statute? The decision in this case will perhaps elucidate this area, especially when one considers who the antagonists are.

Before turning to the far more complex subject of human experimentation, I should like to make a few observations based on the general legal situation illustrated by the New Jersey SPCA case. Here, unlike situations where human experimentation is not performed for the benefit of a patient, there are statutes which provide topoi, or points of departure, from which judges and researchers may derive guidance. But

even in these animal experimentation cases, the standards to be applied will be determined in large part by the practices and norms of those regulated. While not creating law, these “professional customs” supply the ethos and background for the creation of standards to be employed when existing legal precepts are applied to the particular circumstances of each case.¹⁵ This is especially so when the subject of litigation is as complex and esoteric as medical research. Values—societal, medical, or judicial—are not self-certifying. They are based on consequences that flow from choices, consequences of humanity. What precisely are the potential consequences for medical progress that result from restrictions on animal or human experimentation? The legal profession is not competent to answer that question. Only the medical profession can. Our little New Jersey case is typical of the broad problems at hand.

It seems strange that even today, in a country devoted to medical research,¹⁶ the foregoing issues need be raised. But having raised them, I turn to the more difficult area of human experimentation.

In discussing experimentation, one must differentiate cases where experimentation with new treatments is undertaken primarily for the benefit of the particular patient from those in which the scientists’ goal is the advancement of medical science for the ultimate benefit of mankind. In relation to the former, there is abundant legal precedent to guide the practitioner. The general rule of the old cases was that a physician is bound to apply accepted methods of treatment and that he experiments at his own risk.¹⁷

In dicta in later cases, the courts have implied that even valid experimentation would subject the physician to liability if anything went amiss. For example, in a 1902 decision of the Supreme Court of Wisconsin,¹⁸ the court first quoted the rule of an older New York decision:

Some standard by which to determine the propriety of treatment must be adopted, otherwise experiments will take the place of skill, and the reckless experimentalists the place of the educated, experienced practitioner. . . . But when the case is one as to which a system of treatment has been followed for a long time, there should be no departure from it, unless the surgeon who does it is prepared to take the risk of establishing by his success the propriety and

safety of his experiment. The rule protects the community against reckless experiments, while it admits the adoption of new remedies and modes of treatment only when their benefits have been demonstrated, or when, from the necessity of the case, the surgeon or physician must be left to the exercise of his own skill and experience.¹⁹

The Wisconsin court then went on to say,

We think the rule laid down by the court is supported by the weight of authority in cases where there can be said to be a thoroughly established and usual method of treating a situation. We have little doubt that, if the first case of vaccination had proved disastrous and injured the patient, the physician should have been held liable. Nor do we believe that a physician of standing and loyalty to his patients will subject them to mere experiment, the safety or virtue of which has not been established by experience of the profession, save possibly when the patient is in extremis, and fatal results substantially certain unless the experiment may succeed.

A more favorable view was expressed in a Colorado decision²⁰ where the court required only that the physician who uses a new approach must “justify his experiment by some reasonable theory.” Thus, instead of imposing absolute liability on a physician for the outcome of his reasonable experimentation, he is required only to demonstrate that the ordinary reasonable physician might have conducted the experiment under like circumstances. Similar language is to be found in a 1935 Michigan case:

We recognize the fact that, if the general practice of medicine and surgery is to progress, there must be a certain amount of experimentation carried on; but such experiments must be done with the knowledge and consent of the patient or those responsible for him, and must not vary too radically from the accepted method of procedure. One who claims to be a specialist in so far as diagnosing a case is concerned must also be held to the above rule.²¹

More recently, in *Costa v. Regents of Univ. of California*,²² the Supreme Court of California observed that

In fighting so dangerous a condition as here involved [cancer], physicians may take serious risks and in doing so must rely on their judgment in deciding how far to go. . . . To hold them responsible in cases where the bad chance unfortunately materializes would be evidently unjust and most dangerous if physicians were deterred from going to the extent which give their patient the best chance of survival.

The enlightened consent of the patient is a basic legal requirement where such experimentation is involved. Failure to obtain an enlightened consent has resulted in liability, even where no negligence was involved in application of the treatment or procedure.²³

The most complete discussion of the legal implications involved appears in the opinion of the court in a 1964 North Carolina case, *Watson v. Clutts*.

Courts have expressed widely divergent views as to how far the surgeon should go in advising of dangers involved in a proposed operation. Plaintiff insists this Court should take the extreme view expressed in *Salgo v. Leland Stanford Jr. University Board of Trustees*, 154 Cal. App. 2d 560, 317 P. 2d 170: 'A physician violates his duty to his patient and subjects himself to liability if he withholds any facts which are necessary to form the basis of an intelligent consent.'

. . . .

Of course, the type of risk involved should have bearing on the completeness of the disclosure required. Obviously brain or heart surgery involves high risks. Removal of an ingrown toe-nail ordinarily does not. However, a surgeon, except in emergency, should make a reasonable disclosure of the risk involved in a proposed surgical operation if the operation involves known risk. And yet, to send a patient to the operating room nervous from fright is not often desirable. The middle ground rule is admirably stated in 75 *Harvard Law Review* 1445 [1448] 'The duty narrows then, in the average case, to disclosure of dangers peculiar to the treatment proposed and of which it is likely that the patient is unaware. The doctor should have little difficulty in choosing from these the risks that are sufficiently serious and likely to occur as to be essential to an intelligent decision by his patient.'

Difficulty arises in attempting to state any hard and fast rule as to the extent of the disclosure required. The doctor's primary duty is to do what is best for the patient. Any conflict between this duty and that of a frightening disclosure ordinarily should be resolved in favor of the primary duty. And yet, the consent of the patient or of someone duly authorized to consent for him, except in emergencies, is required before the operation is undertaken. The surgeon should disclose dangers of which he has knowledge and the patient does not—but should have—in order to determine whether to consent to the risk.²⁴

The present consent forms in use by members of the medical profession are shown and they accurately reflect the state of the law.

Form 28 Consent to Experimental Procedure or Treatment

The nature and purpose of the procedure or treatment, possible alternative methods of treatment, the risks involved, and the possibilities of complications have been explained to me. I fully understand that the procedure or treatment to be performed is experimental and unproven by medical experience, and that the consequences are unpredictable.

Date _____

Signature _____

Form 29 Authorization for Treatment with Drug under Clinical Investigation

It has been explained to me that the safety and usefulness of the drug in the treatment of patients for the above condition are now being investigated and that the manufacturer or distributor has supplied the drug for the purpose of providing further evidence of its safety and usefulness.

I voluntarily consent to treatment with the drug and release the attending physician from liability for any results that may occur.²⁵

Date _____

Signature _____

The following commentary appears on Form 29.

[Administer only where] . . . (1) the informed consent of the patient or his authorized representative has been obtained; (2) the physician is convinced of the reasonable accuracy of his diagnosis and, if necessary, has confirmed it by adequate consultation; and (3) existing methods of treatment have proven unsatisfactory. . . . The physician is advised to confine his clinical investigations of new drugs to those furnished by reputable sources who have supplied him with comprehensive written information concerning: (1) animal experimentation; (2) previous clinical investigations, if any; (3) recommended dosages; (4) contra-indications; (5) possible side effects to be watched for, and (6) the safety and possible usefulness of the drug, from existing data.

The 1962 federal drug amendments appear to adopt a rule similar to that expressed in the *Clutts* case. The pertinent statutory provision states that, where investigational drugs are used, the subjects must be

informed that the drugs are being used for investigational purposes and their consent must be obtained, "except where [the investigators deem] it not feasible or, in their professional judgment, contrary to the best interests of such human beings."²⁶

Of course, the consent of the patient does not relieve the physician from the usual required standard of reasonable care and diligence, nor from the law's requirement that he select a method of treatment a reasonable practitioner might employ under similar conditions. Also, since the patient's interest is foremost in this type of case, it is generally said that all approved and standard treatments must have proved ineffective, before investigational treatment is used.

I turn now to the situation where experimentation is carried on, not primarily for the benefit of the particular subject or subjects involved but for the benefit of medical progress and ultimately humanity in general.²⁷

As I have stated earlier, the law often looks to the practitioners of a particular regimen to establish the norms or standards that ought to guide their behavior. Thus, it was on the basis of expert testimony that the court in Nuremberg, in the war crimes prosecution known as the Medical Case,²⁸ set forth the ten rules which the members of the court believed necessary to provide an ethical and legal justification for human experimentation. Almost universally, commentators, both legal and medical, have assumed that these Nuremberg "Ten Commandments" would be applied as precedent by a domestic court confronted with a case involving human experimentation not primarily for the benefit of the particular subject.

The ten rules stated at Nuremberg are:

- 1 The voluntary consent of the human subject is absolutely essential.
- 2 The experiment should be such as to yield fruitful results for the good of society, unprocurable by other methods or means of study, and not random and unnecessary in nature.
- 3 The experiment should be so designed and based on the results of animal experimentation and a knowledge of the natural history of the disease or other problem under study that the anticipated results will justify the performance of the experiment.
- 4 The experiment should be so conducted as to avoid all unnecessary physical and mental suffering and injury.

- 5 No experiment should be conducted where there is an a priori reason to believe that death or disabling injury will occur; except, perhaps, in those experiments where the experimental physicians also serve as subjects.
- 6 The degree of risk to be taken should never exceed that determined by the humanitarian importance of the problem to be solved by the experiment.
- 7 Proper preparations should be made and adequate facilities provided to protect the experimental subject against even remote possibilities of injury, disability, or death.
- 8 The experiment should be conducted only by scientifically qualified persons. The highest degree of skill and care should be required through all stages of the experiment of those who conduct or engage in the experiment.
- 9 During the course of the experiment, the human subject should be at liberty to bring the experiment to an end if he has reached the physical or mental state where continuation of the experiment seems to him to be impossible.
- 10 During the course of the experiment the scientist in charge must be prepared to terminate the experiment at any stage if he has probable cause to believe, in the exercise of the good faith, superior skill and careful judgment required of him that a continuation of the experiment is likely to result in injury, disability, or death to the experimental subject.

These Nuremberg Rules were, of course, formulated in the context of a judicial examination of abominable Nazi “scientific” practice and may be in need of substantial restatement before they can be applied, literally, as standards for the appraisal of legitimate medical experimentation. But, by and large, other codes of sound experimental practice merely reiterate the principles of the Nuremberg “Ten Commandments.” Thus, for example, the present AMA rules require merely

- 1 The voluntary consent of the person on whom the experiment is to be performed.
- 2 The danger of each experiment must be previously investigated by animal experimentation.
- 3 The experiment must be performed under proper medical protection and management.²⁹

There are, of course, numerous other proposed requirements, beyond those covered explicitly by the ten Nuremberg rules. The additional requirement most frequently urged is that the individual investigator obtain approval and guidance from a group of investigators who are not going to participate in his inquiry. The theory of this proposal is that the requirement would provide both a broader perspec-

tive and an objectivity not attainable by an investigator personally involved in an experiment.

In view of certain criticisms of human experimentation, such as those expressed by Dr. Henry K. Beecher,³⁰ it is possible that greater legal regulation is required to restrain overzealous medical research scientists who fail to respect human dignity and the limits imposed by the Nuremberg rules and related ethical codes. Some medical research scientists who attempt to follow the Nuremberg rules apparently desire greater guidance than that afforded by the present general guidelines.

The physicians of the Metabolic Group were deeply committed to [the Nuremberg rules] . . . and conscientiously tried to live up to them. . . . However . . . the 'basic principles of human experimentation' are formulated on such an abstract level that they only provide general guides to actual behavior. Partly as a consequence, the physicians of the Metabolic Group often found it difficult to judge whether or not a particular experiment in which they engaged 'kept within the bounds' delineated by these principles.

This was especially true of the experiments they conducted primarily to advance medical knowledge.³¹

A complex code is probably not the best solution for the difficult problem at hand since the standards of medical experimentation are not yet sufficiently developed to be embodied in the Procrustean form of a detailed code.³² Perhaps the best solution consists of an approach similar to that used by the American Law Institute in preparing its various Restatements of the law. On the basis of the existing consensus, the Nuremberg rules, or a modified version of them, could serve as the equivalent of the general principles set forth in the Restatements. The case-by-case resolution by a body of medical and legal experts of difficult ethical problems arising from application of these general principles to specific research experiments could be appended to the relevant rules. This would provide a dynamic and growing body of precedents to guide those who are engaged in medical research involving human experimentation.

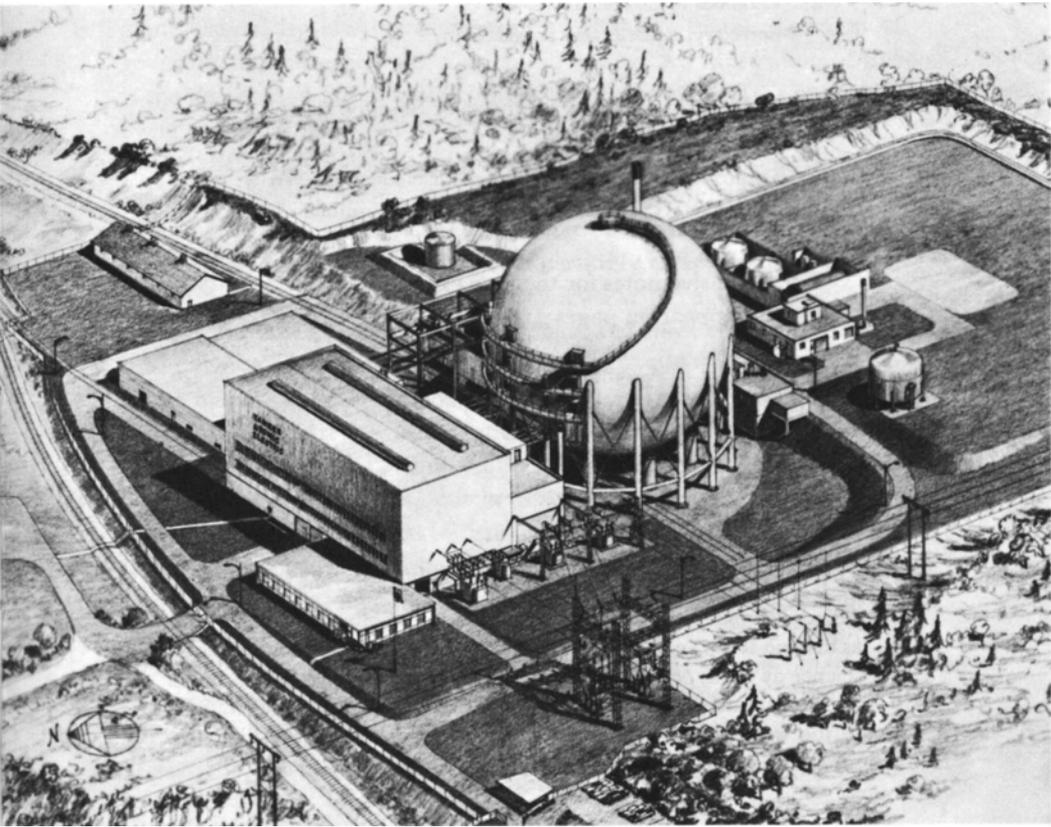
In the last analysis, just as justice depends not on legal propositions but rather on "right-minded, learned, careful and wise" judges,³³ so too must the propriety of human experimentation ultimately rest on "right-minded, learned, careful and wise" research scientists.

The four essays in this section vary widely in specific subject matter, but each of them relates in one way or another to the task of interdisciplinary understanding. In the first of the four, John G. Palfrey, with his on-the-job experience as a member of the Atomic Energy Commission, appraises the occasions and opportunities for effective scientist-lawyer collaboration in public administration and scientific decision-making.

So far, the focus of this volume has been on the natural sciences. In the next two essays, attention shifts to the social or "behavioral" sciences. The first essay, happily and appropriately, is itself a product of the interdisciplinary collaboration of a practicing lawyer and a sociologist. Oscar M. Ruebhausen and Orville G. Brim, Jr., deal thoughtfully and vigorously with the principles involved in reconciling the values of personal privacy with the values of behavioral research. The second essay, by the eminent social psychologist, Leonard S. Cottrell, Jr., is addressed more generally to the interrelationships of law and social science.

Harry W. Jones concludes the discussions by considering the extent to which scientific method can be used, analogously, for disciplining and improving legal inquiry.

II TOWARDS INTERDISCIPLINARY UNDERSTANDING



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Commissioner, United States Atomic Energy Commission

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Partner, Debevoise, Plimpton, Lyons & Gates, and
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ORVILLE G. BRIM, JR.

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and Secretary, Walter E. Meyer Research Institute of Law

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Part II appear on pages 219–229.

The development, licensing, and regulation of atomic reactors such as the one at Rowe, Massachusetts, shown overleaf, illustrate law and science at work, *page 72 ff.* This plant was built in 1960 and is one of the first commercial nuclear-powered electricity generating stations in the world; the reactor and steam generator are inside the steel sphere.

Collegueship in Law and Science

JOHN GORHAM PALFREY

HAVING INHERITED the title of Collegueship in Law and Science, I had to produce my own working definition of "colleagueship," as a mixture of collaboration and gamesmanship—or, if you know Stephen Potter—one-upmanship. In short, colleagueship is a game played by lawyers and scientists engaged in the direction of governmental enterprises of a scientific nature. An illustration of this is the day-to-day life of atomic energy commissioners. It is not, however, a war game.

The theme of this symposium is Law and the Social Role of Science (as distinguished, perhaps, from its antisocial role). A subtheme is Where Law and Science Meet. Whether or not law and science ever meet in the AEC—and they do—it is certainly clear that lawyers and scientists meet every day and at every level of the agency, upstairs in the government at interagency meetings, and most of all at meetings of the five atomic energy commissioners.

We meet as a group of five—three are scientists and two are lawyers variously enriched by administrative experience—on questions of weapons development, arms control, alternating gradient synchrotrons, nuclear propulsion, power reactors located in cities or near earthquake faults, cutbacks in fissionable material production, nuclear desalting, nuclear excavations, nuclear rocket propulsion, international agreements for cooperation, animal bioradiological laboratories, and planned reactor excursions, to name a few. These subjects pose technical problems for the lawyers to understand, legal problems for the scientists to understand, and mixed problems in both law and science.

Actually, by the time the Commissioners meet, particularly in the

operational side of the AEC's program, the working encounter of law and science has to a large extent already taken place. The General Counsel of the Commission has usually arranged it so that he no longer has legal objections, and the technical issues have been resolved, or at least sharpened to the point of putting them before the Commissioners to resolve.

The Commissioners do not meet as scientists and lawyers, nor do they vote as such. At least, there has been no split of scientists against lawyers on any formal or informal issue that I can remember. We meet supposedly as men of judgment to consider the larger issues of atomic policy.

The Commissioners do inject themselves—and to some extent inevitably in their capacities as lawyers or scientists—into the detailed operating life of the atomic energy program, if for no other reason than that the distinction between policy and operations is clear-cut only in theory.

Before examining further how the Commissioners and other instruments of science-law togetherness work in coping with their problems, we should consider how representative the subject of atomic energy has been as an example of the meeting between law and science.

As one looks at the evolution of the Atomic Energy Act and its administration in the last twenty years, it stands out as a prominent, early manifestation of the challenge, to be faced increasingly in the future, of accommodating the laws and institutions of the United States, both to the acceleration of scientific discovery and its technological application, and to a contraction of the time scale in which the accommodation must take place.

The Act has aspects of an intense and therefore revealing, but somewhat upside-down, test case. The assignment of creating the law of atomic energy was so abruptly thrust upon an unsuspecting country in 1945 to 1946, and the subject matter so explosive, that the lawmakers agreed with President Truman that atomic energy was too revolutionary a force to fit into the framework of old governmental ideas. So they abandoned that traditional framework and established the far-reaching provisions of the McMahon Act. With a flourish, the McMahon Act provided things that would have caused an uproar in other

areas of public administration: government ownership of all fissionable material and atomic facilities, a special category of information born secret by definition, a special Joint Committee on Atomic Energy, a Military Liaison Committee, and a civilian commission of five members, to mention a few of the legislative innovations.

Since then, the history of the law's evolution and administration, starting particularly with the comprehensive amendments enacted in 1954, is characterized both by an increasing realization that the atom, while unique, is not *that* unique, and by efforts to treat atomic energy more nearly like other activities of government in the areas of defense, industry, and science. Private ownership of reactors, under government regulation, was authorized in 1954, private ownership of fissionable material in 1964. Laws affecting atomic information and international cooperation were gradually relaxed.

In short, the history of the law of atomic energy suggests that in this area no one can complain that the lawmakers did not respond sufficiently to the impact of the scientific revolution. If anything, the lawmakers overresponded in 1945. In the ensuing twenty years, they have been discovering the relevance of the traditional framework, relationships, and procedures to the changing atomic scene.

A related question comes to mind. How representative is the atomic energy experience as an example of institutional techniques for administering the law governing an enterprise of a scientific nature? Its most curious aspect is the collective management, at the top of the program, which spends eighty per cent or more of its time in the direction of enterprises of an operational rather than a regulatory nature. It is an inheritance of the law and science of atomic energy that five men were thought to be a safer repository of wisdom for the direction of the country's atomic future than one. Twenty years later, many of the grounds for this decision have changed. But meanwhile the lawmakers have not seen fit to make any institutional changes at the top. So five men continue to direct the very different atomic enterprise of the 1960s. Yet the system works, and oddly enough there are some advantages.

These advantages are perhaps most noticeable in the regulatory field which occupies about fifteen to twenty per cent of our time spent

in the licensing and control of private activities in the civil uses of atomic energy, notably in the field of atomic power reactors.

Here the Commission operates much as any other regulatory commission in the licensing of facilities, such as the Federal Communications Commission, except that, organizationally, there is one Commission and two separate staffs. Following a squabble in the mid 1950s over the licensing of an advanced breeder reactor, the Commission's regulatory staff was separated from the programmatic staff in reactor development and related areas, and more formalized regulatory procedures were provided by regulation and statute.

Licensing a reactor is primarily a technical question of reactor safety. The basic question is: Would this design of this type of reactor be safe to build and operate at this location? As an illustration of law and science at work, the licensing process is worth examining. Professor Cavers, in Part I of this volume, aptly characterizes this licensing process as new hazards against which law must erect new safeguards.

Before a construction permit is issued, the AEC regulatory staff reviews the design of the proposed plant and the suitability of the site. The Commission's Advisory Committee on Reactor Safeguards, consisting of experts from various scientific disciplines related to reactor safety, independently reviews the application. Both these groups delineate significant problem areas, and the applicant ordinarily revises his application, prior to the mandatory public hearing on it, in an effort to resolve the safety issues or to propose a research and development program for their resolution. Staff counsel work closely with the regulatory staff in preparing an extensive analysis that could provide a basis for a finding that the facility can be built and operated at the proposed site without undue risk to the health and safety of the public.

Before 1962, a hearing examiner conducted the public hearing. In that year Congress authorized the Commission to appoint atomic safety and licensing boards for the conduct of these reactor-licensing hearings. Each board is composed of three members, two of whom are technically qualified and one of whom is qualified in the conduct of administrative proceedings, that is, a lawyer. The Congress considered that a public hearing before such a board would be a surer and faster

way of handling the complicated technical and scientific questions of reactor safety and would strengthen public confidence in the determinations ultimately made.

The board chairman, who thus far has always been the lawyer, guides the conduct of the proceeding and complements the talents of the board's technical members by his experience in running and expediting such proceedings, as well as by his knowledge of Commission policy and precedents. In each of the nine cases thus far decided by licensing boards, the decision has been unanimous.

In the process, however, a third layer of expert technical review, prior to Commission review, has been added. One wonders about this extra layering—and so do the applicants. The licensing boards are as inquisitive as scientists and as thorough as lawyers. There are growing pains at the moment, but I am confident that the lawyers and the scientists will work them out. These board hearings could, in time, provide an impressive demonstration of care, expedition, and technical soundness. For the time being, I am in favor of a quadruple look at reactor safety.

The Commission itself reviews every initial decision in a hearing case, and I know that it is helped greatly by the decision and record developed by the licensing board. Often the review is a fairly straightforward assignment for the Commission. In a noncontested case, with a proven reactor in a conventional location, there is likely to be a unanimous judgment of regulatory staff, advisory committee, and licensing board.

On occasion, however, the assignment can be much less simple, as is the case when a reactor is proposed in the middle of New York City, as Ravenswood was, or close to an earthquake fault, as Bodega Bay in California was. Neither of these cases reached the Commission, but they would have been interesting if they had. Bodega Bay is particularly relevant to our discussion because in this case the scientists in the regulatory staff disagreed with the scientists on the advisory committee. Confronted with the reactor's proximity to the San Andreas fault, and the probability of at least one major shock during the reactor's lifetime, the regulatory staff said no and the advisory committee said yes to the question of whether, given the present state of our knowl-

edge, there was adequate assurance that the applicant's proposed engineering safeguards would withstand the possible but unlikely maximum earthquake. The application was withdrawn, so the licensing board reached no decision on it. Otherwise, the Commission would have been confronted with a two-to-one split among its reviewing technical bodies, whichever way the licensing board ruled.

I am not rash enough to speculate on how the Commission would have decided the Bodega Bay application, but I do say that in such a case it is extremely useful to have someone with a scientific background on the Commission, in order to understand precisely the grounds on which the experts have disagreed. I would go further and say that it is even more useful to have more than one member with a scientific background on the Commission, because other Commissioners might place too much reliance on one scientist's evaluation of the scientific merits of the case. Not all scientists are infallible.

I conclude, then, that collegueship is all to the good in the regulatory part of the Commission's assignment. In the context of my examination of the response of the law to science in the atomic energy field, however, I have a reservation to record and a recommendation to make. The law requires us, on the one hand, to direct the development of nuclear power and, on the other, to decide which reactors are safe to locate where. During the developmental period, there were evident advantages in having only one agency knowledgeable and responsible for reactor development, reactor safety, and reactor licensing. I am confident that the Commission has been and will continue to be scrupulous in its regulatory decisions on the licensing of private reactors.

Few men, however, can be responsible for the development of nuclear weapons, submarines, rockets, and reactors without becoming, to some extent, enthusiasts for atomic energy. The Commission has been assigned by Congress to work with industry to make nuclear power competitive with other sources of power as rapidly as possible. Recently, the progress has been remarkable. In its job of making reactors as safe as ingenuity and experience can, the Commission has also achieved a remarkable safety record and has become increasingly certain of the demonstrable safety of the proven reactors.

I have no doubt about the Commission's ability in the course of the next decade to establish sound criteria for the location of proven reactors in more populated areas and to review individual license applications in terms of these criteria. No matter how well the Commission does this job, however, I am not sure how long the Commission should be required to be responsible for both development and regulation. Developmental and regulatory assignments are already effectively separated at our staff level. In my judgment, it is not too early to start considering an institutional separation at the top. There is, of course, something to be said for retaining the present arrangement. For instance, it may be easier to retain a regulatory staff of the highest technical caliber when it is part of an over-all program of scientific development.

A principal issue is that of timing. It may make more sense to wait five years or more before establishing an independent regulatory board. But I would like to be sure meanwhile that it is possible for the Commission to retain the high confidence of the public in its regulatory decisions.

Whether it will be in the form of the present Commission or of a future regulatory board, collegueship and joint deliberation are clearly required in the regulatory areas of the atomic energy program. When one turns to the operational part of the Commission's assignment, the appropriateness of a commission-form of organization is less obvious. The normal form of organization for an operational agency is that of a single administrator, as is the case with the space agency, NASA. You may have heard about plans to reorganize the Atomic Energy Commission. I do not propose to discuss the question of commission versus single administrator except to make one point. I have come to the conclusion that as one moves from theory to practice one discovers that it does not make so much difference what particular form of organization is provided for the direction of a scientific enterprise. Whatever the organizational framework, there will be times when the agency functions as a kind of commission and other times when it functions as an operational agency.

Despite the external differences between NASA and the AEC, the operational habits of the two agencies tend to converge. The three top

administrators in NASA meet regularly on policy issues, much as the AEC would, and the AEC, like NASA, often operates as an administrative agency. The Commissioners informally delegate additional authority to the Chairman, because someone must run the show. In dividing up and keeping special track of different areas of the program, the Commissioners often operate in functional ways much as associate administrators do.

Issues of law and science are less frequently posed for our five Commissioners in the operational field. Our operational problems are mostly questions of policy and judgment, and the principal issues of law have usually been resolved at the staff level, as I have already mentioned.

In my own experience I have run across mixed issues of law and science more often in interagency consultations, such as those concerned with the test ban treaty, the plowshare program, the multi-lateral nuclear force, arms control and disarmament, nonproliferation of nuclear weapons, and development of safeguards and inspection in the Atoms for Peace program, as well as in the International Atomic Energy Agency and international conventions on indemnity. At these meetings there are often representatives from State, Defense, the Atomic Energy Commission, the Central Intelligence Agency, the Office of Science and Technology, the Arms Control and Disarmament Agency, and the White House.

One significant characteristic of these interagency meetings is that numerous scientists are present, and the need for them is taken for granted. There are also numerous lawyers, although most of those with legal training who attend the meeting are not there as lawyers. With such committees, as with the Commission, there is rarely a division between lawyers and scientists. Whatever division of opinion there may be reflects an institutional difference of approach, not a professional one. The Arms Control and Disarmament Agency does not always agree with the AEC, for example.

I have sometimes wondered whether it is easier for a lawyer or a scientist to represent the Commission at such meetings. The substantive obstacles to a lawyer's understanding of the technical issues is greater; science is a more foreign language for him than law is for the

scientists. But lawyers are always sticking their noses into other peoples' professions—indeed, that is often their professional occupation—whereas scientists in their natural environment stick somewhat more to their own business. Those scientists who have made the wrench of leaving their laboratories to engage in government administration have already taken a bigger step of accommodation than the lawyers have.

I represent the Commission in meetings on arms control. If the question is what should be done under the test ban treaty about a Soviet test which vented, as recently happened, or if it concerns the assessment of the consequences of a nonproliferation proposal, I can be useful. If the issue is the cutoff of fissionable material production and problems of verification, or the development of our capabilities of seismic detection and the number of on-site inspections we must require, I am less useful, and must rely heavily on the technical knowledge of the Commission's staff and particularly the Special Assistant on Disarmament who accompanies me to these meetings.

My predecessor at these meetings was Leland Haworth, now Director of the National Science Foundation. I think it was simpler for him to represent the AEC at arms control meetings because other people at the meetings knew enough about the law—or thought they did. What they often knew they did not know were such technical questions as those involved in inspecting a shutdown production reactor or detecting a weapons test. This was a simpler thing for Haworth to explain than for Palfrey.

Having said that, however, I come again to my "It doesn't make much difference" conclusion with regard to whether the Commission is better represented by a scientist or a lawyer. Either can learn, with varying degrees of effort, what the interests of his agency and his government are and how to speak about them sensibly in an inter-agency deliberation.

In conclusion, I must try to get out of the box I have built for myself. I have said, in effect, that there are no real problems posed by the collegueship of lawyers and scientists in the atomic field, or I have suggested, at least, that what problems there are manage to get worked out in practical operation. I am aware that this conclusion does not

have the ring of penetrating appraisal. It sounds like the familiar "things are fine with us in Washington if you only knew how they actually are" and does not seem to take into account many of the dimensions of the current confrontation of law and science discussed at this symposium. My conclusion seems, perhaps, to ignore much that has been written about science and public policy and about the problem of the scientist in government.

Let me try to dispose, rather summarily, of the last point first. I have said on other occasions that I can find today no such identifiable phenomenon as *the* scientist in government. It is unhelpful, I think, to take the scientist apart in matters of science and public policy for the purpose of examining his predispositions, tendencies, and impulses in dealing with problems of government and law. Today there are hundreds of scientists in government, not only in advisory positions but also in positions of major administrative responsibility. It is puzzling to me that the government got along with so few scientists in top positions in the late forties and the fifties.

Agencies that direct scientific enterprises should include people who know something about the subject matter. The problem of the scientist in government is, today, something of a red herring. A whole generation of scientists has grown up since the 1940s, when scientists were suddenly exposed to government and politics. Scientists in administration and government can learn about administration and government—and they have.

I turn now to my earlier question. Why have I found no really hard problems of collegueship in law and science? I think there are no hard problems in my field because the scientists and the lawyers who have decided to work in the field of government administration of atomic energy have, by definition, already acquired the necessary common interest and meeting ground. They have something in common to talk about and do. In this working context, the lawyer and the scientist are meeting about a subject that has interested both of them enough to make them come to Washington and work on it. Suddenly, law matters to the scientists and science to the lawyers; both law and science are components of the job they have to do.

If scientists and lawyers get along badly thereafter, it is because of

their inability to get along as people, not because of their professions.

The scientific revolution may, in due course, be providing its own solution to the problem of the two, three, or multiple cultures. As in the atomic energy field, so elsewhere, more and more lawyers and scientists are encountering the problems of each other's discipline while engaged in their own particular pursuits. At the point of intersection, collegueship is ready to develop. The early encounters may be abrasive. In fact, both sides may take offense in the first instance. But, in time, both sides will discover that they have a larger pursuit in common.

Finally, a word about law and how it has worked in the test case of atomic energy. I do not consider that the law should be ashamed of its record. It has not been static or sterile in the face of the seeming compulsions of the atom. Lawyers and scientists have learned a great deal from each other. They have learned to work together in numerous different capacities. As the atom spread out through the government, the Commission lost its insulation and insularity, the atom its uniqueness, and the law its rigidities.

There are many tough questions of law and science ahead of us in the atomic field, but I think that we have finally learned to look at them as such, and not as unique problems of atomic energy that, by definition, require unique solutions. In easing the strait jackets of policy and law, we have learned to subject the atom to the constant and irreverent process of testing, appraisal, and correction of error. That is something to have learned in the past twenty years of accelerated change, and a hopeful preparation for the next.

Privacy and Behavioral Research

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A SUCCESSFUL society is marked by an ability to maintain a productive equilibrium between numerous competing forces. The goal of our own federal political system is to assure for the individual an ample range of freedom, and an ample opportunity for diversity. By tradition and conviction our form of democracy jealously seeks to protect the individual from accumulations of power. This protection finds its expression, for example, in the separation of powers in government, the divorce of church and state, the civilian control over the military, and in the working of both the labor and antitrust laws against the concentration of economic power.

The familiar and constructive tension which exists between science, with its need to be free and open, and society, with its need for restrictions on individual freedom, is thus only one of many examples of conflicting forces that must be held in balance to assure individual dignity, creativity and well-being in our society. This tension between society and science extends to all the disciplines in the social, physical, and life sciences. It affects the practitioner as well as the research investigator.

Examples of this tension are many, and one of the most familiar is the conflict of secrecy for purposes of national security with the free dissemination of knowledge. This conflict is especially complex since dissemination of knowledge is essential to the very developments in science, industry, and government upon which the security of the nation ultimately rests. Additionally, there is the equally familiar conflict between proprietary interests and the disclosure of scientific knowledge. The private property interest at odds with disclosure may

be personal or institutional, commercial or nonprofit, but the conflict is essentially the same. In each of these two illustrative areas of conflict, tension still exists, but accommodations, imperfect as they may be, have been worked out to balance the competing needs and to serve the public interest.

There is, however, another area of tension involving the freedom of science which is not nearly so well recognized. This is the conflict of science and scientific research with the right, not of private property, but of private personality.¹ And it is to this particular conflict in values that this discussion is addressed.

The Moral Claim to Private Personality

Although scholars may trace its origins into antiquity, the recognition of a moral claim to private personality is relatively modern. For most of our recorded history, privacy was not physically possible in either the home, the place of work, or the place of public accommodation. Furthermore, privacy of belief or opinion clearly was not respected until the last few centuries. The record of autocratic government, both temporal and spiritual, is long and disheartening. Robert Bolt, in his moving drama, *A Man for All Seasons*, had the doomed Sir Thomas More say to his inquisitors: "What you have hunted me for is not my actions, but the thoughts of my heart. It is a long road you have opened. For first men will disclaim their hearts and presently they will have no hearts. God help the people whose statesmen walk your road."²

Three of the great forces that have nourished the modern claim to privacy are science, the secularization of government, and political democracy. It was, for example, science that brought about the industrial revolution and made privacy physically possible. Consider, as a small sample, what steam heat and plumbing have done to the design of our homes and to the manner of our living in them. Further, the separation of church and state encouraged pluralism as well as diversity in religious belief. And it was political democracy that in the last analysis elevated the concept of the essential worth and dignity of the individual to the place it now holds in the western world.

It is therefore only in the last few centuries that the primacy of the individual has emerged, has been articulated by philosophers, reflected in political institutions, and implemented in law. Although the moral claim to a private personality has developed along with the claim to individual freedom and dignity, such development has proceeded at a slower rate, perhaps because the western preoccupation with private property as the tangible expression of the dignity of the individual has tended, for more than a century, to obscure the claim to private personality on which the claim to private property was based. Not only did the interest in private property obscure the human claim to privacy but, over the years, it tended to define the claim itself.

Thus, in the absence of trespass, bodily injury, theft, or tangible damage measurable in money as in the case of defamation of reputation, our law has often failed to perceive injury to the private personality. This has led to such legal anomalies as now exist with electronic eavesdropping devices. Thus, if an eavesdropping device is placed next to a wall by a police officer, or brought into one's room concealed on the person of an invitee, then, under present federal law, there has been no affront to an individual's constitutional rights. Should the device, however, be a spike microphone and penetrate an apartment wall by only a few inches, then a trespass has been committed and the fourth amendment violated.³

Just fifty years ago Dean Roscoe Pound published a paper in the *Harvard Law Review* on "Interests of Personality."⁴ There he identified the claim to private personality as "the demand which the individual may make that his private personal affairs shall not be laid bare to the world."⁵ But though he thought the interest was clear, the law, he found, had been slow to recognize such an interest and raise it to the dignity of a legal right.⁶

Even had society's developing awareness of the claim to privacy not been blunted by the then dominant commercial concern for tangible property as evidence of personal worth, the establishment of a right of private personality was destined to be slow. For this there are a number of reasons. The right of privacy is largely a subjective, incorporeal right, difficult to identify and incapable of measurement.

Other more definable values, such as freedom of speech, loomed larger a century and less ago. Until recently, furthermore, science had not provided the devices which, circumventing the old concepts of property, make surveillance possible without an actual trespass. In addition, the modest range of governmental activities of a half century and more ago made the threat to the individual from government seem negligible. Furthermore, the formidable attributes of concentrated economic power were only beginning to be appreciated. Indeed, the aggressive spirit of individual self-reliance which prevailed in America would have made society's concern for the private personality seem incongruous.

It is reasonable, moreover, that the claim to privacy should evolve slowly, for privacy is in conflict with other valued social interests, such as informed and effective government, law enforcement, and free dissemination of the news. Whenever competing rights and values confront each other, it is always a slow and arduous process to evaluate the claim and counterclaim in real life situations. This process, however, is a classic function of the law. In time, therefore, the boundaries between the permissible and unreasonable interferences with privacy will be delineated just as similar conflicts have been resolved in the past.

Although the claim to private personality has yet to reach its destined stature in our law,⁷ it has become a moral imperative of our times. Reflecting the ethical values of our civilization, it flows, as do most of our values, from our concept of the essential dignity and worth of the individual. In discussing this concept in 1958, Pope Pius XII made the following perceptive observations:

There is a large portion of his inner world which the person discloses to a few confidential friends and shields against the intrusion of others. Certain [other] matters are kept secret at any price and in regard to anyone. Finally, there are other matters which the person is unable to consider.⁸

Pope Pius then concluded:

And just as it is illicit to appropriate another's goods or to make an attempt on his bodily integrity, without his consent, so it is not permissible to enter into his inner domain against his will, whatever is the technique or method used.⁹

While Pope Pius' ethics and logic seem persuasive, it is nonetheless a

fact that the protections afforded private personality are not yet comparable to those granted private property.

The rules for the protection of private property, whether in ideas, creative works, goods, or real estate, have received extensive legislative and judicial attention over many decades. These rules are imbedded in the common law and they have often been elaborately developed, as in our systems of copyright and patent law. Moreover, the manner of taking private property for a paramount public purpose has been a matter of intense and continuing national concern. Early evidence of the reverence with which private property has been viewed is found in the constitutional provisions against “unreasonable searches and seizures,”¹⁰ against the quartering of soldiers “in any house without the consent of the Owner,”¹¹ against the deprivation of property without due process of law, and against the taking of “private property . . . for public use, without just compensation.”¹² These constitutional protections have been judicially elaborated over decades of concentrated attention to the proper equilibrium between an identified public need and the claim to private property.

There has been no comparable abundance of legislative or judicial attention to the balance between the public need and the claim to private personality. The application of the first, fourth, and fifth amendments of the federal constitution to the claim to private personality is in a very early stage of evolution.¹³ More than thirty states have now recognized some form of a common law right of privacy; four have created at least a limited right by statute.¹⁴ Yet, another four states have rejected the existence of a right of privacy at common law,¹⁵ although the rejection may be more verbal than substantive.¹⁶ Thus, in terms of a sophisticated system of protections for the claim to private personality—protections discriminantly balanced to permit reasonable interference with privacy in appropriate circumstances—it is clear that our law has not yet matured.

The Nature of Privacy

What then is this emerging claim to private personality?

Private personality is as complex and many-faceted as human beings

themselves, but two principal aspects of the claim to privacy are clear. The one most frequently expressed is the "right to be let alone." This facet of the claim to privacy, first formulated by scholars¹⁷ and repeated by judges,¹⁸ was given widest currency by Justice Brandeis in his magnificent dissent in the *Olmstead* case.¹⁹ But there is another, and obverse, facet of the claim to privacy which has yet to receive equal attention: it is the right to share and to communicate.²⁰

Each and every one of us is well aware of this complicated, ambivalent personal need to communicate and the correlative need, even while communicating, to hold back some area, at least for the moment, for ourselves. Our personal experience is supported by the behavioral scientists. They have documented our need both to share and to withhold.²¹

We need to share in order to feel a useful part of the world in which we live; we need to share in order to test what we truly believe, to obtain the feedback from others which will shape our thoughts, support our egos, and reduce our anxiety. Communication is a form of nourishment, essential to growth and, indeed, to survival. In fact, we are told that if an individual is deprived of all sensory intake and thus isolated from all meaningful association with his environment, he promptly becomes thoroughly disoriented as a person.

Yet, as human beings we also need to withhold—and this for a variety of reasons. Some things which we cannot face we therefore suppress. There are other facts or fears that, although not suppressed, we neither prefer to know nor wish to discuss. Then, too, there are ideas or beliefs or behavior that we are not sure we understand or, even if we do, we fear that the world may not. So to protect ourselves, or our processes of creativity, or our minority views, or our self-respect, all of us seek to withhold at least certain things from certain people at certain times.

Psychologically, then, privacy is a two way street consisting not only of what we need to exclude from or admit into our own thoughts or behavior, but also of what we need to communicate to or keep from others. Both of these conflicting needs, in mutually supportive interaction, are essential to the well-being of individuals and institutions, and any definition of privacy, or of private personality, must reflect this plastic duality: sharing and concealment.

It follows that the right of privacy does not deal with some fixed area of personal life that has been immutably ordained by law, divinity, science, or culture to be off-limits and private.²² The essence of privacy is no more and certainly no less than the freedom of the individual to pick and choose for himself the time and circumstances under which, and most importantly, the extent to which, his attitudes, beliefs, behavior, and opinions are to be shared with or withheld from others. The right to privacy is, therefore, a positive claim to a status of personal dignity—a claim for freedom, if you will, but freedom of a very special kind.

The way in which the choice between disclosure and nondisclosure is exercised, and the extent to which it is exercised, will vary with each individual and with each institution. Indeed, the choice will vary in the same individual from day to day, and even on the same day, in differing circumstances. Thus, flexibility and variety are faithful companions of the concept of privacy.

The Scientific Challenge

The claim to privacy will always be embattled—its collision with the community's need to know is classic and continuous. Man has always lived in a community, and the community has always required some forfeiture of freedom, including that of privacy. It is, indeed, a fact of life that there has never been a condition of complete privacy for the individual insofar as he is a normal man living with other men. At one time or another, privacy has yielded, as it must, to the positive group needs for security, order, sustenance, and survival. The degree of privacy granted throughout history to an individual by one or another community has varied markedly with the nature of the political system, the economic level, the population density, and the characteristics of the environment.

It should also be recognized that not every threat to private personality is a matter of sufficient concern to warrant social protection. Similarly, not every technical trespass is serious enough to warrant social redress. The test is always: is the threat or the invasion unreasonable or intolerable?

Today, there are those who point an accusing finger at science and argue that science now poses an unprecedented and grievous threat to the privacy of personality.²³ The argument, while clearly exaggerated, is not implausible. Modern acoustics, optics, medicine, and electronics have exploded most of our normal assumptions as to the circumstances under which our speech, beliefs, and behavior are safe from disclosure, and these developments seem to have outflanked the concepts of property and physical intrusion, and presumed consent—concepts which have been relied on by the law to maintain the balance between the private personality and the public need. The miniaturized microphone and tape recorder, the one-way mirror, the sophisticated personality test, the computer with its enormous capacity for the storage and retrieval of information about individuals and groups, the behavior-controlling drugs, the miniature camera, the polygraph, the directional microphone (“big ear”), hypnosis, infrared photography—all of these, and more, exist today.

All these significant advances are capable of use in ways that can frustrate an individual’s freedom to choose not only what shall be disclosed or withheld about himself, but also his choice as to when, to whom, and the extent to which such disclosure shall be made. Notwithstanding the large contribution made by each of these scientific developments to the well-being of man, each is, quite clearly, capable of abuse in its application. Such abuse can occur in industry,²⁴ commerce,²⁵ the law and by law enforcement agencies,²⁶ medicine,²⁷ government,²⁸ and a myriad of other fields.²⁹

In the same way, abuse may be found in the area of scientific research with which we are primarily concerned. The one-way mirror is a common fixture in facilities designed for biomedical and behavioral research. Personality and ability tests are as familiar to researchers in these fields as a stethoscope is to the family doctor. The computer and electronic data storage and retrieval have become crucial to the intelligent and efficient use of research data. Socioactive and psychoactive drugs are ever more tempting research tools, as are the concealed camera and the hidden microphone. When these and other scientific and technological advances are used by scientists, they are used by highly trained, well motivated, professional people for a social

purpose on which the community places a high value. But this fact by itself, obviously, does not warrant the invasion of private personality any more than it would warrant the taking of private property or the administration of live cancer cells to a nonconsenting patient.³⁰

The recent advances in science have made it clear that society must now work out some reasonable rules for the protection of private personality. It is perhaps becoming imperative now to define how the interests of the community, whether in scientific research, law enforcement, or economic growth, can be accommodated with the need for privacy. The necessity for such an accommodation poses no idle problem. The consequences of the failure to resolve it are predictable: they begin with the recoil and revulsion of the community;³¹ they conclude with arbitrary legislation.

There is no doubt as to the community reaction to the administration, even in the name of research, of live cancer cells to unwitting patients. Nor should we expect that the community will be any more tolerant of behavioral research that subjects nonconsenting persons to the risk of injurious, though nonfatal, aftereffects. Indeed, community sensitivity as to what is reasonable or tolerable is not limited to situations where physical or psychic injury may be involved.

While neither the most representative nor serious intrusion, a well known example of privacy invasion in the field of behavioral research is the so called "jury bugging" experiment conducted by the University of Chicago. Financed by the Ford Foundation, this was a scientific inquiry conceived and carried out with the best of professional motivation and skill. Although the consent of the court and of opposing counsel was obtained in advance, the surreptitious probing of the individual and institutional³² privacy of the members of the jury shocked the community when the experiment became public knowledge in October 1955. Federal and state statutes were promptly passed, in 1956 and 1957, to ban all attempts to record or observe the proceedings of a jury.³³ The New York statute, for example, reads:

A person . . . who, not a member of a jury, records or listens to by means of instrument the deliberations of such jury or who aids, authorizes, employs, procures, or permits another to do so; is guilty of eavesdropping.³⁴

In New York eavesdropping is a felony punishable by imprisonment.³⁵

Another example where neither physical injury nor emotional trauma is necessarily involved is found in personality testing.³⁶ It requires no Cassandra to predict lawsuits by parents and a spate of restrictive legislation,³⁷ if those who administer these tests in schools, even for the most legitimate of scientific purposes, do not show a sensitive appreciation for both individual and group claims to a private personality.

The lesson is plain. Unless the advances of science are used with discrimination by scientists engaged in behavioral research, as well as by other professions, industry, and government, the constructive and productive uses of these advances may be drastically and unnecessarily restricted by a fearful community.³⁸

The Need for Equilibrium

Obviously, as Samuel Messick wrote recently,

Absolute rules forbidding the use of [personality tests] . . . because they delve into contents beyond the bounds of decent inquiry would be an intolerable limitation both to scientific freedom and to professional freedom.³⁹

It should be equally obvious—yet it may not be⁴⁰—that absolute rules permitting professional license in the name of scientific research to probe beyond the bounds of decent inquiry are equally intolerable to a free society and to free men. Absolute rules do not offer useful solutions to conflicts in values. What is needed is wisdom and restraint, compromise and tolerance, and as wholesome a respect for the dignity of the individual as the respect accorded the dignity of science.

If discrimination and discernment are in fact brought to bear, then we can be confident that the advances in science and technology pose no intolerable threat to privacy. Indeed, they promise to contribute more to an understanding of the claim to private personality, to the recognition of its proper limits, and to the protection of its creative integrity than anything in our recorded experience. Worthy of note is Dr. Robert Morison's reminder that ". . . the sciences are providing more accurate ways of describing moral problems, and are actually calling attention to types of moral problems which heretofore have not been recognized."⁴¹

It is not enough to be optimistic about the consequences of the ten-

sions between science and privacy. It is incumbent upon lawyer and scientist to accommodate the goals of science with the claim to privacy, and to help articulate the rules and concepts that will maintain both the productivity of science and the integrity of personality.

In his well known essay *On Liberty*, John Stuart Mill, while concluding that “over himself, over his own body and mind, the individual is sovereign,” continued,

There is a limit to the legitimate interference of collective opinion with individual independence: and to find that limit, and maintain it against encroachment, is as indispensable to a good condition of human affairs, as protection against political despotism.

But though this proposition is not likely to be contested in general terms, the practical question, where to place the limit—how to make the fitting adjustment between individual independence and social control—is a subject on which nearly everything remains to be done. . . . Some rules of conduct, therefore, must be imposed, by law in the first place, and by opinion on many things which are not fit subjects for the operation of law. What these rules should be, is the principal question in human affairs; but if we except a few of the most obvious cases, it is one of those in which least progress has been made in resolving.⁴²

Although more than a century has passed since this pessimistic estimate was made, its essential validity remains.

Our purpose is to identify some of the rules of conduct which, by providing balance and sensitive awareness, in this century can accommodate, and perhaps even resolve, the confrontation of the values of privacy with other values. While the focus here is on behavioral research, it should be emphasized again that this clash with the values of privacy is not unique to behavioral research.⁴³ The rules of conduct which can accommodate behavioral research to the claims of private personality may, it is hoped, provide useful parallels in other areas.

Behavioral Research and Individual Privacy

The traditional methods of behavioral research may, on occasion, involve a violation of the individual claim to private personality.⁴⁴ These traditional research methods can be grouped into three broad types: 1) self-descriptions elicited by interviews, questionnaires, and personality tests; 2) direct observations and recording of individual be-

havior; and 3) descriptions of a person by another serving as an informant, or the use of secondary data such as school, hospital, court, or office records.

These three major research methods do not necessarily lead to a violation of the claim to privacy. All may be and most often are used under conditions of anonymity or individual consent and with strict control over confidentiality. Nevertheless, each method, if improperly employed, can make serious inroads on personal privacy. Thus, some personality tests induce the subject unwittingly to reveal more about himself than he wishes to; carefully designed questionnaires and interview procedures can be used to trap the individual into making public those facts and feelings about himself or others that he would not wish to disclose. Similarly, direct observational methods can involve privacy invasion as, for example, in the use of one-way glass for the observation of children without their knowledge or in the use of an unidentified participant observer, such as a social scientist pretending to be a patient in a mental hospital, or a member of a minority group, or a drug addict among troubled juveniles. Descriptions of one individual by another, either oral or in the form of written records, can also be used in ways that invade the individual's privacy. Illustrative is information elicited from children about their parents' life together, or the description of husbands by wives, or the use of institutional records, originally compiled for one purpose, for quite another. Examples of the latter are found in cases where school data are made available to outsiders for research that is not related to the administration of the educational program, or where welfare data are made available for purposes not connected with the welfare objectives for which they were obtained.

Each of these three basic research methods may engage one or both of the two central—and ethical—issues which are at the core of the relationship between research and personal privacy. These are 1) the degree of individual consent that exists and 2) the degree of confidentiality that is maintained. The former concerns the conditions under which information is obtained from a person; the latter, the conditions under which the information is used.

Let us consider some of the ways in which these two issues are raised by behavioral research.

In the use of self-description, a privacy issue arises if the individual respondent does not participate willingly or if he participates without knowing what information is being elicited from him, or without understanding the purposes for which such information will be used. The nature of the private information being yielded can be obscured from the respondent either by direct artifice, by reliance on the respondent's ignorance or lack of sophistication, or by some form of coercion to enlist his cooperation. Similarly, with direct observations, a privacy issue arises if the examinee does not know he is being observed, or if he is put off by misleading instructions as to the nature or purpose of the observation or the identity of the observer, or if he is an unwitting participant in a deceptively constructed test situation. An examinee, for example, might be the only person not to know that a group of which he is a part is behaving in a planned abnormal manner so as to test his desire to conform. Where informants or secondary data are employed, privacy questions can arise in several ways. An inducement to a breach of faith or confidence may be involved; naïveté may be purposefully and systematically exploited. Alternatively, the information may have been supplied only because its nature or the subsequent use to be made of it was not known to the respondent.

In each of the three research techniques there can be an additional point of some complexity: were the privacy-related data obtained originally for a different purpose? For example, we may consent to yielding vital data for the purpose of being admitted to practice law, or society may properly insist on some loss of individual privacy in order to combat disease or other hazards to life or tranquility.⁴⁵ In any such case, however, the individual should not then be deemed to have consented, without qualification, to the subsequent use of such data by a credit agency, or by a member of the school board, or even a scientist engaged in bona fide research.⁴⁶

Lawyers are persuaded that they must not talk about their clients' affairs. While this is now a matter of professional ethics, this restraint is rooted in a recognition that any other state of affairs would corrode the trust which is the very essence of the professional relationship. The effectiveness of the doctor, plainly, is similarly vulnerable if patients ever believed they could not rely on their physicians to respect imparted

confidences. What would happen to the process of education if student attitudes, as revealed in the Socratic interchanges of the classroom, were recorded and reported by the teacher and then used for scientific research or for other purposes such as responding to inquiries by potential employers?

The point, then, is that consent and confidentiality have a pragmatic as well as a moral importance to the pursuit of any profession. The quality and effectiveness of behavioral research accordingly will depend on the confidence the public has in the behavioral scientists and the way they pursue their science.⁴⁷

The Concept of Consent

The essence of the claim to privacy is the choice of the individual as to what he shall disclose or withhold, and when he shall do so. Accordingly, the essential privacy-respecting ethic for behavioral research must revolve around the concept of consent.⁴⁸ Taken literally, the concept of consent would require that behavioral research refuse to engage in the probing of personality, attitudes, opinions, beliefs, or behavior without the fully informed consent, freely given, of the individual person being examined. There are, however, several reasons why the concept of consent cannot be so literally invoked in the name of privacy.

In the first place, a rigid and literal insistence on formal consent, in a research context, can readily become unrealistic. In some instances, insistence on consent would shake the validity of the research itself. The very selectivity involved in consent would ensure that the research was based on a biased sample and therefore could not be generalized to a wider population. And where subtle attitudes are being measured, knowledge of and consent to what is being sought is almost certain to distort the results. In other instances, the requirement of consent might frustrate the project at the outset.⁴⁹ Finally, in many instances a full appreciation of the nature of the research, the purposes to be achieved, and the risks involved would be impossible to convey fully because of their essential complexity, or because they involve unknown factors, or because they are beyond the capacity of the subject to understand.

Any application of the concept of consent as a privacy-protecting

test for scientific research is further complicated by the difficult factual problem of assessing, in each particular case, what constitutes consent. When is it informed; when is it freely given; who is entitled to give it? In research situations consent may be given by tacit acquiescence, explicit oral avowal, or written statement, or it may be implied from the totality of the circumstances. While each of these methods of consent can raise troublesome issues, implied consent is by far the most difficult.

Obviously, in many situations, consent can be fairly implied. Certainly, public figures, particularly those who appeal to the public for elective office, have implicitly consented to the yielding up of some areas of private personality. The comings and goings of a mayor, governor, or Hollywood starlet, and a public evaluation and discussion of their strengths and weaknesses in their public roles, are proper subjects of news report, analysis, and research. Similarly, when a client seeks occupational counseling from a psychologist, or a parent seeks educational guidance for his child, or when a patient seeks psychotherapy, he has consented to some probing and revelation of his private personality.⁵⁰ While the combination of circumstances that will warrant the implication of informed consent are myriad, restraint must be exercised not to imply such consent in the absence of reasonably compelling facts. Otherwise, the whole requirement of consent can too readily be rationalized away through implication.

Moreover, consent to the revelation of private personality for one purpose, or under one set of circumstances, is not license to publish or use the information so obtained for different purposes or under different conditions. This is especially so when the operative consent is implied or when it would be reasonable to assume that the initial consent would not have been given for the new purpose or the different situation. Further, varying degrees of consent must be recognized. Consent, however given, may be restricted in numerous ways—as to the methods to be used, the risks to be taken, the degree of information the subject wishes to give or receive, the type of data to be obtained, or the uses to which it may be put.

Another complicating factor in the concept of consent is the determination of whether consent has been freely given or coerced. Torture is an old and well tried technique for extracting private information—

and torture need not be physical. Mental anguish can be just as searing and difficult to endure. The prospect of release from suffering, therefore, is a powerful lever for access to the private area. Its uses for the manipulation of behavior or the probing for knowledge are not unknown to sheriffs and prosecutors, to personnel directors, school teachers, and parents—indeed, to virtually anyone who has experienced authority. Conversely, its uses are very well known by the jobless, the hungry, the homeless, the ambitious, and the young. The obvious cases of physical, mental, economic, or social duress are readily identifiable; but when does a subtle inducement such as the regard of your boss or even of your peers, or some inducement, not quite so subtle, such as an extra point added to your college grade in return for participation in psychological experiments—when do these become tantamount to duress? What about the vast prestige of scientific research itself as a means of persuasion upon the unsophisticated? And when does the relative disproportion between the knowledge, sophistication, and talents of the investigator and his subject make the consent of the respondent questionable, however freely and explicitly given? It is all too apparent that the distinction between consent and concealed coercion may often be difficult to establish. This is, however, the type of distinction with which our social institutions, in particular our law and our courts, have a demonstrated competence to deal.

As compared with the complexities of coercion, the problem of identifying the person whose consent must be obtained can, in most cases, be more readily resolved. Normally, when a competent adult is the examinee or the subject of research, he is the person whose consent must be obtained. If he is not an adult, or if he is not legally competent, then the consent must be obtained from the person legally responsible, namely, a guardian or parent. In the case of children, however, while the legal principles may be clear, a lingering ethical question remains. Should not a child, even before the age of full legal responsibility, be accorded the dignity of a private personality? Considerations of healthy personal growth, buttressed with reasons of ethics, seem to command that this be done. If so, then, in the case of adolescents (and probably even earlier), some form of prior consent to privacy probing should be obtained from *both* the parent and the respondent child.⁵¹

A special word should be said about anonymity in behavioral research. Frequently it is possible to obtain data of value for behavioral research where the subjects need never be identified by name. National opinion surveys are one example; the use of students in a college classroom may be another. Where anonymity in fact exists, the invasion of privacy involved in behavioral research might well be regarded as *de minimis*. Nevertheless, it must be stressed that anonymity is not a complete substitute for consent. An individual may feel on occasion that his privacy is being invaded when asked to reveal his thoughts or feelings or to describe his actions, even though he remains quite anonymous to the researcher. It is a fact that many people, even under conditions of anonymity, resist such revelation to others. It would therefore seem that, wherever possible, both consent and anonymity should be sought in behavioral research.

The condition of anonymity sometimes is used as a justification for the invasion of privacy in psychological experiments where the subject is deceived as to the meaning of the experiment, or where false information is given to the person so as to arouse or decrease self-esteem, motivation, or other similar feelings experimentally. That the subject remains anonymous, however, cannot justify the failure to obtain his consent prior to any such purposeful manipulation of his personality.⁵²

Behavioral scientists need no reminder that the concept of consent is not now universally operative as a condition of the research projects on which they are engaged. The use of human guinea pigs is not confined to prisons. Examples of "forced" submission to privacy probes can be found in our hospitals, our schools, our colleges, our social welfare programs, our research institutes, and our institutions for the disturbed, handicapped, or retarded. Such a disregard for the dignity of personality, occasional though it may be, must be guarded against and eliminated by the social scientists themselves.⁵³ If they fail or refuse to exercise self-control, then the community will inevitably feel compelled to act for itself and legislate for the protection of personal privacy.

While the knowledgeable, freely given consent of a participant should be a basic ground rule for all behavioral research, there is, of course, a need for exceptions. There must be, indeed, a fundamental exception to cover the many instances where society will accept the in-

vasion of privacy as permissible and reasonable. Thus, when the general welfare requires it and due process is observed, our society permits the taking of private property without consent. There is no reason to doubt that, under similar circumstances, society will permit at least a limited invasion, or taking, of private personality. Circumstances under which the community tolerates the probing into private areas without the consent and, if necessary, without the knowledge of the examinee do, in fact, exist. A number of examples can be easily found in law enforcement, selection for military service, social welfare work, protection of the public health, the national census, and the selection of employees for the Central Intelligence Agency or as airline pilots.

A public trial may also invade the privacy of the individuals involved in the litigation. Yet since our society is persuaded that a public hearing is essential to a fair trial and to social order, it finds the idea entirely reasonable that the individual claim to privacy must yield in this instance. Even here, however, the equilibrium between the competing values is sensitively preserved and there are occasions when the court is cleared or the testimony sealed.⁵⁴

Even where the public interest may warrant the taking of private property or of private personality, no absolute license is justified. The taking should be reasonable, it should be conducted with due process, and it should be limited to no more than what is necessary for the fulfillment of the public purpose which, in fact, warranted the invasion.

If we apply these principles to behavioral research, it is clear that, in determining whether the interference with the right of private personality is reasonable, one must appraise many diverse factors. They include such matters as whether the research is necessary or simply desirable; whether the identification of the individual is in fact required for the successful conduct of the research; whether the invasion of privacy is being limited to the narrowest extent possible; whether artifice and the risk of physical or psychological injury are being avoided; whether the research is being conducted by trained professionals under controlled conditions; whether the paramount public interest favors the research at the risk of a reduction in individual privacy; and whether the paramount nature of the public interest has been explicitly recognized or otherwise accepted by the community in its laws, by its

codes, through its political action, or in such other laborious ways that social consensus is reached and expressed in a free society.

The analogy between behavioral research in the public interest and investigative visits by welfare agents administering public assistance is pertinent. So are the words of the Deputy Commissioner of the New York City Department of Welfare:

The fact that public assistance is a statutory right means, therefore, that it is subject to conditions imposed by the Legislature. . . . It means that the Legislature may require that the applicant waive his right to privacy to permit a thorough investigation of his eligibility for public assistance. It means that the applicant must open his home to admit representatives of the Welfare Department to enter and to inquire and to observe. It does not mean, of course, that this permissible and necessary invasion of privacy may go so far as to violate the constitutional right against unreasonable search and seizure. It does not mean that the investigator may enter forcibly and without the consent of the applicant nor does it mean that the investigator may come in the dead of night, but it does mean that the applicant must submit to an investigation and, therefore, to an invasion of privacy which falls short of being unreasonable and that if he refuses to submit and refuses to permit such infringement upon his right of privacy, then he may not exercise his right to receive public assistance. The question, therefore, is wholly one of reasonableness and in this respect there may well be a difference of opinion among people of good will. . . .⁵⁵

A clear and paramount public interest in a particular behavioral research inquiry, in spite of a high cost in human privacy, can no doubt frequently be established. However, the recent emergence of behavioral science knowledge as a potential contribution to human welfare has yet to be matched with an explicitly recognized set of laws or codes or otherwise publicly expressed agreements on the value of different kinds of research. Thus, there are and will be many occasions in which conflict between the individual's claim to privacy and the larger community interest in research for the general good must be resolved—and the method of resolution must be an expression of community consensus.

This concept of consensus is not employed in any formal mechanistic way. In a sense, what is meant is that the issue of paramountcy as between private personality and a particular program of scientific research should not be left solely to the decision of the research investi-

gator. There should be some strong element of community approbation; the delicate balancing of the colliding values involved should reflect more than a single point of view.

Community consensus can obviously be expressed in laws, judicial decisions, or political constitutions. But it demands no such formal manifestation, and can also be expressed in far more subtle but equally pervasive ways. For example, consensus can be expressed in the values of our peers as they are articulated to us. Consensus can be formed through the stated views of our opinion leaders whether they be leaders in government, industry, labor, the professions, or the clergy. Consensus can also be reflected in the provisions of collective bargaining contracts between labor and management, in the executive orders or instructions issued by presidents, cabinet officers, personnel directors, and administrators of all kinds.

Most appropriate, however, for scientific research—as it is for all the professions—is the expression of a consensus on values in a published and operative code of ethics. Such a code yields a triple return: it articulates the values involved, uplifts thereby the awareness and standards not only of the profession but the entire community, and can provide a means for disciplining transgressions within the profession.

Thus, in launching any behavioral research project, the investigator should first determine whether voluntary, informed consent, as well as anonymity, can be accommodated with the integrity of the research. If not, the investigator should then ascertain whether the community consensus approves the conduct of the research under the proposed conditions, without the actual consent and anonymity of the subjects. As a minimum, this means the knowledgeable concurrence of those responsible for both the research project—for example, the financing institution—and for the well-being of the subject, as, for example, the administration of the college he attends. The history of public health and medicine in this country, and earlier in Europe, gives many illustrations of the establishment of just such a community consensus on the invasion of privacy for the general welfare.⁵⁶

One may anticipate that, as behavioral science develops and its contributions to society increase, the democratic process may afford to it more occasions of publicly approved invasions of personal privacy.

The Concept of Confidentiality

Whether private data are collected with consent, or without consent but with society's permission because of the perceived public interest involved, the minimal requirements of privacy seem to call for the retention of the private data in a manner that assures its maximum confidentiality consistent with the integrity of the research. Thus, the second privacy issue presented by behavioral research, as with all inroads on the private personality, is the issue of confidentiality.

One of the most important ways in which the concept of confidentiality in behavioral research can be served is to seek to design the research so that the responses of the persons providing the data can be anonymous; the design should avoid identifying any individual respondent with a particular response. While this should be possible in all opinion surveys, in many instances the nature of the research will require an ability to identify each respondent with the data elicited from him. This would of course be true in longitudinal studies, as of child growth and development, where respondents must be examined or interviewed a number of times, or in studies of several diverse sets of records which must be matched to a particular individual.

If full anonymity is not possible in the research design,⁵⁷ then there are several other safeguards which should be stressed to provide some degree of anonymity or confidentiality. The first, needing no more than a passing mention, is the integrity of the behavioral research scientist which, along with his interest in science, must be assumed as a basic prerequisite. The integrity of the professional scientist will assure both his informants and society at large that he will be responsible and will maintain the confidence of any information given to him by identifiable informants. That there are occasional breaches of professional confidence at this level underscores the significance of putting stress on the responsibility of the investigator both during his professional training and throughout his research career.

Another important safeguard for confidentiality can be provided through control techniques. For example, the identity of the respondent may be coded and separated from his response except for the code number. The code, in turn, may be made accessible only to a few of

the most responsible officials or, perhaps, only on two signatures or by the use of double keys. Even as elementary a safeguard as a locked file can make for substantial improvement. Penalties within the profession may also be devised for any breach of the confidentiality which should be of the very essence of professionalism.

Another readily available step is the destruction of research data. At the very least, that part of the data which would identify any individual with any portion of it should be destroyed, and destroyed at the earliest possible moment. Today, it is quite rare for an institution or an individual scientist to take what is now viewed as a radical step and destroy data which potentially has value over a longer time span. Indeed, behavioral scientists have strong incentives to retain all original research data.⁵⁸ Such data can provide information of a longitudinal nature about the development of personality or organizations over time, the early childhood antecedents of career success, the degree of change in interest and attitude from one age to another, the effects of marriage upon personality characteristics, and other fascinating problems. There are now great repositories of such data in the United States collected about individuals in schools, both secondary and college, and other institutional settings, which have been maintained because of this natural resistance of the research scientist to discard anything of such potential value. Nevertheless, the maintenance and use of this information for purposes other than that originally agreed to, and the threat to confidentiality inherent in its continued maintenance, strongly suggest that the proper course of the person or institution possessing such data is either to obtain the consent of the individual involved to its continued preservation, or to destroy the data, painful as the latter prospect may be.

It should be emphasized that neither the integrity of the scientist nor the technical safeguards of locks and codes can protect research data against a valid subpoena; such data are at present quite clearly subject to subpoena. In the last analysis, therefore, unless our laws are changed to accord a privileged status to privately given research information, confidentiality can be assured only by destruction of the data. The change in the law that is required to accord a privileged status to research data can be accomplished by statute. Thus, by stat-

ute in eighteen states⁵⁹ a privilege has already been afforded to information received by a psychologist from his client. This statutory privilege does not, however, seem to extend to psychological research.⁶⁰

While statutes may be desirable, they may not always be necessary. A privileged status has been afforded by the common law to communications between husband and wife,⁶¹ and attorney and client;⁶² privilege also inheres in constitutional doctrine—as in the privilege against self-incrimination. Thus, it is conceivable that privilege could be extended by the courts to other situations—perhaps in a persuasive case, where a research scientist was willing to resist a subpoena and risk imprisonment in order to protect the private research data in his possession. While there is a role for the martyr both in science and in law, privilege should not be viewed as a status symbol for the scientist.⁶³ It should rather be a protective shield for his informant. As the law now stands, however, it is apparent that the research scientist who probes in the realm of the private personality without consent bears a special and heavy responsibility to the subjects of his research. It is a responsibility for confidentiality which, at present, in the face of a subpoena he may find himself powerless to discharge.

A sensitivity on the part of the scientist to the limited purpose for which the research data were originally obtained is also crucially important to the protection of confidentiality. It is generally accepted that research data should not be published by the investigator with the identities of the individual subjects attached, and there is no reason why this same ethical sense of the confidentiality or the privacy of the data cannot be extended to other forms of publication. Thus, it should be part of the responsibility of the research scientist not to make his research data, in which individuals are identifiable, available to others, whether they are personnel directors, private detectives, police officers, journalists, government agents, or even other scientists.

Assuredly, one can visualize situations in which the release of research data for a use not initially contemplated would, because of the great public interest involved, be socially tolerable. But, just as certainly, it is possible to visualize situations in which it clearly would not. The sale of personal information to commercial organizations for subscription or mailing lists obviously falls in the latter category.

In determining the proper limits to be placed on the availability of research data, a workable proposition may well be to confine such data to the particular research purpose for which permission was initially obtained, or to a reasonably equivalent purpose. At the least, such a proposition might be accepted as an operative rule in the absence of persuasive considerations to the contrary. Of course, it must be recognized that as an individual may consent to an initial privacy invasion, so may he waive a limitation of that consent to the original research purpose. Care must, however, be taken in such instances that a waiver is not implied in situations where it may not have been intended.

As in other affairs, there is, unquestionably, a happy mean between excessive privacy and indecent exposure in behavioral research. One way to begin to establish such a mean is for the behavioral scientists themselves to demonstrate, by codes of ethics and research standards, their own acute sensitivity and concern for the problem. Psychologists have made a start on an enforceable code of ethical standards directed primarily to the client relationship.⁶⁴ Other disciplines can learn from their example and all can extend such codes more broadly to behavioral research.

An Ethical Code

From the foregoing there emerges an outline of the contest between the values of privacy and those of behavioral research. The community is sensitive to both values. Our society will support and indeed will insist on a decent accommodation between them. An accommodation which takes into account the ethical and legal obligations of the investigating scientist can be achieved without diminishing the effectiveness of the scientific inquiry. Scientists who are responsive to the claim of privacy will find themselves pressed to develop better and more rational research techniques. Their innate inventiveness can be expected to yield new and better research methods.

Not only will the behavioral scientists be inventive in accommodating the competing values of privacy and research, but in doing so they will be more sensitive to the complexities and nuances involved than either courts or legislatures. To be sure, however, judges and legislators

do have a supportive role and can be expected to fill it either by correcting abuses or protecting the responsible investigator who operates in accordance with the ethical consensus of the community.

The supportive measures available to the law, of which several have already been mentioned, are numerous and varied. One is the extension of a privileged status to the confidential communication of private information to a behavioral scientist. Another is the provision of civil or criminal remedies for the breach of the right of privacy.⁶⁵ A third is to assess and define the contexts in which, or the conditions under which, the cost in privacy is either marginal, *de minimis*, or permissible, because outweighed by the positive gains perceived for society in a particular research project. A fourth measure is to preclude public officials or employees from disclosing confidential information acquired in the course of employment.⁶⁶ A fifth approach is to develop "disciplinary proceedings" to enforce the claim to privacy against public officials in some form of mandamus or contempt,⁶⁷ and against private professional persons through disbarment or loss of license. Still another possible supportive legal measure is to require registration for the possession of all privacy-invading devices.⁶⁸ The alternatives are clearly varied. It should be noted, however, that the existing legislative attempts to prohibit eavesdropping by use of devices have been uniformly defective. The current statutes are either inadequate in scope or indiscriminate in application, or both.

A precondition for the development of a proper balance between the values of privacy and those of behavioral research is the growth among behavioral scientists themselves of a heightened sense of their own confidential professional relationship with their informants. One of the best ways of articulating and developing this heightened sense of the confidential professional relationship is through the development and observance of codes of ethics in which the claim to privacy is recognized.

Codes of ethics for the several disciplines of scholarship and research are sound and sensible, and such codes should be general rather than specific, simple rather than complex. A workable code of ethics should be subject to expansion, interpretation, and application in specific cases according to the distinctive character of the research situation.

In accord with this view, seven principles are suggested for inclusion in a general code of ethics for behavioral research.

- 1 There should be a recognition and an affirmation of the claim to private personality.
- 2 There should be a positive commitment to respect private personality in the conduct of research.
- 3 To the fullest extent possible, without prejudicing the validity of the research, the informed and voluntary consent of the respondents should be obtained.
- 4 If consent is impossible without invalidating the research, then before the research is undertaken, the responsible officials of the institutions financing, administering, and sponsoring the research should be satisfied that the social good in the proposed research outweighs the social value of the claim to privacy under the specific conditions of the proposed invasion. These officials in turn are responsible, and must be responsive, to the views of the larger community in which science and research must work.
- 5 The identification of the individual respondent should be divorced as fully and as effectively as possible from the data furnished. Anonymity of the respondent to a behavioral research study, so far as possible, should be sought actively in the design and execution of the study as a fundamental characteristic of good research.
- 6 The research data should be safeguarded in every feasible and reasonable way, and the identification of individual respondents with any portion of the data should be destroyed as soon as possible, consistent with the research objectives.
- 7 The research data obtained for one purpose should not thereafter be used for another without the consent of the individual involved or a clear and responsible assessment that the public interest in the newly proposed use of the data transcends any inherent privacy transgression.

Neither these seven suggested principles, nor any other set will resolve, nor should be expected to resolve, the productive tension between the needs and advancement of science and the vibrant diversity of human personality. If it is correct, however, that there has been a growing imbalance in the relation of science and research to the values of privacy, then either the dignity, diversity, and strength of the individual in our free democratic society will be diminished, or society will correct the balance. If the balance is to be corrected—as it will and must be—the lead should be taken by the scientific community through its own codes, its own attitudes, and its own behavior.

The Interrelationships of Law and Social Science

LEONARD S. COTTRELL, JR.

THE EMERGENCE OF new activities and forms within a social system sooner or later evokes regulatory operations designed to bring the new elements within the normative and institutional consensus. In western societies it is the legal system that is primarily responsible for these necessary adaptations, which involve critical changes in established norms quite as frequently as the established norms are imposed on the emergent activities themselves.

With the wisdom of hindsight, perhaps, one could say that the common characteristic of these situations is that recognition of the social significance and implications of the emergent elements frequently comes too late to avoid huge social costs in making the eventual and necessary adaptations. Great Britain had to lose its first and choicest colonial possession before it could make the necessary legal-political adaptations by which it was able to build its empire. Americans had to fight what was then the bloodiest war in history before they could deal effectively with the necessary transitions of power attending their industrial revolution. Who can count the cost of the barbarities we have endured and will endure before we recover from the consequences of uncontrolled and unplanned growth of megalopoleis? If past rates of adaptation of our integrating and control systems have been woefully laggard, what can we say about the current plight we are in, where the technical and professional training required at our present technological level becomes obsolete before it can even be put to use? And this is to say nothing of the adaptations of theory, practice, and institutional arrangements required to absorb and regulate the newly

emergent conditions and problems of social relationships that are posed by these technologies.

During our own generation, science has moved out from the schools to become a big business and a major component of our social system. With an incredible acceleration of pace in the production and application of new knowledge, this young giant has produced and increasingly will produce profound and far-reaching changes in the whole social system. It is high time, therefore, and indeed the hour is late, for us to move rapidly in a sustained and intensive effort to enhance the capabilities of our integrating and regulatory machinery and the consensus upon which it must rest if we are to encompass and harness these new, vast potentialities for man's welfare and higher development.

This sobering task will obviously require mobilization of the best talent and resources of both the legal profession and the scientific community. Because of the nature of the case, collaboration between law and those disciplines that are concerned with the phenomena of human behavior and social organization will be of critical importance. For it is in the threat, as well as the promise, that technical developments have for man's ordered social life and well-being that we find our most difficult problems of strengthening individual and collective competence to cope with the changing world.

Within the context of our discussion, there are two perspectives from which we might consider the interrelations of law and the social sciences. One perspective is that in which social science is seen as an expanding activity requiring the development of appropriate legal policies and rules for its control. This is an important and complex area and will become even more so as the social sciences play an increasing role in the world beyond the campus. Ruebhausen and Brim, in the preceding discussion, deal with one of a wide range of problems which will have to be approached with the greatest understanding and skill if we are to achieve responsibility and discipline without loss of the freedom and creativity necessary for productive scientific work.

Another perspective, and one, I assume, more in keeping with the purposes of my assignment here, is that in which law and social science are seen as disciplines that could profit by more effective collaboration. This is the approach I shall take.

In taking this perspective, we are, of course, making the assumption that there are essential and complementary differences between the two disciplines—an assumption not always agreed to.¹ Thus, when some time ago I suggested to the dean of one of our top law schools that he consider a program aimed at developing more effective working relations between law and the social sciences, he demurred at my assumption of difference. “What do you mean, *between* law and the social sciences?” he challenged. “Law *is* a social science, and I would go further and claim it is *the* social science.”

To debate the dean’s proposition would be tangential to our present concern. And indeed our conversation ended with at least some agreement that there were some differences that could make collaboration useful and interesting as well as difficult and problematic. I shall allude to some of these differences later.

The first observation, of course, about the relations between law and social science is their relatively complete insularity, which only in very recent years has begun to dissipate. To be sure, a vigorous tradition of sociological jurisprudence has existed for many years in legal scholarship. But while this tradition stems from the pragmatic empiricism and legal realism endemic to American culture, it has not led to any general systematic exploitation of social science resources by the legal profession in theory, research, teaching, or practice. Strangely enough, and this is more puzzling to me, this great tradition has not evoked a strong interest among social scientists to cultivate the rich, cultural, institutional, and social-psychological phenomena found in law for theoretical and research purposes, quite apart from any immediately utilitarian considerations of such exploration.² In any case, certainly nothing in the relations between law and the social sciences approaches that obtained between medical practice and the biological sciences.

It will no doubt be pointed out that there are exceptions to my assertion of mutual avoidance with respect to economics and criminology. Indeed in these instances there has been a history of reasonably persistent and deliberate collaborative activity. As to economics, I do not feel myself competent to judge. Here and there there are law schools with economists on their faculties. Legislators and law firms

serving corporations and labor unions use economists extensively. A host of administrative government agencies require the services of economic specialists. Such popularity must be deserved, and we may well have a type of cross-disciplinary relationship that should be emulated by the other social disciplines. The empirical questions of the nature and extent of actual interpenetration of economic and jurisprudential thought at policy, law-making, decision-making, and practitioner levels are significant and should be of great interest.³

In the case of criminology it is my impression that the preoccupation of the social scientist with causes of crime and his comparatively slight attention to legal-institutional, procedural, and penological theory and practice have tended to make joint undertakings unrewarding. Perhaps with the increased interest of social science in institutional analysis, criminal law procedures, treatment theory, and similar problems, the social scientists will have more impact on legal codes, theories, and procedures than is now evident.⁴

This detour into qualifying my assertion of a relatively complete insulation between the law and social science does not do much to alter the case. By and large, the towering ignorance and indifference on the part of most lawyers, concerning the social sciences and their potentialities, is matched only by the abysmal illiteracy and irresponsible neglect on the part of most social scientists, concerning the legal system. This may or may not be overstating the case, but I wish to turn attention now to the fact that in the past five years highly significant shifts have been taking place that promise marked and strategic changes in the relationships between the law and social science. In the past, of course, there have been noteworthy instances of collaboration in research, writing, and teaching.⁵ Here and there social scientists have been placed on law faculties, sometimes with the result that they have become more legalistic than their law-trained colleagues. There have been courses and seminars. The impact on either discipline, however, has apparently not been widespread or sustained. The distinguishing feature of the movement toward rapprochement in recent years is the drive toward institutionalization of channels of communication and collaboration in a way that should encourage the development of more comprehensive, systematic, and sustained relations

between the fields. Not the least significant aspect of this newer development is the emergence of the concept of cross-disciplinary careers in law and social science with attention and effort directed toward evolving appropriate training for such careers.

I should like to document, at least in part, the emergence of this new pattern of relationships by referring briefly to the experience of Russell Sage Foundation in its efforts to develop viable programs in law and social science.⁶ Before citing this experience, I must enter two disclaimers. First, the use of the experience of Russell Sage Foundation should not be attributed to excessive local pride. It is the best evidence I have. So far as I know, Russell Sage Foundation and the Walter E. Meyer Research Institute of Law are the only two funding organizations with major commitments of staff and funds to a systematic cultivation of this field. To be sure, there are other and larger sources of funds, such as the Ford Foundation, which have supplied generous support for specific projects frequently involving collaborative work. These efforts appear, however, to be more sporadic and *ad hoc* than guided by a systematic plan for accomplishing what we are discussing here. Other evidence is impressionistic but confirmatory. Conference discussions, reports of activities, requests for funds, all point in the direction we are heading.

In the second place, lest I appear lacking in gratitude to the past, let me say without quibble that the phase we are now embarking upon could hardly be conceived without the favorable climate created by the tradition of sociological jurisprudence, the experience of the legal profession with the economists and the criminologists, and the mounting literature and funded experience of the many individual explorers who have broken new trails through this as yet uncharted domain. Beyond the favorable climate thus created is the fact that social science in its theory and method has matured to the point where it can, at least to a reasonable degree, measure up to its responsibilities in the projected partnership.⁷

With these and any other appropriate apologies then, let me pass on to a brief review of Russell Sage Foundation's current program and some appraisal of its significance for future developments.

In 1947, under the leadership of Donald R. Young who became its

General Director at that time, the Foundation announced its intention to focus its resources on the development of more effective working relations between the social sciences and the practicing professions. Under this general program it offered support for a variety of projects that involved social scientists and members of a practicing profession in collaborative research, teaching, writing, and other activities designed to open the way to more productive relationships between the disciplines concerned.⁸

It was anticipated that the social welfare professions would be more nearly prepared than the others to participate in programs of the type indicated. Somewhat to our surprise, however, it was the medical and health professions that took the lead.

Notwithstanding persistent promotion, more than a decade was to pass before similar interests and opportunities appeared in the legal profession. But once started, developments came rapidly. Since 1959 projects in this field have been presented that have had the merit and promise to warrant appropriations by the Foundation of more than two million dollars. Over two-thirds of this amount has been allocated since 1962. Those who know the size of the Foundation's resources will realize that this represents a major commitment. Indeed, the opportunities for good investments in the field are now well beyond our capacity to support them. Activities have expanded from one program in 1959 to include sole or major support of interdisciplinary research and training at four universities,⁹ and more limited projects at four additional universities.¹⁰

Perhaps a more accurate indication of the growth of interest in the program is seen in the numbers of persons involved. The first project involved one sociologist and one lawyer with two part-time assistants. By 1963 to 1964, participants in the various programs included twenty-eight law faculty members, thirty-five social science faculty members, fifty law students and law graduates, and ninety social science graduate students and postdoctoral fellows.

That the impact of these programs is now spreading beyond the immediate participants may be surmised from the reports of new courses in being or projected and the increasing numbers of articles published or in preparation, as well as from the mounting volume of

working papers for informal seminars and special conferences. Of special interest is the formation in 1964 of the Law and Society Association, whose membership is to come primarily from law and the social science disciplines. Leadership in the organization of this group came from members of the four university training and research programs already mentioned and includes both lawyers and social scientists. At the present time, approximately six hundred persons have expressed an interest in membership and in subscription to a quarterly journal now projected and financed, which, it is hoped, will provide a much needed channel of communication among persons working in this field.

To be sure, increasing funds invested and numbers of people involved offer promise of important gains only if work of strategic significance is actually being done. The programs mentioned in this report have been in operation too short a time to provide a firm basis for evaluating their impact. A brief description, however, of what these programs are attempting to accomplish should enable us to form a tentative judgment as to whether they promise to contribute substantially to a firm and viable relationship between law and the social sciences. While the programs differ in some respects, they have certain basic objectives in common that they are seeking to implement in a variety of ways. Chief among these objectives are:

- 1 Systematic cross-disciplinary training for younger faculty members in law and the social sciences. This may be done in some instances through providing released time for law faculty members to take formal work in social science theory, research methods, and substantive fields, and for social science faculty members to take formal work in law. Some of these participants have undertaken to satisfy the requirements for a law degree or an advanced degree in social science, as the case may be. In other cases, the cross-disciplinary training is provided in special courses and seminars.
- 2 Provision for intensive collaborative experience in the identification and conceptualization of problems in which there is a convergent interest on the part of lawyers and social scientists, and in the development of appropriate designs and methods for research on these problems. Some of these efforts result in actual collaborative ventures; others in research by an investigator from one discipline, with intensive consultative help from one or more members from the other disciplines.
- 3 Provision for cross-disciplinary working seminars which permit all par-

ticipants in the programs to present significant problems for research which they are seeking to define and conceptualize, to discuss theoretical formulations and research designs, and to outline research procedures and methods. In addition to improving the quality of theory and research design and methodology, these working sessions contribute materially to the development of skills in cross-disciplinary communication.

- 4 Provision of support for small-scale research projects and for pilot phases of larger projects for which additional outside funding is to be sought.
- 5 Development of curricula, special courses, and seminars for senior law students and law graduates, and for those graduate students in the social sciences who are interested in training in law and social science, which will provide supervision and research experience for these students and financial assistance in the form of research assistantships and fellowships for those of outstanding promise. In addition to the assistantships and fellowships available through the university programs mentioned above, the Foundation itself offers a small number of post-LL.B. and postdoctoral residencies to help graduates of high scholastic standing to gain additional training and experience for cross-disciplinary careers.
- 6 Preparation of manuscripts for publication of research findings and of materials for use in courses of cross-disciplinary interest.

Whether or not these objectives will be realized, and whether or not the essential elements of the programs will be absorbed in the perduring structures and budgets of universities is the kind of gamble foundation boards and staffs have to take and properly should delight in. The important point is that, given even modest success, we shall have moved well beyond the *ad hoc* bits and pieces phase of cross-disciplinary work toward a much more systematic and solid bridging of the gap between law and social science. Crucial components of such an achievement will be a substantial increase in sustained attention from both disciplines to the potentialities of systematic collaboration; increased literacy of each discipline in the other with consequent augmentation of competence in meaningful cross-disciplinary communication; increased supply of personnel with the technical and professional training required to function efficiently in cross-disciplinary enterprises; increased facility for identifying strategic areas and problems of research that represent convergent interests of the two disciplines and for the development of adequate conceptualizations and methodologies appropriate for addressing these problems; a number of at least

partially tested models of institutional structures for facilitating collaborative operations; and, we hope, a body of literature reporting what was accomplished and analyzing the conditions determining the successes and the failures.

A large order, no doubt—but we are confronting large issues. I refer here not to issues seen in the perspectives of academia merely, but to urgencies of the real world that will cause us to tax our joint capabilities to the uttermost to contain them, if indeed they can be contained. We cannot attempt here any systematic coverage of problem areas that appear to require such effort. A few illustrative areas must suffice.

One can venture only a frightened glance at the staggering task of determining the moral, legal, and scientific bases for a competent world community, and observe not only that mankind will achieve some such *modus vivendi* or fail to survive, but that the most intimate and intensive collaboration of the legal profession and the social sciences will be indispensable for even the most preliminary approach to the problem.

Turning quickly, and with some relief, to a less awe-inspiring domain of problems that call for combined attack, I should like to suggest the general area of the creation and maintenance of a consensual basis for societal integration under conditions of modern urban industrial life. Social control, in the sense of the adaptation of the behavior of persons and groups to meet the requirements of collective living, is a focal interest of the social scientist. He conceives of effective control as resting ultimately upon the incorporation in the behavioral repertoires of the constituent individuals of a shared system of values, and meanings, and systems of reciprocal role patterns—in short, the consensual basis of the society.

Social control is, of course, the central concern and function of the legal system. While no formal system of rules and procedures could encompass the intricate, interdependent activities represented in the basic consensus of even a simple society, the legal system does define metes and bounds and provides a structure of rules and sanctions for the minimal requirements for preservation of the system. But the efficacy of even this minimal framework rests ultimately upon the basic consensus of the society in which it functions.¹¹

When the definitions of relations and mutual systems of reciprocal expectations and obligations that make up the operating consensus become ambiguous and lack consistent general acceptance and support, society tends to resort increasingly to formal legal controls. This is, in my opinion, an exceedingly important aspect of the so called "law explosion"¹² in this country. When the complex functional differentiations in modern urban industrial society are complicated further by geographic, class, ethnic, and racial differentia, integration of the community, based on an adequate working consensus, is more and more difficult to achieve and to maintain. Under these conditions there is a tendency for fragmentation and alienation of groups, especially those who perceive themselves as deprived, disadvantaged, or threatened. It appears futile to try to meet this problem by elaboration of formal rules that in turn are relatively impotent unless based upon a vigorous consensus. It may well be that this is all we can do, in the hopes that a new moral consensus will emerge. But it strikes me that here is a prime field for law and relevant social science disciplines to collaborate in devising policies and mechanisms aimed at facilitating the emergence of a more adequate consensual base for the American community. This has been borne in upon me as I have followed the experience of some of the comprehensive community action programs mounted by the federal government and aimed at the problems of delinquency control and youth development.¹³ From these efforts, it has seemed pretty clear that merely strengthening the formal legal and law-enforcing agencies, and even the schools and welfare agencies in the target demonstration areas, would have little impact unless these and other efforts had the understanding and support of a community competent to participate in the formulation and the implementation of the goals. This obviously calls for capabilities of developing a working consensus upon which collective action can take place.

Clearly, one of the indispensables in the development of consensus is the capacity to participate in the communicative processes of defining goals and issues, sharing information, articulating and clarifying one's own stake in the situation, and reaching mutual understandings, agreements, and commitments.¹⁴ Any segment of the population that cannot participate effectively in this process will remain an alien body

and a severe handicap in achieving the necessary working consensus.

There are many alienated segments in our population, not all of them in the slums by any means. To judge from the number of social policy and legal questions, as well as social science problems, that we encounter in trying to upgrade the capabilities of some of these groups to participate effectively in community processes, I have no doubt that both disciplines will find this a worthy area for collaborative work. Such work should include analysis of the processes of involvement and of the conditions for competent interaction, and the fitting of this knowledge into appropriate social policy, legislative, and administrative formats that will not only provide the regulatory framework for the social-political process, but facilitate it as well.

One aspect of this problem of alienation and consensus building that raises explicit and significant problems for the legal profession has to do with differential accessibility to the protections and remedies of the law. One of the characteristic orientations of inarticulate alienated groups in our demonstration project areas is that the law is conceived of as the enemy. Neighborhood legal service centers set up to combat this attitude by providing increasing accessibility to legal advice and representation have highlighted the need for a thorough going examination of the problems of how to provide adequate legal information and assistance to all citizens. The required conditions of a vigorous and healthy consensual basis for the social order call for a broad accessibility of legal resources parallel to the accessibility of health and educational resources. This problem, of course, is attracting increasing attention.¹⁵ I mention it as another area that offers opportunities for productive joint efforts of the lawyer and the social scientist, and indeed demands such joint efforts.

It is not appropriate here to extend further our consideration of the many and varied problems of developing and maintaining the consensual foundations of our society and of implementing them in law. What has been said should at least suggest the need for efficient professional teamwork in more sophisticated assessments of the actual consensus and its fluctuations, and in devising ways and means of facilitating the achievement and maintenance of new bases of social order under the rapidly changing conditions of modern life.

While we are at this general level of discussion, let me mention briefly one more general problem area that, in my opinion, should be attracting sustained attention from social scientists and legal scholars. I refer to the complex of problems posed by the tension between the inherent necessities for increased centralization of control and coordination imposed by the continued growth of modern social systems in size, complexity, and interdependence on the one hand, and the deeply held values placed on the integrity, autonomy, and unique value of the person on the other. The sobering presentation by Ruebhausen and Brim in the preceding discussion of the problem of the tension between the needs of research and the individual's right to privacy is one concrete instance of the general problem. The problem they pose goes beyond that of scientific striving for more and more knowledge. The requirements of administering an intricate interdependent social system in which more and more accuracy in predicting human behavior is demanded, literally thrust us into the inner world of values, perspectives, attitudes, and self-conceptions out of which the person mobilizes his readiness for overt action. In other words, quite apart from any particular research need to invade privacy and any particular social interest involved, there is the general need to know more about persons and what to anticipate from them. This conflict may well be too general to be dealt with, instance by instance, on the issue that a particular investigation is relevant to the public interest, although it is quite likely that, practically speaking, this is the best we can do for the time being.

It may be, of course, that this emphasis on the integrity and worth of the individual is a culture-bound value that will have to give way to the overriding necessities of sheer mass and the complexity of vast corporate systems. One shudders at the prospect.

It is my own conviction that we have not begun to exploit our research and development capabilities and inventive potentials for devising social organizational and communicative technologies, and the human developmental know-how that will make possible genuine and effective participation of the citizen in the shaping of his destiny.¹⁶ At any rate, what a splendid arena for law and science collaboration!

While the foregoing problem areas are difficult to reduce to clearly

formulated research programs representing convergent interests of the two disciplines, they are, in my opinion, of strategic importance, and it is gratifying to note that the research activities of the university programs I have already mentioned are including at least some aspects of these larger issues.

A somewhat more concrete area containing more readily identifiable and specific problems of cross-disciplinary interest is the study of law and its complex of institutions as a social system. Not only are problems in this area more amenable to definition and research design, but they are of more immediate interest and relevance to those interested in updating our legal institutional system and upgrading its capabilities for dealing with the mounting load placed upon it.

Reports of research in this field currently under way or projected include broad-scaled studies of the articulation of the legal system with other components of the social system, such as the economic, political, welfare, and religious systems. Efforts to analyze the role of legal institutions in the processes of social change are of especial interest. Investigations of more limited and specific objectives include such studies as: the operation of informal decision-making processes in law enforcement and adjudication, and how these processes relate to the operation of the formal machinery; the relative efficiency of the adversary process; the effects of pretrial discovery procedures; problems of the use of social science findings in legal procedures; the adaptations required to ensure equal justice in an unequal society; adaptations required to ensure the proper legal safeguards in the juvenile courts and, at the same time, retain the advantages of an informal and therapeutic climate; analysis of factors determining location in the status structure of the bar and the processes by which such locations affect vulnerability to pressures to violate professional norms.

The list could be extended much further and appears to be quite a mixed bag, without system or sense of direction. Nevertheless, these activities represent necessary and desirable explorations in a new domain and should provide the experience for developing more systematic and strategic programs for joint research.

The experience, observations, and impressions registered in this rather discursive report lead me to conclude that while the interrela-

tions of law and the social sciences must still be regarded as somewhat inchoate, uncrystallized, and problematic, we nevertheless appear to be headed toward the emergence of patterns of relations that are much more sophisticated, productive, and viable than we have ever had in the past. Given the present level of apparent motivation and rate of movement, and assuming reasonable continuity of support, it would seem that the essential elements of productive models of collaboration should become reasonably clear within the next decade.

In closing, I am moved to an appreciative comment on the special significance and appropriateness of this interchange between lawyer and scientist, where lawyers find themselves in the midst of a distinguished body of scientists—a growing community of those whose minds are as comfortable probing the awesome depths of endless space as they are in contemplating energy particles whose entire life span is less than a millionth of a second, and whose fingers are well-nigh touching the ultimate secrets of life itself. In their magnificently heedless drive to know, scientists are almost daily producing knowledge that shakes to the very foundations the hardly won edifice of belief, rule, and practice by which man orders his relationships to himself, his fellows, and his universe.

There is nothing new in the scientist's upsetting the societal applecart. He has been doing so ever since the first man used a stick or sharp bone or flint as a tool or weapon. The novel and critical features of our present situation—namely, the magnitudes of the variables involved and the steepness of the curve of acceleration—pose, as never before, the problems of ordered change and optimal utilization of the products of scientific creativity. If we are to cope with these problems, since there is little likelihood of any respite, it is imperative that the legal profession and the social sciences move rapidly towards a working relationship of maximum productivity.

Legal Inquiry and the Methods of Science

HARRY W. JONES

TO THE MIND OF the Middle Ages, the world of science and the world of law were not as far apart as they seem to the modern mind. In the world view of the thirteenth and fourteenth centuries, the eternal law, God's ordained and promulgated reason, provided both the government of inanimate nature and the constitution for control of human behavior and interpersonal relations. The man of science and the man of law were both interpreters: the scientist striving to discern and formulate the eternal laws of nature that explain physical phenomena, the lawyer striving to apprehend and make effective the moral structures of God's natural law for man. It would not have occurred to Thomas Aquinas that there would be any great intellectual or cultural difficulty about interdisciplinary understanding between scientists and lawyers—he would have said that the scientist and the jurist are, at farthest remove, workers in neighboring vineyards.

This felt affinity of science and law has disappeared with the theocentric world view that gave it birth. No explicit postulate of divine ordinance supports the logical structure of contemporary science, and law, for its part, is studied and appraised as a product of human will, judgment, and artifice. The old affinity of law and science seems remote and even quaint to us; the best we can do to relate the scientist's vocation to the lawyer's is to say that there is a certain unity in the creative process, that science and law—however manifest their differences in method, effect, and product—are both forms of man's culture, efforts by human intelligence to understand, explicate, and universalize the varieties of experience.¹

Beyond this, we are properly suspicious of claims that the work of the scientist and the work of the lawyer can be reduced to anything like a common denominator. The scientist's field of action has become increasingly inaccessible to the lawyer, as to other outsiders, as science becomes ever more abstract and deductive in character. The "hard" sciences are, indeed, hard going for the legally trained mind. A lawyer of scientific interests can still, if he works hard at it, achieve an amateur's beginning of an understanding of the essentials of contemporary physiology, where observation and laws proceeding directly from observation are still relatively central, but he is lost in the abstract world of contemporary physics, where the scientist speaks the Pythagorean language and seems to roam in a world far removed from the world of ordinary sense-experience. And, since Lord Snow has been cited more than once during our discussions, let me proclaim that the admission fee to these mysterious precincts of science is far more than the mastery of the second law of thermodynamics. I know, because I have done my own homework on Lord Kelvin, with the hope that this might give me a Rosetta stone, but the literature of contemporary physics remains as opaque to me as it was when I thought that a Carnot cycle was some kind of velocipede.

Limitations on the Scientific Analogy for Law

My first point then—and here I anticipate one central and pessimistic conclusion of this paper—is that I am highly skeptical as to whether the methods of contemporary science provide any pat analogy that can be taken over bodily from one or more of the natural sciences for the modernization and enrichment of legal inquiry.

The scientist, for his part, must be warned that legal scholarship, at times, uses an Aesopian language. When law is spoken of as itself a "science," as it was eighty years ago by Dean Langdell, the founder of the law school case method and, more recently, by Mortimer Adler and Hans Kelsen, the speaker's manifest analogy is not to methodology in the physical and life sciences but to the "sciences"—if they can be properly so characterized—of formal logic and mathematics. The idea reflected in this analogy is that law can be approached as if

it were, like formal logic, an abstract deductive system without basis in, or point of contact with, particular empirical data. Said Langdell: "Law is a science, and all the available materials of that science are contained in printed books."² Similarly, Adler's "science of law in discourse" is, in his own words, "a purely formal science, like mathematics; its subject matter is entirely propositional; its only instrumentality is formal logic."³ The purity of Kelsen's "Pure Science of Law" is achieved only by excluding from the province of jurisprudence all questions concerning the desirable content of legal rules, all issues about the efficacy or inefficacy of particular legal norms as influences on individual and social behavior, and all speculation or investigation as to the extent to which decision-making officials of the legal order conform their rulings to formal legal prescriptions. In short, legal discourse is made "scientific," in this formal logical sense, by excluding precisely the questions—the nature of the social reality to which law is addressed—on which scientific knowledge is most needed and for which the scientific spirit of disciplined empirical investigation and verification seems best designed. It is as if empirical investigation in physics were to have stopped after Newton, and the whole genius of contemporary physics been given to the sharper definition and formal elaboration of the concepts of Newton and his predecessors, without continuing enrichment from challenging new postulates and their experimental verification and ultimate inclusion in the deductive structure of scientific knowledge.

The promise of the scientific analogy for the improvement of legal or law-related inquiry is further reduced by the unhappy but inevitable intercultural circumstance that it is often an outmoded, unduly literary or otherwise oversimplified version of scientific method that is used as a model by the enthusiast for a more "scientific" approach to the problems of the legal order.⁴ The literature of legal and social philosophy furnishes many instances of this kind of reasoning from a false or misleading scientific analogy. Charles Darwin's theory of the origin of species, seized upon and spectacularly oversimplified by Herbert Spencer, was transmuted into the social and legal theory of cultural evolution; law and government should not intervene to mitigate the sufferings of the indigent because that would interfere with the work-

ings of the all pervasive process of “the survival of the fittest,” the “beneficent but severe discipline” by which the unfit and their dependents are eliminated from society. The late Judge Jerome Frank, a man of great good sense and intellectual resourcefulness, once built an imposing edifice of legal theory⁵ on a popularized version of psychoanalytic theory that would have horrified Sigmund Freud fully as much as Spencer’s “philosophy of evolution” must have horrified Charles Darwin. Legal scholars of my generation were substantially misled, I think, by an oversimplified account of scientific method in the writings of John Dewey, particularly in an article entitled “Logical Method in Law,”⁶ in which he said—or seemed to us scientifically unsophisticated law professors to be saying—that scientific method was, above all, the method of experiment, and that the postulational structure of the sciences was of only secondary importance. Whether the fault was Dewey’s or our own, many legal scholars, for at least a decade, tended to equate scientific method with simple trial-and-error procedures and proclaimed that law could be made more “scientific” at once if legal scholars and practitioners would only become more experimental in temper and pay less attention to general ideas.

Certainly there are characteristics of scientific procedure that can be borrowed for the disciplining of legal inquiry. We must give more thought than we have so far in law to quantitative measurements of the measurable and to the design of procedures to measure the presently unmeasurable. We have a great deal to learn from science about the importance of casting the results of legal inquiry into a form permitting verification by others and about the central significance, for social inquiry, of rules of correspondence that will relate theoretical notions to observable societal data.⁷ But it is wildly uncritical to suggest that the methods of science can be taken over lock, stock, and barrel for investigation of the problems of law in society. Dr. Bronk and I may be workers in neighboring vineyards, but I cannot easily copy his methods of cultivation for my very different soil and vines. Nor can he too easily copy mine, assuming for the moment that he would ever want to.

Law is not a science, and references, however casual, to “legal science” or to “the science of law” are deceptive and misleading. How-

ever law is to be characterized—as a discipline, an art, a control system, or a technology—law exhibits none of the essential attributes of a science. Legal propositions have their origin not in empirical observation but in authoritative pronouncement by a court or legislature. Neither do these propositions constitute a unified system; the propositions of law, even in a code country like France or Germany, are at most an aggregate, not a deductive hierarchy. And propositions of law are not verifiable by experiment or investigation; the ultimate test of legal truth is not verifiability of results by other members of the legal community but an authoritative adjudication, often arrived at, in the frontier areas of legal dialectic, by a vote of five judges to four or six to three. A fact in science is not important in itself but has its significance as an instance of a general law. A *case* in law is wholly misunderstood if approached as merely an instance of some general rule; indeed, law's general rules are means of diagnosis, instruments for the just and consistent decision of particular cases.

Even the sociology of legal scholarship differs dramatically from the sociology of scientific scholarship.⁸ The scientist chooses as his subjects for investigation those within his competence that can contribute most to the advancement of knowledge. If he thinks at all of the practical applications his postulate will have, once it is verified, this thought is at most secondary. By contrast, the legal scholar is incurably—and I think rightly—reformist and application-oriented in his choice of subjects for investigation. The best “scientific” work—or most nearly approaching scientific work—now in progress in legal scholarship is in areas like judicial administration⁹ and criminal law enforcement,¹⁰ where the applications are clear whenever trustworthy knowledge is arrived at and made accessible.

The scientist who would understand law and legal inquiry must be mindful that law has its own unique purposes and values, even its own logic.¹¹ Law's great purpose is not the advancement of knowledge—although we lawyers like to think that law provides and maintains the conditions without which effective pursuit of knowledge would be impossible—but the maintenance of social stability, that is, preservation of the public peace and of certainty in human affairs, the settlement of disputes, and the engineering of social change. Law is impera-

tive in its essential tenor. It prescribes the norms to which members of society are to conform their conduct, and coercion, sanction, and obligation are the forces by which law's imperatives are made effective. Science, by contrast, is descriptive and explanatory; the scientist may manipulate natural forces, as in his controlled experiments, but only to verify his hypotheses and so to extend the frontiers of knowledge. Law's controls are imposed not as means of experimental investigation but because it has already been decided, and more than provisionally, that the behavior ordered is in the public interest.

Perhaps the most striking difference of all is that law, as a discipline and cultural form, is far less *autonomous* than science. Scientific truth is objectively verifiable. The community of scientists is the ultimate tribunal in which asserted new contributions to knowledge are appraised and judged. Law lacks this autonomy and is inseparably linked to political processes and to public understanding and acceptance. Every legal scholar in the United States might agree that a certain projected ordering of affairs would be just and socially preferable to that provided by the existing law, but that new proposal would not be law—"legal truth," if you will—until some high court or, in farther-reaching matters, some legislative body has authoritatively declared that it is to be the law. Scientists might be kinder to their legal brethren, and more patient than they are about the glacial rate of change and improvement in legal institutions as compared to the explosion of knowledge in the natural sciences during the past fifty years, if they kept in mind the fact that fundamental changes in the legal order, even those aspects of the legal order that bear most directly on science, can be accomplished only at the sufferance of popularly elected lawmakers. It is as if natural scientists in the United States had been unable to proceed along the directions pointed to by Bohr's theory of the atom or Heisenberg's indeterminacy principle unless and until two congressional committees and a majority of the members of both houses of the Congress of the United States were satisfied that Bohr and Heisenberg were quite right in their theoretical conclusions.

It should be evident from what I have said so far that the better characterization of law is that it is not a science but a complex and crucially important social technology. This is not to say that social

phenomena—individual and group behavior—are not proper subjects for truly scientific study. It is to say that the societal equivalents of physics, chemistry, biology, and the other natural sciences are not *legal* disciplines but are rather sociology, anthropology, social psychology, and the other social or “behavioral” sciences. Even in the universe of intellect and high theory, law is not an autonomous discipline; fundamental improvements in the technology of law and government will come, over the long pull, only as we begin to acquire genuinely scientific knowledge concerning human nature and conduct. I am wary of the dangers involved in drawing hard and fast lines between “basic” and “applied” sciences, as if these were clear and mutually exclusive categories, but it is instructive, I think, to suggest that law as an applied science relates to sociology, economics, and the other social sciences in much the same way as engineering relates to physics, industrial technology to chemistry, and the applied science of medicine to biology and physiology.

The analogy to medicine as an applied science—and art—is particularly appropriate because in law, as in medicine, a technology applied by the working profession was fully grown before its corresponding “pure” sciences began even to emerge from postulational and methodological infancy. Medicine as a profession and technology was prescientific, roughly and often hazily empirical, until at most fifty years ago. The miraculous advances of medicine are, in a sense, by-products of revolutionary theoretical advances in fundamental scientific knowledge. Similarly, until the tardy emergence of the behavioral sciences, law was an applied science in search of a basic science.¹² Nothing is further from my mind than to belittle the social function of law or to suggest in any way that legal propositions and practical legal decisions were arrived at arbitrarily and a priori, in disregard of understood causes and consequences. Law, in a real sense, was the custodian of such behavioral science as there was in the universities and elsewhere, and many of the great men of the law—Ulpian, Bentham, John Marshall, Geny, Holmes, and, in our own day, Pound and Llewellyn—had piercing insights about social values and forces and about the norms of individual and social behavior. But these legal insights were and are

speculative and prescientific, that is, intuitive, largely unverifiable, and commonsensical. Some great guesswork went into the construction of the great institutions of Roman law, and into the great institutions of our common law, but in any truly scientific sense guesswork it was.

Does punishment deter? What is the relative force of coercion and internal obligation as influences on law-observing behavior? To what extent do rules control decisions? These are among the great themes of jurisprudence, themes to which profound legal thinkers have devoted their best efforts for two thousand years, but we have no really verifiable scientific knowledge on any of them, and the social sciences, as yet, have little help to offer us.⁴³ Lawyers, I make bold to assert, are by natural capacity, training, and experience the most resourceful technicians in our society but, as yet, they have little scientific knowledge to draw on. The social sciences, despite the great advances they have made since World War II, are still relatively primitive in their methodology and conceptual structure, not only as compared to the perfect deductive edifice of contemporary physics but also as compared to the state of knowledge in what the physicist or the chemist considers the “soft” sciences.

Serious consideration of the question, “Can law be scientific?” thus leads directly and inevitably to the question of whether the newer sciences of society—sociology, social psychology, economics, political science, and the like—can ever achieve anything remotely comparable to the conceptual structure of verifiable postulates characteristic of present-day scientific knowledge. By and large, the contemporary social sciences are fully “scientific” only in their aspiration—and perhaps in the unintelligibility of much of their rhetoric to the interested outsider—and vast methodological problems loom ahead as these infant sciences move towards maturity. These methodological problems—the very limited availability of controlled experimentation as an instrument of inquiry and verification in the investigation of social phenomena; the restrictions on social inquiry imposed by the social values embodied in the right of privacy; the difficulties involved in distinguishing spurious from genuinely causal correlations in controlled empirical inquiry; the elusiveness of any effort to establish com-

prehensively transcultural laws of social behavior—are analyzed brilliantly in Chapters 13 and 14 of Ernest Nagel's great book, *The Structure of Science*.¹⁴ I will not try to add anything to Nagel's appraisal of the methodological problems ahead for the social sciences, except to say that I am convinced and heartened, as a legal scholar, by Professor Nagel's ultimate conclusion that genuinely scientific knowledge is not unachievable in the social sciences, if social scientists are truly scientific and not in too much of a hurry to assert final conclusions. We lawyers and legal scholars have a great stake in the development of the social sciences because they alone can give us, over the long pull of many years, the scientific knowledge we need to enrich our historic technology.

For more than twenty-five years, scholarly lawyers, judges, and law professors have been aware of the promise of social science method and social science knowledge for the understanding and improvement of legal institutions. At least a few of the best of our company have worked out effective patterns of "colleagueship"—to borrow Donald Young's term—for investigation of law-related social phenomena by social scientists and lawyers jointly. The results of this collaborative scholarship have been wonderfully encouraging; my only concern is that we lawyers tend to be unduly attentive to immediate applications of social science methodology—for example, what sociology can tell us today about today's problem of law administration—and to be insufficiently aware that fundamental knowledge comes, in the social sciences as in the natural sciences, only when truth is sought as an end in itself, without too much concern, at the stages of basic inquiry, with possible practical applications. This tendency to be in too much of a hurry about immediate applications is, I fear, as characteristic of social scientists generally as it is of lawyers.

It is harder to keep inquiry value-free in the social sciences than in the natural sciences because the data under investigation are always value-impregnated. Undue concern with immediate applications creates additional danger that evaluative preferences may color or distort the results of social science inquiry. The great lesson I read in the history of science and technology is that if basic scientific inquiry is im-

aginative, intellectually autonomous, and free, the applications will take care of themselves in due time. The most important of all science's possible analogies for law is that law, as a great social technology and control system, has even more to gain, in a long-run view of things, from the perfection of the social sciences as "basic" sciences than from such immediate applications of social science methods and insights as may be helpful to law from time to time as the social disciplines move towards scientific maturity.

The Importance of Interdisciplinary Understanding

The second part of this volume is entitled "Towards Interdisciplinary Understanding," and I wonder whether I have made much of a case for the importance of that understanding, either for law or for the advancement of science. Fortunately, the preceding contributors have made that case, particularly as they have examined the points of confrontation and mutual misunderstanding at which law and science meet. These are points at which the scientist must take account of legal restrictions and policies and at which the lawyer, in his decision-making roles, must be able to grasp, if only from the outside, the seriousness of the scientific issues that may be at stake in what seems at first to be a "legal" decision. These confrontations of law and science increase with greater public and political awareness of what we have called here the "social role" of science.

When science is viewed in its social role, there is a reappearance of something like the old affinity of science and law. The world we live in is being remade by modern science and its applications in contemporary technology, and it is the task of law to see to it that this remade world be one of order, justice, and the common good.

Change and progress are not synonyms. Two hundred years ago, scientists and enthusiasts for science were inspired and sustained by the optimistic assumption—held by Franklin and Jefferson and their opposite numbers in every European country—that the advancement of scientific knowledge would inevitably be accompanied by a higher quality of civilization and material and spiritual well-being for every-

one. The formula, they thought, was simple and infallible: if truth is advanced, progress follows. The philosophical orientation of contemporary science is no longer utilitarian. Today's creative scientist is more inclined to say, rather defensively, that the quest for truth is the single and sufficient purpose of science and that the scientist is not concerned with, or responsible for, the technological applications that may be made of his discoveries.

This he says, but I wonder whether he means it. I have known a good many scientists, even a few great ones, and it is my distinct impression from their less guarded conversations that the scientist, disavow it as he may, clings to the old conviction, whatever may be the contemporary evidence against it, that the advancement of truth will, in the long run of things, contribute to the greater fulfillment and happiness of mankind. "Ye shall know the truth, and the truth shall make you free" is still, I think, a postulate of the scientist's vocation, if not of his conceptual system.

The lawyer, similarly, is not centrally concerned with progress. Law and lawyers are not for or against social and technological change as such. It is rather the purpose of law in society to see to it that inevitable change be accomplished without friction, disruption, and social conflict. Yet the lawyer, too, however self-consciously hard-boiled his protestations in the matter, has a profoundly optimistic conception about the social utility of the rule of law: if social order and security are maintained, truth will be advanced and progress achieved.¹⁵

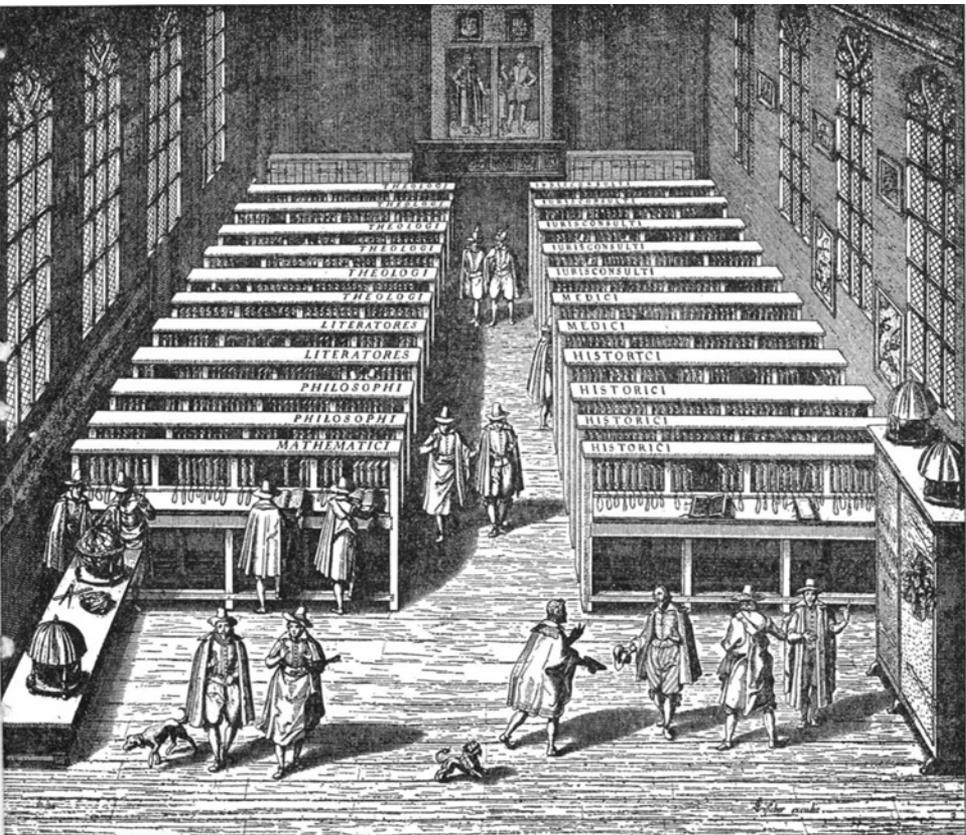
Neither science nor law assures genuine social progress. Each provides one of the indispensable conditions without which progress is impossible. If, as I believe, men of science and men of law are the most important molders of contemporary and future society, it is of the highest urgency that they understand each other, that is, that men of law be less distrustful of scientists and their mysterious works and men of science less condescending towards lawyers and their imperfect legal institutions. There are no easy methodological analogies; law's processes cannot really be appraised in scientific terms, nor the methods of science understood by analogy with the workings of law.

Scientists and lawyers are likely to be quite different people in temperament and inclination. But our vocations have their inevitable point of confrontation at the idea of social progress, the social role that is inevitable for science and central for law. Scientists and lawyers must understand each other and know the values to which each is dedicated, if we are both to be fully equipped to go about our, and Our Father's, business.

The Rockefeller University conference on "Law and the Social Role of Science" is but one manifestation of a widespread scholarly interest in the increasingly important problems and opportunities created by the intersections of science with government and law. Other conferences on science and law have been held. Related programs, such as the Harvard University Program on Technology and Society, are under way at many universities. The literature on the interrelationships of science and law has grown to almost unmanageable proportions, and interested scholars find difficulty keeping up with the onrushing torrent of relevant publications.

The following compilation of law-science literature has been prepared for this volume by Morris L. Cohen with the collaboration of his associate, Betty J. Warner.

III LITERATURE OF THE LAW—SCIENCE CONFRONTATION



Literature of the Law-Science Confrontation

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In the sixteenth-century engraving, overleaf, the titles on the book stacks of the library at the University of Leyden indicate that there are more books on religion than on any other subject; with law (5 stacks) and philosophy, science, and technology (5 stacks) tying for second place; history and literature are third and fourth. In 1965, there were more books published in the United States on philosophy, science, and technology than on any other subject; with religion second, history and literature tied for third, and law fourth.

THE LITERATURE contained in the bibliographies which follow has been selected primarily from American scholarship of recent years. Although a few references to English and Commonwealth sources are included, the foreign literature has not been searched and is but slightly represented. These limitations have been set to provide a manageable tool and yet one which offers a broad sampling of the relevant research.

Scholarship has yet to produce a comprehensive historical or bibliographic study of the continuing relationship between law and science. Although a search of early sources reveals little evidence of anything like the prolific interdisciplinary literature which we see developing today, careful probing turns up a variety of contacts and mutual concerns. These encounters are not always explicit and were rarely recognized by the editors, indexers, and catalogers of the past. References are scattered here and there in sufficient number, however, to indicate that many of the problems which mark the law-science confrontation today existed also in ancient days.

Professor Cavers in his introductory essay describes five categories or types of problems¹ which provide a helpful framework for analyzing the law-science encounter. Following that outline, we can find examples in many literatures, from even ancient times, of encounters which fall within each of its categories. In the early history of adjudication, scientific knowledge and the assistance of scientific experts were employed on occasion to aid the fact finders.² Such encounters on the procedural side were far outnumbered by contacts arising from the law's continuing concern with medical science, mechanics, astronomy, agriculture, mathematics, and other disciplines involved in the substantive regulation of human activity and behavior. An English lawyer of the seventeenth century, Henry Finch, in recommending a broad course of study for the prospective lawyer, noted that "the Sparks of all Sciences in the world are raked up in the ashes of the Law. . . ."³

With respect to Professor Cavers' next category the historical evidence is less substantial. Until recent times, governments have not often been involved in the allocation of scientific research resources. But, from the days of Ancient Greece and Rome, governments have

responded (often unpleasantly) to the new research and teaching of men of science. From Anaxagoras in the Athens of the fifth century B.C. to Galileo in sixteenth century Rome to John T. Scopes in Dayton, Tennessee in 1925, a pattern of negative reactions can be traced.⁴

If we search broadly in the relevant literature for references to such contacts as these, we find that the greatest number can be grouped into three areas: 1) the reaction of law and government, often under strong religious influence, to new and apparently subversive teachings of science; 2) the regulation of medical practice and related activities; and 3) the law's concern with the various branches of science and technology in the formulation and application of rules governing human activity and behavior.

Before approaching the bibliographies of the current literature, let us take a backward glance at the highlights of these three points of confrontation.

Law versus the Scientist

Only occasionally will classical literature produce a specific reference to *cooperation* between the worlds of law and science. One such example is the popular version of Archimedes' famous dash from his bathtub to the streets of Syracuse, shouting "*Eureka*" while clothed only in the exuberance of his discovery of the first law of hydrostatics. It is said that the discovery stemmed from an experiment in forensic science performed at royal request. The scientist had, at the moment of that discovery, been considering an appropriate method of computing the proportion of gold in his King's crown. A goldsmith had been accused of fraudently adulterating the gold content of the crown and King Hiero had sought Archimedes' help in establishing evidence of his guilt. Such was the rather tenuous law-science encounter behind this famous incident.⁵

A far more frequent and serious type of encounter involved society's reaction to new scientific thinking which offended the religious authorities of the State. It is noteworthy that this conflict begins with the persecution of one of the earliest scientists of Greece. Anaxagoras was an Ionian who lived and taught in Athens in the fifth century B.C. He was

the leading intellectual figure of his time and is generally considered to have been the first physicist in history and one of the founders of the scientific method of inquiry. His work and writing in several sciences influenced later thought, and among his many students was the great Pericles. His teaching concerning the heavenly bodies, however, aroused the religious authorities, and he became a convenient target for the political enemies of Pericles. Anaxagoras was tried for impiety, probably convicted, and exiled. Although the various accounts of his legal difficulties differ in detail, several (including Plutarch's) indicate that his prosecution was based at least in part on religious opposition to his scientific investigation and teaching of astronomy. Sarton has said of him :

He was certainly not the first victim in the incessant war between bigotry and science, but he is the first known one. We may not call him a martyr of science, because his sentence was simply of banishment, but he was the first man in history who was punished for thinking freely, for following the dictates of his reason and conscience rather than the opinions of the community.⁶

All the extant classical writings about Anaxagoras, including the variant versions of his fall, are brought together in a recent unique study in the history of science, *Anaxagoras and the Birth of Physics*, by Daniel E. Gershenson, a classical scholar, and Daniel A. Greenberg, a theoretical physicist.⁷

Farrington, in *Science and Politics in the Ancient World*,⁸ describes the efforts of early science to assert itself against the obstacles of the religious establishment. Farrington sees in Aeschylus' great drama of *Prometheus Bound* a symbolic presentation of "the political problem of adjusting contemporary institutions to meet the great upheaval of the old ways of life represented by the Ionian enlightenment."⁹ Prometheus' impudence in stealing fire from the gods and giving it to men for their use, is likened to the efforts of the rationalists who sought to discover and teach the secrets of nature for human betterment against the will of the representatives of the gods on earth. The invocation of the law against the Ionian scientists paralleled Zeus' torment of Prometheus.

White, in *History of the Warfare of Science with Theology in Christendom*,¹⁰ and Draper, in *History of the Conflict Between Religion and Science*,¹¹ describe the continuing struggle for freedom of scientific inquiry. Anne

Haight's bibliography of censored literature, *Banned Books, Informal Notes on Some Books Banned for Various Reasons at Various Times and in Various Places*, lists Roger Bacon (between Abelard and Dante) with the note:

1257 England: Bonaventura, General of the Franciscan order, suspicious of Bacon's supposed dealings in the black arts, interdicted his lectures at Oxford, and placed him under the superintendence of the order in Paris. Here he remained for ten years, suffering great privations, and forbidden to write for publication.¹²

Bacon sought with his writing, teaching, and inventions to revive experimental research and applied science. After a respite under Pope Clement IV, his work was again condemned in 1278 and he was imprisoned for fourteen years. Some may consider it unfair to tax the *law* with these ecclesiastical persecutions, but it is quite difficult to separate Church and State during these centuries.

Bacon foreshadowed the great Renaissance conflict between religion and law on one side and science on the other. The overthrow of the Ptolemaic view of a geocentric universe, which had become part of Church dogma, involved a long struggle. Many of the most illustrious names in the founding of modern science were involved—Kepler, Copernicus, Galileo, among others. Bruno, a contemporary of Galileo, died at the stake in 1600 for his imprudent philosophic and scientific views, including acceptance of the Copernican system of the universe. He allegedly retorted to his judges, "Perhaps it is with greater fear that you pass the sentence upon me than I receive it."¹³

Despite Galileo's recantation of his scientific theories, the dramatic highlight of the long confrontation was undoubtedly his trial in 1633. A recent study of the many issues involved is particularly noteworthy: Giorgio De Santillana's *The Crime of Galileo*¹⁴ includes a thorough presentation of not only the scientific and philosophic issues involved, but also the underlying human and political conflict.

The troubles of the scientist did not cease with Galileo's recantation. *Banned Books* lists the works of giants like Descartes, Pascal, and Darwin, and later those of the prophets of the sexual revolution, Havelock Ellis, Marie C. Stopes, Margaret Sanger, and Alfred Kinsey. The effect of Darwin's work in particular brought forth an anguished reaction

from the religious world which called on the power of government to save the souls of Christendom from the Darwinian heresy. A description of fundamentalist attacks on his thinking in the United States is described in detail in Maynard Shipley's indignant rejoinder, *The War on Modern Science*.¹⁵ A highlight of that campaign was the trial in 1925 of John Thomas Scopes, a high school teacher in Dayton, Tennessee, for violation of a statute which made it unlawful "to teach any theory that denies the story of the Divine Creation of man as taught in the Bible, and to teach instead that man has descended from a lower order of animals." The trial proceedings have been reported in detail, dramatized, and widely discussed.¹⁶

Nor did the totalitarian inquisitions of the twentieth century spare men of science. When, on 10 May 1933, 25,000 volumes by Jewish authors were burned by the Nazis at the University of Berlin, works by Karl Marx, Sigmund Freud, Alfred Adler, and Albert Einstein were included.¹⁷ The age of Sputnik has tended to overshadow the earlier scientific repressions in the Soviet Union. Although initiated by Lysenko, himself a scientist, the establishment of an orthodox theory of genetics and the ruthless repression of geneticists with different theories were carried out with the full cooperation of the government and the legal system. That campaign is fully described and documented by Julian Huxley in *Soviet Genetics: The Real Issue*.¹⁸

Some have seen a similarly repressive tendency in the 1954 administrative hearing concerning the security status of J. Robert Oppenheimer with the Atomic Energy Commission and in the excesses of governmental concern with scientific loyalty and secrecy during the McCarthy era.¹⁹ The author of *The Crime of Galileo* saw ominous similarities between the cases of Galileo and Oppenheimer, but he admitted that "today there is a tendency not to suppress physics but rather to exploit it. . . ."²⁰

However, the last ten years have seen a noticeably more liberal trend in our government's relations with the scientific community. Despite occasional lapses, the thaw in American-Soviet relations has relieved some of the restrictions on international exchanges and travel. The importance of scientific research to national security has given the scientists a strong bargaining point which has enabled them to achieve

financial support, freedom, and even political power. This new relationship of science and scientists to the political and legal structure in the United States is described by Don Price in his recent study, *The Scientific Estate*.²¹

Law and the Healing Arts

The regulation of medical practice for the protection of the public was one of the earliest contacts between law and science. Although it has not produced a significant literature of its own, evidences of the relationship appear regularly in the separate writings of law and medicine.

Henry E. Sigerist, the great medical historian, in his *History of Medical Licensure*,²² mentions one of the earliest recorded regulations in the Persian *Venidad* of the *Zend Avesta*.²³ It rather cynically established the standard for admission to surgical practice among the worshippers of Mazda.

36(94) Maker of the material world, thou Holy One! If a worshipper of Mazda wants to practice the art of healing, on whom shall he first prove his skill?—on worshippers of Mazda or on worshippers of the Daevas?—

37(96) Ahura Mazda answered: “On worshippers of the Daevas shall he first prove himself, rather than on worshippers of Mazda. If he treat with the knife a worshipper of Daevas and he die; if he treat with the knife a second worshipper of the Daevas and he die; if he treat with the knife for the third time a worshipper of the Daevas and he die, he is unfit to practice the art of healing forever and ever.”

Among the early Semites, medical practitioners were also subject to legal control. The Babylonian Code of Hammurabi, between its provisions governing Assault and Barbers, contains several relevant regulations of surgical practice. Sections 215 to 217 and 221 to 224 establish the fees for different types of operations,²⁴ varying them with the status of the patient, the nature of the operation, and the success of the surgeon's work. Sections 218 to 220 and 225 deal with the penalties for unsuccessful operations, which range from a reduction in the surgeon's fee to the cutting off of his fore-hand.

Medical regulation was apparently not a matter of legal concern among the early Greeks and Romans, although the special status of the

physician was recognized. Among Hippocrates' numerous writings was the *Oath* which set standards of medical practice for at least some of the physicians of that time and became forever part of the professional tradition. The Hippocratic Oath did not, however, have the force of law. Although the Romans gave practicing physicians special privileges, including exemption from taxation and military service, there was for many centuries no limitation as to who might practice. Penalties for malpractice, however, are indicated in the *Lex Aemilia* of 433 B.C. and the *Lex Cornelia* of 88 B.C. Benjamin Gordon, in his *Medicine Throughout Antiquity*,²⁵ traces the gradual development of regulation until licensure was instituted under Lucius Septimius Severus in the second century.

Medicine was an integral part of the Jewish religion and is dealt with frequently in Biblical law, particularly in matters of hygiene and ritual cleanliness. It is not, however, until postbiblical writings that there is evidence of regulation of medical practice. Medical licensure was apparently introduced under the Tannaim of the first two centuries of the Christian era. Regulation of physicians under Jewish law was considerably fairer than among other groups (although perhaps not as lenient as among the Greeks and Romans) and physicians were held responsible only if they intentionally hurt their patients.²⁶ The classic study of Jewish medicine, reflecting the development of medical practice, is Julius Preuss's *Biblich-talmudische Medizin*²⁷ and an interesting recent survey is Immanuel Jakobovitz' *Jewish Medical Ethics*.²⁸

Medical licensure as we know it today was an institution of Europe in the Middle Ages. Sigerist notes that the first medieval regulations promulgated in 1140 required certification of fitness by the medical faculty of Salerno. He then describes the excellent and detailed ordinances of Frederick II²⁹ and surveys the subsequent history of European regulation with its early emphasis on control by the universities. The first English statute requiring a license for medical practice was passed in 1511³⁰ and its preamble is at once a tidy summary of the social problem and a fine piece of English prose.

Forasmuch as the science and cunning of physick and surgery (to the perfect knowledge whereof be requisite both great learning and ripe experience) is daily within this realm exercised by a great multitude of ignorant persons, of

whom the greater part have no manner of insight in the same, nor in any other kind of learning; [so far that] common artificers, as smiths, weavers and women boldly and accustomedly take upon them great cures, and things of great difficulty in the which they partly use sorcery and witchcraft, partly apply such medicines unto the disease as be very noious . . . to the high displeasure of God, great infamy to the faculty, and the greivous hurt damage and destruction of many of the King's liege people most especially of them that cannot discern the uncunning from the cunning: be it therefore . . . enacted that [none shall practice as a physician or surgeon in London, unless examined and approved by the bishop of London]

The medical profession itself subsequently took steps to raise minimum qualifications and the College of Physicians was eventually given the responsibility of examining prospective physicians for licensing.

With the advancement of science and the growth of the professions generally, legal controls over medical practice grew tighter throughout the world during the nineteenth and twentieth centuries. In this country we moved from no controls at all in the Colonial period to the establishment of the National Board of Medical Examiners in 1915 and the passage of laws of this kind in every state. Today, this aspect of the law-science encounter is tightly regulated by licensure and by both civil and criminal law.

Science as a Material Source of Law

From early times, law has dealt with matters of personal status and kinship, crime, commerce and economics, inheritance, agriculture, public health, and property. In the formulation of regulations in those fields and others, the legislator drew on the scientific knowledge of his time and, in their application, the tribunal required access to similar expertise. However, the scientific foundation of such laws was rarely explicit in their legal text and the study of legislative history was not highly developed before this century. Therefore, the evidence of this aspect of the relationship between law and science is most difficult to document. Although the standard histories of law and those of science offer little help in this respect, we can speculate on our own.

The relationship is perhaps clearest in medicine and hygiene and we have seen some evidence of this already. The Ancient Codes, in-

cluding particularly the Hebrew Bible, were concerned with the control of disease, disposal of the dead, purity of food and water, status of the insane, and similar problems of public health not unlike those of today. The Jewish concern with hygiene was particularly marked.

The concept of purity is of eminent importance in biblical legislation . . . Hygienic regulations were imposed on the people by law with the authority characteristic of divine maxims and in the form of religious ceremonies. Some of these regulations existed also in Egypt and in Babylonia, where they had a magic character. . . .³¹

Regulation of such subjects involved to a considerable extent knowledge of the medical and natural sciences.

Laws governing agriculture and land tenure were fundamental to the economic life of ancient communities. Such regulations covered questions of cultivation, field rental, tenancies, flood losses, crop loans, irrigation, livestock, and distribution yields. They were treated in detail in the laws of the Babylonians,³² the Assyrians,³³ the Hebrews,³⁴ and most other ancient peoples. Driver and Miles in their Commentary on the Code of Hammurabi note that "many processes continue to be carried out unchanged to the present day, and a knowledge of modern practice as well as the ancient agricultural contracts is essential to a right understanding of many passages of the Laws."³⁵

Mathematics was important in the legal establishment and enforcement of uniform weights and measures and in questions of coinage and calendar stabilization. Algebra was helpful in problems of inheritance while geometry was employed in determining real property shares and boundaries. Salo Baron, in *Social and Religious History of the Jews*, treats in detail the significance of science and mathematics in Jewish law and Muslim law as well.³⁶

Although these practical applications of mathematics to law are most significant, Sarton notes a more subtle and insidious mathematical influence in Platonic jurisprudence.

. . . [Plato's] approach was not arithmetic (in our sense) but geometric. The secret of the universe (cosmos) is order and measure. Plato extended that conception to everything domestic and political and he did it without moderation. Everything in the perfect city must be regulated; no change is foreseen, therefore there is no opportunity, no choice, no fancy. The city will function

like a machine. Some chapters of *Laws* regulate private life with so much detail and so little restraint that they are to the modern mind repulsive and obscene.³⁷

The modern literature of *forensic science*, and its counterpart, *medical jurisprudence*, has developed widely and encompasses civil and criminal questions of the extent and cause of physical injury, mental responsibility, abortion, paternity, and numerous other scientific problems. A necessarily small selection of these writings is listed in the bibliographies which follow, but it reflects one of the most dramatic and popular fields of cooperation between law and science.

The bibliography which follows is based in part on the categories outlined by Professor Cavers, with several modifications and additions. No attempt has been made for an exhaustive bibliography. It is designed to highlight and illustrate the major areas of literary concern. Where useful periodicals or services regularly survey a particular field, they are noted at the beginning of that topic. The coverage ends with the close of 1965.

The following outline is set forth here to assist the reader in locating particular areas of concern. The topics included are also covered in the index.

LAW AND SCIENCE: GENERAL CONSIDERATIONS

- Law and Science
- Law and Social Science
- Law as Science
- Scientific Method, Logic, and Legal Reasoning

SCIENCE AND THE ADJUDICATORY FUNCTION OF LAW

- Expert Testimony Generally
 - Medical Experts
 - Psychiatric Experts
 - Computer Evidence
- Legal Evidence and Problems of Proof
 - Causation
 - Legal Evidence and the Social Sciences
 - Scientific Evidence in General
 - Blood Test Evidence*
 - Radar Evidence*
 - Privileged Communications
- Science and Law Enforcement

SCIENTIFIC DEVELOPMENTS LEADING TO THE REEXAMINATION OF LEGAL DOCTRINES

Privacy

Eavesdropping and Wiretapping

Lie Detection

Chemical Tests for Intoxication and Addiction

Artificial Insemination

Abortion, Contraception, and Population Control

Sterilization and Eugenics

Medicine and Law Generally

Medical and Psychological Experimentation

Psychiatry, Psychology, and Mental Illness

LEGAL CONTROL OF HAZARDS TO PUBLIC HEALTH AND SAFETY

Addiction

Narcotics

Alcohol

Drugs and Food

Drug Regulation

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Quantitative Analysis and Prediction of Judicial Decisions

Empirical Research in Law

Semantics and Linguistics

Law and Science: General Considerations

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Part I · Where Law and Science Meet

Law and Science:

Some Points of Confrontation [pages 5–15]

- 1 The problems of scientific testimony in that field are examined in Whinery, *The Role of the Court Expert in Patent Litigation*, Study of the Subcommittee on Patents, Trademarks, and Copyrights, Senate Committee on the Judiciary, pursuant to S. Res. 55, 85th Congress, 1st Session, Study No. 8 (1958). The supporting research, conducted at Columbia University Law School for the Armstrong Project, has been resumed there by Professor H. L. Korn.
- 2 See *Salgo v. Leland Stanford, Jr.* University Board of Trustees, 154 Cal. App. 2d 560, 568, 317 P. 2d 170, 175 (1957). The court explained that this “conspiracy” had led courts to apply the doctrine of *res ipsa loquitur* (the thing speaks for itself) to certain malpractice cases, enabling the jury to draw an inference of negligence from the fact of injury alone.
- 3 *M’Naghten’s Case*, 10 Clark & Fin. 200 (1843). The varied formulations of the rule and its supplementation in at least fourteen states by the “irresistible impulse” test are reported and discussed in Weihofen, *Mental Disorder as a Criminal Defense*, c. 3 (1954).
- 4 *Durham v. United States*, 214 F. 2d 862 (D.C. Cir. 1954). The case has stimulated a vast literature. See, e.g., Glueck, *Law and Psychiatry*. Lecture III (1963); Hall, *Psychiatry and Criminal Responsibility*, 22 *U. Chi. L. Rev.* 367 (1955). A doctrine anticipating the philosophy of the Durham rule was developed in New Hampshire in the 1870s. See Weihofen, *op. cit. supra* note 3, c. 3, § 7.
- 5 Am. L. Inst., *Model Penal Code*, § 4.01(1) (1962). (Subsection (2) excludes “abnormality manifested only by repeated criminal or otherwise anti-social conduct,” the so called “psychopathic personality.”) This provision has been adopted in Illinois, Ill. Crim. Code of 1961, § 6–2. It is now under consideration in New York and doubtless other states. A modified version was adopted judicially in the Third Circuit. *United States v. Currens*, 290 F. 2d 751 (3d Cir. 1961).
- 6 See Goldstein & Katz, *Abolish the “Insanity Defense”—Why Not?* 72 *Yale L.J.* 853 (1963). The task of establishing a defendant’s requisite criminal intent would remain on the state.
- 7 Conflicting viewpoints are presented in a symposium on expert testimony in 34 *Temp. L.Q.* 357 et seq. (1961). See also Van Dusen, *A United States District Judge’s View of the Impartial Medical Expert System*, Proceedings of the Annual Judicial Conference of the Tenth Judicial Circuit, 32 F. R. D. 498 (1963) (pro) and Berry, *Impartial Medical Testimony*, id. 539 (con). Seven existing plans are examined in Comment, *Impartial Medical Testimony*, 47 *Marq. L. Rev.* 523 (1964).
- 8 See, e.g., Levy, *Impartial Medical Testimony—Revisited*, 34 *Temp. L.Q.* 416, 424 (1961). A decision upholding the plan used by federal courts in the Eastern

- District of Pennsylvania was denied review by the Supreme Court. *Hankinson v. Van Dusen and Kraft*, 359 U.S. 925 (1959).
- 9 The 1921 "Briggs Law" in Massachusetts (applicable in capital cases and to persons previously twice indicted for, or once convicted of, felonies) has been much discussed but is copied only in Kentucky, Michigan's similar law for murder cases having been repealed. The Briggs Law, as currently administered, is open to criticism. See Tenney, *Sex, Sanity and Stupidity in Massachusetts*, 42 *B.U.L. Rev.* 1 (1962); Kreutzer, *Re-examination of the Briggs Law*, 39 *id.* 189 (1959).
 - 10 Am. L. Inst., *Model Penal Code* § 4.05 (1962); see Weihofen, *op. cit. supra* note 3, c. 7, §§ 1,2. Provision is also made for court-appointed experts on any issue in Federal Rules of Criminal Procedure, Rule 28 (1940), and in all fields of law by the Model Expert Testimony Act § 1 (1937), 9A *Un. L. Ann.* 353 (1957) (adopted in South Dakota only); Uniform Rule of Evidence 59 (1953), 9A *Un. L. Ann.* 238 (Supp. 1964) (adopted in New Jersey, Kansas, Canal Zone, and Virgin Islands); Am. L. Inst., *Model Code of Evidence*, Rule 403 (1942).
 - 11 Am. L. Inst., *Model Penal Code* § 4.07(4) (1962).
 - 12 A like privilege, freeing the witness from the strait jacket of the hypothetical question (unless the judge directs its use), is to be found in Model Expert Testimony Act, § 9; Uniform Rule of Evidence 58; Am. L. Inst., *Model Code of Evidence*, Rule 409; all *supra* note 10.
 - 13 Three of the adoptions of the Uniform Rules of Evidence have come in the past two years. In January 1965, the California Law Revision Commission published a recommendation proposing an Evidence Code, of which § 802 appears consistent with model provisions cited in note 12, *supra*. Some of my colleagues who teach Evidence have discerned signs of a like trend in the case law. Probably it is most common at the trial court level with respect to defendants' experts.
 - 14 See Ploscowe, *The Expert Witness in Criminal Cases in France, Germany, and Italy*, 2 *Law & Contemp. Prob.* 504 (1935); Schroeder, *Problems Faced by the Impartial Expert Witness in Court: The Continental View*, 34 *Temple L.Q.* 378 (1961); Kaplan, von Mehren, and Schaefer, *Phases of German Civil Procedure I*, 71 *Harv. L. Rev.* 1193, 1242 (1958).
 - 15 See Ploscowe, *supra* note 14, at 508; Kaplan, von Mehren, and Schaefer, *supra* note 14, at 1243.
 - 16 See Dash, Schwartz, and Knowlton, *The Eavesdroppers* (1959); Packard, *The Naked Society* (1964); King, *Electronic Surveillance and Constitutional Rights: Some Recent Developments and Observations*, 33 *Geo. Wash. L. Rev.* 240 (1964); Hearings on invasion of privacy through the use of electronic equipment before the Subcommittee on Administrative Practice and Procedure, Senate Committee on the Judiciary, 89th Congress, 1st Session, 23 February 1965 (not yet printed).
 - 17 Michael, *Speculations on the Relation of the Computer to Individual Freedom and the Right to Privacy*, 33 *Geo. Wash. L. Rev.* 270 (1964).
 - 18 Hearings before the Subcommittee on Administrative Practice and Procedure, Senate Committee on the Judiciary, *supra* note 16; Use of Polygraphs by the Federal Government, Foreign Operations and Government Information Subcommittee, House Committee on Government Operations, 88th Congress, 2nd Session, Preliminary Study (April 1964).
 - 19 The study has been undertaken by the Association's Committee on Law and Science; Professor Alan Westin of Columbia University is directing the research.

- 20 The problem is discussed in Note, Copyright Protection for Computer Programs, 64 *Colum. L. Rev.* 1274 (1964); Note, The Patentability of Computer Programs, 38 *N.Y.U.L. Rev.* 891 (1963). A symposium of four articles on the subject in the Bulletin of the Copyright Society, 11 *Bull. Copyright Soc.* 361 et seq. (1964), was prefaced by an announcement from the Copyright Office that computer programs meeting certain conditions might be registered as "books." The announcement recognized that this action was subject to favorable resolution of two basic legal questions, both of which it characterized as "doubtful."
- 21 Food, Drug, and Cosmetic Act, § 505 (1938), 21 U.S.C. § 55. For the background of this provision and the Act containing it, see Cavers, The Food, Drug, and Cosmetic Act of 1938: Its Legislative History and Its Substantive Provisions, 6 *Law & Contemp. Prob.* 2 (1939).
- 22 See Administered Prices, Hearings before the Subcommittee on Antitrust and Monopoly pursuant to Sen. Res. 57, Senate Committee on the Judiciary, Pts. 14-15, 86th Congress, 1st Session (1960), Pts. 14-15, 86th Congress, 2nd Session (1960), Pts. 23-26, 86th Congress, 2nd Session (1961). Other Parts relate to other commodities.
- 23 For an account of the impact of this action on the legislative situation, see Harris, *The Real Voice* 181-93 (1964).
- 24 Food, Drug, and Cosmetic Act, §§ 201 (p), 505 (a) 21 U.S.C. §§ 321(p), 355(a). A drug's safety and effectiveness are determined with reference to "use under the conditions prescribed, recommended, or suggested in the labeling thereof."
- 25 See "New drugs for investigational use; exemptions from section 505(a)," 21 C.F.R. § 130.3 (1963). The regulations specify two phases of the investigation which must precede the clinical trial and prescribe detailed forms to be submitted by the sponsor of the drug claiming the exemption and by each investigator involved in the clinical pharmacology.
- 26 The AMA's position with respect to drug regulation was the subject of a hearing in 1963. Interagency Coordination in Drug Research and Regulation, Senate Committee on Government Operations, 88th Congress, 1st Session, Pt. 6 (1963). Supplementary exhibits include statements indicating the AMA's opposition to the Drug Amendments of 1962 and the regulations governing clinical investigations. See, especially, pp. 3069-3072. See also Harris, *The Real Voice* 123-127 (1964).
- 27 See Cutler, Practical aspects of drug legislation, in *Drugs in Our Society* 149, 154 (1964).
- 28 This suggestion is advanced in articles by two leading counsel in the field of drug regulation, Cutler, *supra* note 27, at 154, and Kleinfeld, New Drug Application and Suspension Procedures, 18 *Food, Drug Cosm. L.J.* 632, (1963), and opposed by a third. Austern, Sanctions in Silhouette: An Inquiry into the Enforcement of the Federal Food, Drug, and Cosmetic Act, *id.* 617, 625. The problems of administrative decision-making created by the new drug amendments are discussed in Cavers, Administering that Ounce of Prevention: New Drugs and Nuclear Reactors—I, 68 *W. Va. L. Rev.* 109 (1966).
- 29 Food, Drug, and Cosmetic Act, §§ 201(g), 408 (1954), 21 U.S.C. §§ 321 (q), 346a (pesticide chemicals); §§ 201(s), 409 (1958), 21 U.S.C. §§ 321(s), 348 (food additives); §§ 201(t), 706 (1961), 21 U.S.C. §§ 321(t), 376 (color additives). Advisory committees may be demanded by applicants under the pesticide and color additive provisions, but there has seldom been recourse to them.
- 30 For the licensing provisions, see Atomic Energy Act, c. 16, 42 U.S.C. §§ 2131-41.
- 31 A quarterly, *Nuclear Safety*, is published by the AEC's Division of Technical Infor-

SOME POINTS OF CONFRONTATION *continued*

- mation which is devoted to the problem. A recent issue lists the titles of the papers on nuclear safety problems presented at the Third International Conference on the Peaceful Uses of Atomic Energy and reviews them briefly. Review of the 1964 Geneva Papers Related to Nuclear Safety, 6 Nuclear Safety 111 (1965). The papers number more than 150; they come from over twenty countries.
- 32 For detailed descriptions and critiques of the AEC's reactor licensing procedures before the 1962 amendments providing for the creation of Atomic Safety and Licensing Boards to preside at hearings in lieu of a hearing examiner sitting alone, see *Improving the AEC Regulatory Process*, Joint Committee on Atomic Energy, 87th Congress, 1st Session, vols. I and II (1961). The problem is discussed in Cavers, *Administrative Decisionmaking in Nuclear Facilities Licensing*, 110 *U. Pa. L. Rev.* 330 (1962), and Cavers, *Administering that Ounce of Prevention: New Drugs and Nuclear Reactors—II*, 68 *W. Va. L. Rev.*, No. 3 (1966). Problems in the functioning of the Boards have given rise to a new Commission-sponsored study, followed by the publication, by the AEC, of proposed changes in its licensing procedures in substantial accord with the study's recommendations. See AEC, *Notice of Proposed Rule Making, Amendments to, 10 C. F. R. pts. 2, 50, 115, 31 Fed. Reg. 830 et seq.* (21 January 1966).
 - 33 See Wolfman, *Federal Tax Policy and the Support of Science*, *infra*.
 - 34 Beresford, *Lawyers, Science, and the Government*, 33 *Geo. Wash. L. Rev.* 181 (1964).
 - 35 *Id.* at 204.
 - 36 *High Energy Physics Program: Report on National Policy and Background Information*, Joint Committee on Atomic Energy, Joint Committee Print, 89th Congress, 1st Session (February, 1965).
 - 37 The Federal Water Pollution Control Act, § 4, 33 U.S.C. § 470, contains an authorization of up to \$5,000,000 per year for research grants "relating to causes, control, and prevention of water pollution." Fellowships and in-service training programs as well as federal laboratories and demonstration projects are also to be financed from these funds.
 - 38 *Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water*, signed at Moscow, 5 August 1963, TIAS No. 5433, reprinted in 57 *Am. J. Int'l L.* 1026 (1963). For a comment, see Schwelb, *The Nuclear Test Ban Treaty and International Law*, 58 *id.* 642.
 - 39 Although no treaty to this end has been achieved, both the United States and the Soviet Union have declared in the General Assembly their intention not to station objects in outer space carrying nuclear weapons, and the Assembly by resolution called on all nations to refrain from doing so. Res. 1884 (XVIII), adopted on 17 October 1963, Gen. Ass. Off. Rec., Supp. 15 (A/5515) p. 13.
 - 40 Res. 1962 (XVIII), adopted on 5 December 1963, Gen. Ass. Off. Rec., Supp. 15 (A/5515) p. 15, reprinted in 58 *Am. J. Int'l L.* 477 (1964). For comments on this resolution which settled a number of points at issue between the United States and the Soviet Union, see Gardner, *Outer Space: A Breakthrough for International Law*, 50 *A.B.A.J.* 30 (1964); Simsarian, *Outer Space Cooperation in the United Nations in 1963*, 58 *Am. J. Int'l L.* 717 (1964).
 - 41 *Antarctic Treaty*, signed at Washington, 1 December 1959, TIAS No. 4780, reprinted in 54 *Am. J. Int'l L.* 476 (1960). For its background and a discussion of its terms, see Hayton, *The Antarctic Settlement of 1959*, *id.* at 349 (1960).

- 42 The Communications Satellite Corporation (Comsat), a unique instrumentality, was the creature of legislation (the Communications Satellite Act of 1962, 76 Stat. 419, 47 U.S.C. §§ 701-44 (Supp. 4, 1963)) designed to reconcile a number of conflicting domestic objectives and interests, much less attention being devoted to potential international complications. The Act and its offspring are discussed in Kirkpatrick, *Antitrust in Orbit*, 33 *Geo. Wash. L. Rev.* 87 (1964); Levin, *Organization and Control of Communications Satellites*, 113 *U. Pa. L. Rev.* 315 (1965).
- 43 See Agreement Establishing Interim Arrangements for a Global Commercial Communications Satellite System and Special Agreement (containing technical and financial arrangements to which communication entities designated by signatory governments are also parties), 20 August 1965, TIAS No. 5646, reprinted in 3 *Int. Legal Materials* 806, 810 (1964). The arrangements are discussed, and Soviet objections to them reported, in Simsarian, *Interim Arrangements for a Global Communications Satellite System*, 59 *Am. J. Int'l L.* 344 (1965).

Law and Research Supported by Government [pages 16-24]

- 1 I have followed the lead of the Bureau of the Budget and used the term "research and development" in the sense in which it is used in the federal budget, i.e., the conduct of activities intended to obtain new knowledge or to apply existing knowledge to new uses. See Bureau of the Budget, Report to the President on Government Contracting for Research and Development, S. Doc. No. 94, 87th Congress, 2nd Session (1962) p. 1, hereinafter referred to as "Bureau of the Budget Report." I have not, except where specifically noted, attempted to distinguish basic research from applied research or research activities from development activities, nor, for that matter, "science" from "technology."
- 2 See the address of the Secretary of Commerce, Luther H. Hodges, reported at 109 Cong. Rec. 1754 (1963). Report of the Select Committee on Government Research of the House of Representatives 88th Congress, 2nd Session (1964) Study Number X, p. 3 (Hereinafter cited as "Elliott Committee Report").
- 3 Bureau of the Budget Report, at 2.
- 4 See note 1, supra.
- 5 Hearings on Federal Budgeting for Research and Development before the Subcommittee on Reorganization and International Organizations of the Senate Committee on Government Operations, 87th Congress, 1st Session (1961).
- 6 See note 2, supra. The Elliott Committee Report Study No. VII contains 34 pages (Appendix I) of "Selected Bibliography of Material Related to Government Research and Development Contracts, Procedures and Policies."
- 7 Bureau of the Budget Report, at 5.
- 8 Snow, *The Two Cultures: And a Second Look* 60 (ed. Mentor, 1964).
- 9 Hoyle, *Of Men and Galaxies* 9-10 (1964).
- 10 Id. at 18.
- 11 See the symposium, Administration by Contract: An Examination of Governmental Contracting-Out, 31 *Geo. Wash. L. Rev.* 685 et seq. (1963), and particularly the articles by Professor Arthur S. Miller and NASA General Counsel, John A. Johnson.
- 12 On the difficulty of drawing a meaningful distinction, see Snow, supra note 8, at 64.
- 13 Elliott Committee Report, Study No. I at 49.
- 14 Ibid. According to Dr. Frederick Seitz, President of the National Academy of

GOVERNMENT-SUPPORTED RESEARCH *continued*

Sciences, the denial of a request by Fermi, Szilard, and others, for \$30,000 worth of graphite needed to attempt a chain reaction at the start of World War II may have been attributable to that kind of thinking. See *New York Times*, 15 April 1965, p. 30.

- 15 Elliott Committee Report, Study No. I at 40.
- 16 *Ibid.*
- 17 For a sharp attack on the preoccupation with specificity of the 1954 Code, see Cary, *Reflections on the American Law Institute Tax Project and the Internal Revenue Code: A Plea for a Moratorium and Reappraisal*, 60 *Colum. L. Rev.* 259 (1960).
- 18 72 Stat. 1793 (1958) 42 U.S.C.A. §§ 1891 et seq. This statute is the source of authority for government agencies other than the National Science Foundation, and the Departments of Agriculture and Health, Education and Welfare, to make grants for the support of basic scientific research.
- 19 H.R. Rep. No. 2640, 85th Congress, 2nd Session 3-4 (1958).
- 20 Elliott Committee Report, Study No. I at 61.
- 21 *Id.* at 64.
- 22 Many of the difficulties encountered by scientists are common to the entire field of government contracting: for example, one of the causes of the great complexity in our contract program is that Congress has found irresistible the temptation to regulate the conduct of contractors in matters irrelevant to the performance of the contract—such as minimum wages, nondiscrimination, etc. For a discussion of “regulation by contract,” see Miller, *Administration by Contract: A New Concern for the Administrative Lawyer*, 36 *N.Y.U.L. Rev.* 957 (1961).
- 23 Price, *Government and Science* 192 (1954).
- 24 High energy physics research is one area of basic research in which the prospective cost has already begun to trouble Congress. An interesting experiment, which seems to have involved some elements of the “adversary system,” was conducted by a subcommittee of the Joint Committee on Atomic Energy in an effort to gain perspective on the national needs in that area. In a departure from the usual “Hearing” format, the Committee convened a group of leading scientists to comment on the AEC’s Report “Policy for National Action in the Field of High Energy Physics.” For a report on the colloquy and the AEC report see the April 1965 issue of *Nucleonics Magazine*.
- 25 Fuller, *The Adversary System*, in *Talks on American Law* 32 (ed. Berman, 1961).
- 26 *Id.* at 42.
- 27 From an address by Dean Acheson on the occasion of the presentation of the Annual Freedom Award to former President Truman, 13 April 1965, *Washington Post*, 18 April 1965 pp. E 1 et seq. Mr. Acheson extolled President Truman for, inter alia, utilizing “in administration, the law’s most fundamental procedure.” He continued:

For centuries, legal procedure has required all parties involved in the issue to be present before the court at the same time, with the right to be heard and to hear one another. President Truman introduced this procedure into executive administration. To it he added an equally ancient and, in administration, equally novel practice of the law: the decision was made in writing.

...
The changes which these procedures and practices made in policy were as great as the change in recording history from Homer to Churchill made in knowledge of it. To

explain how and why requires amplification of the statement that the Council became a working body operating through personal presentation of views by the highest officials and decisions by the President.

But what sort of views? And what sort of decisions? Later, the practice came to be 'agreed recommendation' for presidential approval. Agreement can always be reached by increasing the generality of the conclusion. When this is done, only the illusion of policy is created. The President gives his hierarchical blessing to platitude.

28 Ibid.

29 Bureau of the Budget Report at 4.

30 Indemnification legislation covering nuclear activities (the Price-Anderson Act) was enacted in 1957. 71 Stat. 576 (1957), as amended 42 U.S.C.A. §§ 2012(i), 2014(j), (n), (o), (r), (u), 2039, 2073(e)8, 2210, 2232(b) 2239(a). The most recent comprehensive study of the problems of indemnification is Rosenthal, Korn, and Lubman, *Catastrophic Accidents in Government Programs* (1963) prepared for the National Security Industrial Association by the Legislative Drafting Research Fund of Columbia University.

31 To the extent that the administrator is successful, the result in many cases will be that injured members of the public are uncompensated, and, in all cases, that the government escapes an obligation properly resting on it.

Federal Tax Policy and the Support of Science [pages 25–39]

1 By "science" I mean, as Professor Cavers has suggested in the first paper, "the body of knowledge—or system of hypotheses—concerning the structure and processes of nature, or that body of applied knowledge we call technology, or the processes whereby both bodies of knowledge are acquired, or the array of scientists and engineers who are learned in them."

2 My use of the word "justify" suggests a point of view which places the burden of persuasion on those wishing to use the tax laws to support science. For reasons which I hope will become clear, that is my point of view.

3 See generally National Academy of Sciences–National Research Council, *Federal Support of Basic Research in Institutions of Higher Learning* (1964); 12 National Science Foundation, *Federal Funds for Research, Development and Other Scientific Activities* (1964).

4 Compare Eisenstein, *The Ideologies of Taxation* (1961); Hellerstein, *Taxes, Loopholes and Morals* (1963); Stern, *The Great Treasury Raid* (1964); Blum, *Tax Policy and Preferential Provisions in the Income Base*, 51 *Ky. L.J.* 233 (1962); Blum, *Federal Income Tax Reform—Twenty Questions*, 41 *Taxes* 672 (1963); Klein, *Federal Income Tax Reform—A Reaction to Professor Blum's Twenty Questions*, 42 *Taxes* 175 (1965); Blum, *More on "Twenty Questions,"* 42 *Taxes* 180 (1964).

5 Int. Rev. Code of 1954, § 117.

6 Int. Rev. Code of 1954, § 103.

7 Int. Rev. Code of 1954, § 175.

8 Int. Rev. Code of 1954, §§ 1201–02.

9 Int. Rev. Code of 1954, § 1235.

10 Int. Rev. Code of 1954, § 74.

11 Today individuals may deduct up to 20% of their "adjusted gross income" for "charitable contributions." In some cases the limit reaches 30%; in others, there is no limitation. Where the 30% limitation is exceeded, provision is made for a

- five year carryover. Corporations are limited to 5% of their "taxable income," with a two year carryover. Int. Rev. Code of 1954, § 170. The estate and gift tax deductions for charitable contributions are unlimited. Int. Rev. Code of 1954, §§ 2055, 2522.
- 12 Int. Rev. Code of 1954, § 170(c)(2)(B); cf. Int. Rev. Code of 1954, § 501(c)(3).
 - 13 Int. Rev. Code of 1954, § 170(c)(2)(C).
 - 14 Treas. Reg. § 1.501(c)(3)-1(d)(5), as amended, T.D. 6525, 1961-1 *Cum. Bull.* 187. Although the provisions of this regulation relate directly to scientific organizations whose income is exempt from tax, they are the same scientific organizations to which deductible contributions may be made under § 170 of the Internal Revenue Code. The Treasury Regulations issued under § 170 of the Code do not deal definitionally with a "scientific" organization.
 - 15 Treas. Reg. § 1.501(c)(3)-1(d)(5) (1959), as amended, T.D. 6525, 1961-1 *Cum. Bull.* 197.
 - 16 Treas. Reg. § 1.501(c)(3)-1(d)(5)(iv) (1959), as amended, T.D. 6525, 1961-1 *Cum. Bull.* 187. Compare Treas. Reg. § 1.501(c)(3)-1(d)(5)(iii) (1959), as amended, T.D. 6525, 1961-1 *Cum. Bull.* 187.
 - 17 Rev. Rul. 65-1, 1965 *Int. Rev. Bull.* 14.
 - 18 Int. Rev. Code of 1954, §§ 501(a), 501(c)(3), 170.
 - 19 Int. Rev. Code of 1954, §§ 511-14.
 - 20 Int. Rev. Code of 1954, § 512(b)(7).
 - 21 Int. Rev. Code of 1954, § 512(b)(8).
 - 22 Int. Rev. Code of 1954, § 512(b)(9).
 - 23 Treas. Reg. §§ 1.512(b)-1(f)(3), (4) (1958).
 - 24 It will be remembered that the distinction drawn between "fundamental" and "applied" research in the exemption of a scientific organization's contract income is not made in determining its qualification to receive a deductible contribution. See text accompanying note 14 *supra*.
 - 25 Congress may have decided that research undertaken by a university is likely to be of unusual worth to society even though "applied," or that universities deserve an extra edge in competing for work. Profits from contracts let by Government may be exempt, though the research is "applied," in order to keep down direct governmental costs. If private industry is expected to compete for applied research contracts, however, the rationalizations do little to eliminate this gross interference with market determinants. The exemption of "fundamental" research might be justifiable on the ground, if it is the fact, that relatively few business enterprises compete for such work. Cf. S. Rep. No. 2375, 81st Congress, 2nd Session, 1950-2 *Cum. Bull.* 483, 504-05.
 - 26 Int. Rev. Code of 1954, § 117.
 - 27 Int. Rev. Code of 1954, § 102; cf. Rev. Rul. 61-66, 1961-1 *Cum. Bull.* 19.
 - 28 Cf. Higher Education Act of 1965, H.R. 9567, 89th Congress, 1st Session (1965). Compare Int. Rev. Code of 1954, § 168(e).
 - 29 See, e.g., the rulings and cases digested in 1965-1 CCH Stand. Fed. Tax Rep. ¶ 1179.017-12. Compare Rev. Rul. 65-59, 1965 *Int. Rev. Bull.* No. 12, at 7, with Rev. Rul. 65-117, 1965 *Int. Rev. Bull.* No. 18, at 7.
 - 30 Int. Rev. Code of 1954, § 263.
 - 31 Int. Rev. Code of 1954, § 167.

- 32 Treas. Reg. § 1.167(a)-3 (1956), as amended, T.D. 6452, 1960-1 *Cum. Bull.* 128; cf. Int. Rev. Code of 1954, §§ 1001, 1011.
- 33 Int. Rev. Code of 1954, §§ 167(b) (2), (3); Rev. Proc. 62-21, 1962-2 *Cum. Bull.* 418.
- 34 Int. Rev. Code of 1954, § 38.
- 35 Int. Rev. Code of 1954, § 174. For a review of research and development activities and costs see 12 National Science Foundation, op. cit. supra note 3; National Science Foundation, *Reviews of Data on Research & Development* (No. 41, September, 1963).
- 36 Treas. Reg. § 1.174-2(a) (1957). There is no support for the exclusion of literary and historical research in either of the committee reports. See H.R. Rep. No. 1337, 83rd Congress, 2nd Session A57-58 (1954); S. Rep. No. 1622, 83rd Congress, 2nd Session 33 (1954).
- 37 But cf. Rev. Rul. 63-275, 1963-2 *Cum. Bull.* 85; Wolfman, Professors and the "Ordinary and Necessary" Business Expense, 112 *U. Pa. L. Rev.* 1089 (1964).
- 38 Int. Rev. Code of 1954, § 1.
- 39 Int. Rev. Code of 1954, §§ 1201-02.
- 40 Int. Rev. Code of 1954, § 1235. In substantial part, § 1235 represents only the congressional imprimatur on a result the courts were reaching on their own. President Kennedy sought unsuccessfully to have Congress reverse this result. See Hearings Before the House Committee on Ways and Means, 88th Congress, 1st Session, pt. 1, at 150 (1963).
- 41 Int. Rev. Code of 1954, § 1221(3). Prior to the enactment of this provision in 1950, the Internal Revenue Service had ruled that General Eisenhower was entitled to capital gains treatment on his sale of the copyright for *Crusade in Europe*. Bittker, *Federal Income, Estate and Gift Taxation* 566 (3rd ed. 1964). When § 1221(3) was proposed, the House of Representatives sought to treat patents and copyrights alike—both as noncapital assets. The Senate Finance Committee, however, whose view prevailed, felt "the desirability of fostering the work of . . . [occasional] inventors" justified eliminating patents from the noncapital asset category to which copyrights were assigned. S. Rep. No. 2375, 81st Congress, 2nd Session, 1950-2 *Cum. Bull.* 483, 515.
- 42 See text accompanying note 36 supra.
- 43 See Senate Comm. on Finance, 89th Congress, 1st Session, Treasury Department Report on Private Foundations 1, 11-13 (Committee print 1965); Sacks, The Role of Philanthropy: An Institutional View, 46 *Va. L. Rev.* 516 (1960).
- 44 A case can be made for the proposition that the deduction be replaced by a credit against tax. It would provide the same dollar contribution by the Government for the low bracket taxpayer as for the high except in the case of the low income taxpayer whose tax absent the credit would not equal the credit. It may be, of course, that if the percentage of a taxpayer's contribution allowed as a credit were not sufficient to give a high income taxpayer as much tax benefit as he now receives, contributions to charity would fall off. The stimulative effect of the deduction for charitable contributions has never been measured, however; it has been suggested that its gross impact is small and that although deductibility probably does motivate high income taxpayers, gross contributions are increased "by less than the tax relief granted." Vickrey, One Economist's View of Philanthropy, in *Philanthropy and Public Policy* 54 (ed. Dickenson, 1962); cf. Kahn, *Personal Deductions in the Federal Income Tax* 72, 81-82 (1960). Professor Vickrey also questions "whether it is sound public policy to . . . subsidize much more heavily the charities favored

- by the wealthy as distinct from those appealing primarily to the poorer contributors." Vickrey, *supra* at 54. Richard Goode suggests continuing the deduction, but limiting it to those contributions that exceed a given percentage of income. Goode, *The Individual Income Tax* 172-73 (1964).
- 45 A broader, across-the-board approach might well allow, for example, the recovery of costs incurred in purchasing good will and securing higher education.
 - 46 A fair question is why in any case the active commercial business enterprise is entitled to greater protection than the taxable passive investor from the competition of a tax exempt organization. The "greater protection" thesis underlying the 1950 unrelated business income amendment is probably and, I would think, justifiably based on a concern that tax exempt active businesses can exercise control over market conditions, especially price, to a much greater degree than can tax exempt passive investors.
 - 47 In some instances, of course, the nonprofit fellowship-granting organization enjoys part of the benefit of the tax exclusion by making a smaller grant than would be feasible if the recipient were fully taxable.
 - 48 I would hope that no new benefits such as those suggested in the text find their way into the tax law. Preanalysis in the Bureau of the Budget would help to expose the arbitrariness and extravagance of any attempt to allocate resources to science by such tax tampering. Compare Hubbell, *Concealed Subsidies in the Federal Budget*, 10 *Nat'l Tax J.* 214 (1957). Several tax preferences were recognized recently as federal subsidies in Joint Economic Comm., 89th Congress, 1st Session, *Subsidy and Subsidy-Effect Programs of the U.S. Government* (Committee print 1965).

Project Research and the Universities [pages 40-52]

- 1 A. T. Waterman, *The Changing Environment of Science*, 147 *Science* 13 (1965) contains an interesting commentary on this development. The opposing view is expressed in a letter to the Editor titled "Research and Purpose" by S. R. Hoover, 147 *Science* 1523 (1965).
- 2 See various suggestions for improvement in Federal Support of Basic Research in Institutions of Higher Learning, National Academy of Sciences, National Research Council, 1964. Additional material may be found in Health Research and Training, House Report No. 321, 87th Congress, 1st Session; Sixth Annual Report of the Surgeon General of the Public Health Service, House Document No. 375, 87th Congress, 2nd Session; Report to the President on Government Contracting for Research and Development, Senate Document No. 94, 87th Congress, 2nd Session.
- 3 Where the federal government is concerned, this will also include directives and administrative rulings.
- 4 See, for example, Findings and Recommendations of the Wooldridge Study, reported in 147 *Science* 1556, et seq. (1965).
- 5 This raises the question of whether the institution is justified in selling the services of the graduate students participating in any particular supported research project. Has, for instance, the student a purchased interest in the results?
- 6 See Summary Statement of Paper Submitted to the Committee on Ways and Means for discussion on December 15, 1959, on the subject "Business Income of Exempt Organizations," by Norman A. Sugarman, Esq., of Cleveland, Ohio.

The terms, "educational" and "scientific" are defined in Treasury Department Regulation § 1.501 (c)(3)-1.

- 7 Trustees of Columbia University v. Jacobsen, 53 N.J. Super. 547, 148 A2d 63 (1959).
- 8 See G. L. Christian and Associates v. United States, (Ct. Cl. 1963) 312 F2d 418, 9 CCF 71964.
- 9 The question of academic freedom is not presented here. So long as the scholar stays within the Groves of Academe he has academic freedom. Departure from those groves into the surrounding fields of commercial research subjects the scholar to the responsibilities of commercial practice. A scholar would not justify theft of the bursar's safe under the heading of academic freedom. He should not seek to so justify misappropriation of intellectual properties belonging to another.
- 10 117 Ohio. App. 493, 192 N. E. 2d 99 (1963).
- 11 Munster and Smith, Savants, Sandwiches, and Space Suits, 145 *Science* 1276 (18 September 1964).
- 12 The General Electric Research Laboratory was probably the first permanent industrial research laboratory in the United States. It was preceded in point of time, however, by the Academy of Natural Sciences of Philadelphia (organized in 1812) and the Franklin Institute (organized in 1824). The Mellon Institute was organized at the urging of Professor Robert M. Duncan, a long standing proponent of a community of interest between universities and industry. In 1925, as a result of a testamentary trust, the Battelle Memorial Institute was launched, followed in 1936 by the Armour Institute of Technology.
Communities lacking in local research facilities similarly sensed the advantage of independent nonprofit research centers. The first such establishment was the Southern Research Institute of Birmingham, Alabama, in 1941. Subsequently, similar organizations were established: Midwest Research Institute in Kansas City, Missouri (1944), Stanford Research Institute (1946), and the Southwestern Research Institute in San Antonio, Texas (1949).
- 13 See Schram, Protection and Promotion of Products of the Mind Resulting from Research in a Technological Institute, 6 *PTC J.* 150 (1962).
- 14 Op. cit. supra note 13, at 154.
- 15 35 *Industrial and Engineering Chemistry* 177 (1943).
- 16 75 *Electrical World* 1505 (1920).

Restrictions on the Use of Animals and Persons in Scientific Research [pages 53-65]

- 1 Shultz, *Humane Movement in the United States* 154 (1924). The first animal anti-cruelty act provided that "nothing in this act shall be construed to prohibit or interfere with any properly conducted scientific experiments or investigations, which experiments shall be performed under the authority of the faculty of some regularly incorporated medical college or university of the State of New York." N.Y. Session Laws of 1867, Section 95.
- 2 Although a bill was introduced by Senator Gallinger in 1900 "For the Regulation of Scientific Experiments Upon Human Beings in the District of Columbia," it was not intended to prohibit, but rather to regulate human experimentation. S. 3424, 56 Congress, 1st Session (1900). See Ladimer, Ethical and Legal Aspects of Medical Research on Human Beings, 3 *J. Pub. Law* 466, 497-98 (1954).
- 3 Codman, *Human Vivisection and the American Medical Association* 4 (1923).
- 4 See Shultz, op. cit. supra note 1, at 155.

ANIMALS AND PERSONS IN RESEARCH *continued*

- 5 Jung, *Memories, Dreams, Reflections* 101 (1963).
 - 6 James, Is Life Worth Living? in *The Will to Believe and other Essays* 32, 58 (1898).
 - 7 Dewey, *The Ethics of Animal Experimentation* (Pamphlet for the Committee on Experimental Medicine of the Medical Society of the State of New York, 1909).
 - 8 Chain, We Tamed Penicillin, *Reader's Digest* 89, 90 (March, 1965).
 - 9 An interesting development is the breeding of animals with congenital deformities, such as a cleft palate, for research purposes. In one instance an entire colony of monkeys with hypertension, arteriosclerosis, and coronary heart disease was created by subjecting them to a high degree of tension. See Hearings on S.J. Res. 41 Before the Committee on Labor and Public Welfare, 86th Congress, 1st Session 39-40 (1959). Although the animals involved are subjected to considerable pain and discomfort, the high value of these experimental "freaks" for medical research designed to alleviate the particular induced abnormalities and diseases is obvious.
- 10 The code read:

I. Vagrant dogs and cats brought to this laboratory and purchased here shall be held at least as long as at the city pound, shall be returned to their owners if claimed and identified. II. Animals in the laboratory shall receive every consideration for their bodily comfort; they shall be kindly treated, properly fed, and their surroundings kept in the best possible sanitary condition. III. No operations on animals shall be made except with the sanction of the director of the laboratory, who holds himself responsible for the importance of the problems studied and for the propriety of the procedures used in the solution of these problems. IV. In any operation likely to cause greater discomfort than that attending anesthetization, the animal shall first be rendered incapable of perceiving pain and shall be maintained in that condition until the operation is ended. Exceptions to this rule will be made by the director alone and then only when anesthesia would defeat the object of the experiment. In such cases an anesthetic shall be used so far as possible and may be discontinued only so long as it is absolutely essential for the necessary observations. V. At the conclusion of the experiment the animal shall be killed painlessly. Exceptions to this rule will be made only when continuance of the animal's life is necessary to determine the result of the experiment. In that case, the same aseptic precautions shall be observed during the operation and so far as possible the same care shall be taken to minimize discomforts during the convalescence as in a hospital for human beings.

- 11 New York law illustrates the detailed nature of some of the applicable regulations. The present provision exempting scientific experimentation from the cruelty to animals statute reads:

[This law is] not to be construed to prohibit or interfere with any properly conducted scientific tests, experiments, or investigations, involving the use of living animals performed or conducted in laboratories or institutions, which are approved for these purposes by the Commissioner of Health.

The State Commissioner of Health shall prescribe the rules under which such approvals shall be granted, and therein standards regarding the care and treatment of any such animals. Such rules shall be published and copies thereof conspicuously posted in each such laboratory or institution.

The current rules published by the State Commissioner of Health provide:

Title 10 Section 55.1 of the Official Compilation of Codes, Rules and Regulations of the State of New York. 10 N.Y.C.R.R. § 55.1. a) Approval may be granted labora-

tories and institutions for the use of living animals in properly performed or conducted scientific tests, experiments or investigations. Approval will be granted only when the applicant has demonstrated a need for the use of living animals. b) Approval will not be granted to laboratories for the use of living dogs or cats: 1) Unless evidence is presented that the general research or teaching program of the institution will contribute to the understanding of the problems of human or animal health; 2) Unless it can be shown that other animals are not equally satisfactory.

55.2. Only laboratories or institutions will be approved in which the use of living animals for the above purposes will be under the immediate supervision of persons qualified by training and experience to conduct scientific work.

55.3. Application for approval shall be made on forms provided by the State Department of Health. Approval will be granted to a laboratory or institution in the name of the person responsible for the use of living animals. The certificate of approval is not transferable and is revoked if the individual in whose name approval has been granted shall cease to be in charge.

55.5. The individual whose name appears on the certificate of approval shall be responsible for all of the experimentation that involves the use of living animals in the designated laboratory or institution. He shall be responsible for the care of the animals whether within or away from the laboratory or institution, the propriety of the procedures used, and the scientific justification for the use of animals in experiments, tests or demonstrations.

55.6. Care and Treatment of Animals. a) The laboratory or institution shall give careful consideration to the bodily comfort of animals wherever located. They shall be kindly and humanely treated and provided with adequate amounts of food and water. The food given to the animals shall be wholesome and in sufficient quantity for the type of animal and scientific test. The animals' quarters shall be kept clean, well lighted and ventilated and be maintained at a proper temperature. Quarters or cages of suitable size shall be provided so that each animal may stand, sit, and lie in a normal position and turn around with ease. All quarters and cages shall be kept clean and after they are vacated and before they are re-occupied shall be cleaned by procedures suitable to prevent spread of communicable diseases. b) Laboratories and institutions providing transportation for animals must arrange for their humane handling during their transportation to and from the laboratory. c) Any operation or experiment likely to cause greater discomfort than that attending anesthetization shall not be undertaken until the animal is first rendered incapable of perceiving pain. The animal shall be maintained in that condition until the operation or experiment is completed. Exceptions to this section may be made only when provisions for maximum comfort, including anesthesia, would defeat the object of the experiment and then only with the express permission of the individual whose name appears on the certificate of approval. d) At the conclusion of experiments, the animals must be killed painlessly or given care to minimize discomfort which is equivalent to that rendered human beings following an operation.

55.12. [One must keep records on dogs and cats, including—1) a description of each animal, 2) the date and place the animal was procured, 3) the cost of obtaining the animal, 4) the condition of the animal on arrival, 5) the scientific use to which the animal was put, 6) whether anesthesia was used in the experiment, and 7) the method used for humane disposal of the animal.]

Such records shall be available for inspection by the State Commissioner of Health or his representative. b) Reports shall be made to the State Department of Health on such matters and at such times as the State Commissioner of Health may require.

12 N.J.S.A. 4:22-16.

13 N.J.S.A. 4:22-26.

14 New Jersey SPCA v. The Board of Education of East Orange, Essex County Court, Law Division, Docket No. A-8605. (Complaint filed 22 June 1964).

- 15 See Cardozo, *Nature of the Judicial Process* 60 (1921).
- 16 See Fox, Some Social and Cultural Factors in American Society Conducive to Medical Research on Human Subjects, 1 *Clinical Pharmacology and Therapeutics* 423 (1960).
- 17 Slater v. Slater, 2 Wils. (K.B.) 359, 95 Eng. Rep. 860 (1767). The most widely noted of the early American cases is Carpenter v. Blake, 60 Barb. 488 (N. Y., 1871). For analysis of these early court decisions, see Cady, Medical Malpractice: What about Experimentation? 6 *Ann. West. Med. & Surg.* 164 (1952); and Ladimer, Ethical and Legal Aspects of Medical Research on Human Beings, 3 *J. Pub. Law* 467 (1954).
- 18 Allen v. Voje, 114 Wis. 1, 89 N.W. 924 (1902).
- 19 Carpenter v. Barber, *supra* note 17, at 523-524.
- 20 Jackson v. Burnham, 20 Colo. 532, 39 Pac. 577 (1895).
- 21 Fortrer v. Koch, 272 Mich. 273, 261 N.W. 762 (1935).
- 22 254 P. 2d 85 (Calif. 1953).
- 23 In Natanson v. Kline, 186 Kan. 393, 350 P. 2d 1093 (1960), the court noted, at p. 1107, that for failure to obtain the informed consent of the patient, the physician-defendant was guilty of malpractice, no matter how skillfully the treatment was administered. See Stetler and Moritz, *Doctor and Patient and the Law* 326 (4th ed. 1962), and 151 *Science* 663-66 (1966).
- 24 262 N. C. 153, 136 S.E. 2d 617, 621 (1964), and to the same effect: Ball v. Mallinkrodt Chemical Works, 381 S.W. 2d 563 (Tenn. 1964); Yeates v. Harms, 393 P. 2d 982 (Kan. 1964).
- 25 *Medicolegal Forms*, Law Dept., AMA (1961) at 37.
- 26 21 U.S.C. § 355(i). The legislative history of this section indicates the exception was intended to apply to cases involving children needing emergency treatment whose parents could not be reached to give consent, unconscious patients, those suffering from incurable diseases when the knowledge of the nature of the disease would exacerbate their condition, mentally incompetent patients without guardians, and the like. However, the language itself would seem to apply to those cases where an informed consent would interfere with the design of the experiment. It is for this reason that the National Health Federation feels that this exception permits experimentation on unsuspecting "human guinea pigs." See *Modern Medicine*, 4 February 1963, 14. See also Rheingold, Products Liability—The Ethical Drug Manufacturer's Liability, 18 *Rutgers L. Rev.* 947, 958 (1964).
- 27 Among the numerous works discussing experimentation for the benefit of the patient the following are especially informative: Keaton, Physicians and Surgeons: Liability for Medical Experimentation, 40 *Calif. L. Rev.* 159 (1952); Ladimer, *loc. cit.* *supra* note 2; Long, *The Physician and the Law* 2nd ed. (1959); Beecher, *loc. cit.* *infra* note 30; Stetler and Moritz, *Doctor and Patient and the Law* 4th ed., 326-28 (1962). For a valuable anthology and bibliography of related works, see *Clinical Investigation in Medicine: Legal, Ethical and Moral Aspects*. ed. Ladimer and Newman (1963).
- 28 U.S. v. Brandt (The Medical Case), II. Trials of War Criminals 181-82 (1947).
- 29 The AMA is now in the process of drafting a new code relating to clinical testing and human experimentation. It is not yet available for comment.
- 30 Beecher, Experimentation in Man, 169 *J. Am. Med. Soc.* 461 (1959).
- 31 Fox, *Experiment Perilous* 47 (1959).

- 32 Professor Louisell has noted that "the law [regarding medical experimentation] is not as certain as one ideally would want it to be. . . . However, the situation may not be too intolerable in the field of experimentation today. Are the uncertainties so serious that they curtail important and justifiable things which should be done? If not, perhaps a gray area is more desirable socially at this time than premature crystallization of legal dogma which potentially could produce too rigid a formula." Louisell, *Legal Limits on Human Experimentation*, 6 *Archives of Environmental Health* 784 (1963). The problems and arguments pro and con codification are set forth at length in Carter, *The Proposed Codification of Our Common Law* 5-91 (1884); Introduction to the Completed Civil Code (1865), in Field, 1 *Speeches* 323-31 (1884); Pound, *Sources and Forms of Law*, 22 *Notre Dame Law.* 71 (1946).
- 33 Llewellyn, *The Common Law Tradition* 185 (1960).

Part II · Towards Interdisciplinary Understanding

Privacy and Behavioral Research [pages 80-105]

- 1 See generally Shils, *Social Inquiry and the Autonomy of the Individual in The Human Meaning of the Social Sciences* 114 (ed. Lerner, 1959).
- 2 Bolt, *A Man For All Seasons*, Act II, at 157 (Random House, 1962).
- 3 Lack of trespass was cited by the Supreme Court in refusing to invalidate the use of a detectaphone on the outer wall of a hotel room, *Goldman v. United States*, 316 U.S. 129 (1942); see *United States v. Pardo-Bolland*, 348 F. 2d 316 (2nd Cir. 1965), petition for cert. filed, 34 U.S.L. Week 3081 (U.S. 2 September 1965) (No. 521); in allowing the use of a concealed transmitter by a government undercover agent in a suspect's laundry, *On Lee v. United States*, 343 U.S. 747 (1952); and in upholding the use of a concealed recorder by a tax agent in a suspect's place of business, *Lopez v. United States*, 373 U.S. 427 (1963). In *Silverman v. United States*, 365 U.S. 505 (1961), the decision excluding evidence was based on the actual penetration of an apartment wall by a spike microphone which, by making contact with a heating conduit, enabled the police to overhear every word spoken within the house.
- 4 Pound, *Interests of Personality*, 28 *Harv. L. Rev.* 343 (1915).
- 5 *Id.* at 362.
- 6 To the extent that the claim to privacy has not yet been recognized or protected by law it cannot, at least in a technical legal sense, be called a "right."
- 7 By contrast with American legal development, it has been said that ". . . the trend in the foreign legislation is towards an outspoken protection of the rights of personality. We find the expression of this common concern in the Civil Code of Liechtenstein (1926), in the Italian (1942) and Greek (1946) codes, in the reformed Japanese code (1948) and the recent Egyptian and Philippine codes, and in a project of law in the German Federal Republic." Janssens, *European Law Includes Rights of Personality*, *Va. L. Weekly*, 29 April 1965, p. 1. See also Krause, *The Right to Privacy in Germany—Pointers for American Legislation?* *Duke L.J.* 481 (1965).
- 8 Address to the Congress of the International Association of Applied Psychology, 10 April 1958.
- 9 *Ibid.*
- 10 U.S. Const. amend. IV.

- 11 U.S. Const. amend. III.
- 12 U.S. Const. amend. V.
- 13 The law on this issue appears, however, to be in an active phase of transition. See, e.g., Judge Sobel's opinion in *People v. Grossman*, 45 Misc. 2d 557, 257 N.Y.S.2d 266 (1965) and Justice Brennan's dissent in *Lopez v. United States*, 373 U.S. 427, 446 (1963). See also the new constitutional right of privacy announced by Justice Douglas in *Griswold v. Connecticut*, 381 U.S. 479 (1965), and *Massiah v. United States*, 377 U.S. 201 (1964) (sixth amendment held to have been violated when an eavesdropping device was used to elicit information from a defendant in the absence of counsel).
- 14 See, e.g., the listing in Prosser, *Privacy*, 48 *Calif. L. Rev.* 383, 386-89 (1960). For a better analysis, see Bloustein, *Privacy as an Aspect of Human Dignity: An Answer to Dean Prosser*, 39 *N.Y.U.L. Rev.* 962 (1964). See also Hamberger v. Eastman, 206 A.2d 239 (N.H. 1964); *Truxes v. Kenco Enterprises, Inc.*, 119 N.W.2d 914 (S.D. 1963).
- 15 See Prosser, *supra* note 14.
- 16 In New York, for example, where the common law right to privacy is thought not to exist, the same result may be reached by more tortuous routes—e.g., actions for libel, slander, trespass, or unfair labor practice, or the common law remedy to safeguard mental tranquility from the intentional infliction of distress. See *Battalla v. State*, 10 N.Y. 2d 237, 176 N.E. 2d 729, 219 N.Y.S. 2d 34 (1961); *Scheman v. Schlein*, 35 Misc. 2d 581, 231 N.Y.S. 2d 548 (Sup. Ct. N.Y. Co. 1962). See also *Restatement (Second), Torts* § 46 (1965), and especially the caveat and comment thereon. Consider also the possibility of basing civil remedies on criminal statutes such as N.Y. Pen. Law § 738 (eavesdropping) or § 834 (holding a person up to ridicule). See *Restatement (Second), Torts* § 286; see also *Reitmaster v. Reitmaster*, 162 F. 2d 691 (2d Cir. 1947).
- 17 See Cooley, *Torts* 29 (2nd ed. 1888).
- 18 See, e.g., *Roberson v. Rochester Folding Box Co.*, 171 N.Y. 538, 544, 64 N.E. 442, 443 (1902).
- 19 *Olmstead v. United States*, 277 U.S. 438, 478 (1927). See also Warren and Brandeis, *The Right to Privacy*, 4 *Harv. L. Rev.* 193 (1890).
- 20 See Shils, *supra* note 1, at 156.
- 21 On the importance of individual (and collective) secrecy in social relationships, see *The Sociology of Georg Simmel* 307-44 (ed. Wolff, 1950).
- 22 Yet, it is to be expected that particular cultures will, from time to time, reach a consensus on definable areas that are deemed to be private. Such a consensus is likely, however, to be both temporary and limited.
- 23 See, e.g., Packard, *The Naked Society* 5 (1964).
- 24 a) For example in personnel selection or retention, compare *Town & Country Food Co.*, 39 Lab. Arb. 332 (1962), with *McCain v. Sheridan*, 160 Cal. App. 2d 174, 324 P. 2d 923 (1958) (refusal of employees to take "lie detector" tests). Several state statutes prohibit employers from making certain uses of lie detector tests. See, e.g., Alaska Stat. § 23.10.037 (Supp. 1965); Cal. Labor Code § 432.2; Mass. Ann. Laws c. 149, § 19B (Supp. 1963); Ore. Rev. Stat. § 659.225 (1963); R.I. Gen. Laws Ann. § 28-6.1-1 (Supp. 1964). In New York, bills to preclude the use of lie detectors as a condition of initial or continued employment are introduced

in the Legislature with regularity. In the 1965 session, seven such bills were introduced, see 1965 N.Y. Leg. Record & Index 1337, and two, after reaching the Governor, were vetoed for "technical defects." See N.Y. Assembly Bill Print No. 4439, passed 7 June 1965, vetoed 28 June 1965 (1965 N.Y. Leg. Record & Index 865); N.Y. Sen. Bill Print No. 279, passed 27 April 1965, vetoed 24 May 1965 (1965 N.Y. Leg. Record & Index 29). See also 111 Cong. Rec. 15378 (daily ed. 8 July 1965) (a resolution of the Communications Workers of America on invasions of privacy).

b) For examples, in labor relations, compare Chesapeake & Potomac Tel. Co., 98 N.L.R.B. 1122 (1952) (monitoring an employee's home telephone), with Eico Inc., 44 Lab. Arb. 563 (1965) (television surveillance of production floor) and Thomas v. General Elec. Co., 207 F. Supp. 792 (W.D. Ky. 1962) (in-plant movies for time, motion and safety studies). See also N.Y. Lab. Law § 704.

- 25 See McDaniel v. Atlanta Coca-Cola Bottling Co., 60 Ga. App. 92, 2 S.E. 2d 810 (1939) (use of eavesdropping device to obtain evidence for defense of civil action); Schmukler v. Ohio-Bell Tel. Co., 66 Ohio L. Abs. 213, 116 N.E.2d 819 (Ohio C.P. 1953) (use of telephone monitoring to ascertain breach of contract). For the statutes of those states making at least some form of eavesdropping a crime, see note 65 infra. For a discussion of some of the ethical issues in personality testing in business, see Cronbach, *Essentials of Psychological Testing* 459-62 (2nd ed. 1960).
- 26 a) For examples in the practice of law, see Matter of Wittner, 264 App. Div. 576, 35 N.Y.S. 2d 773 (1st Dep't 1942), *aff'd per curiam*, 291 N.Y. 574, 50 N.E. 2d 660 (1943) (lawyer suspended from practice for surreptitious use of recording device). The Committee on Professional Ethics of the Association of the Bar of the City of New York has concluded that the use of recording devices by lawyers, without the consent of the person whose conversation is being recorded, violates the Canons of Ethics. See, e.g., Opinions Nos. 832, 836, 13 N.Y.C.B.A. Record 36, 568 (1958); No. 813, 11 N.Y.C.B.A. Record 207 (1956).

b) In law enforcement: see Dash, *The Eavesdroppers* (1959); Symposium, 44 *Minn. L. Rev.* 811 (1960). See also *New York Times*, 14 July 1965, p. 1, col. 3 (use of two-way mirrors and other eavesdropping devices by Internal Revenue Service).

- 27 a) In medical research: see Lewis, Part I of this volume.
- b) In medical practice: see Rheingold, Products Liability—The Ethical Drug Manufacturer's Liability, 18 *Rutgers L. Rev.* 947, 957, 1009 (1964).
- 28 See Staff of House Comm. on Gov't Operations, Use of Polygraphs by the Federal Government (Preliminary Study 1964), 88th Congress, 2nd Session (Committee print 1964); House Comm. on Post Office and Civil Service, Use of Electronic Data Processing Equipment in the Federal Government, H.R. Rep. No. 858, 88th Congress, 1st Session (1963); Hearings Before the House Comm. on Post Office and Civil Service, Confidentiality of Census Reports, 87th Congress, 2nd Session (1962); cf. *United States v. Rickenbacker*, 309 F. 2d 462 (2d Cir. 1962), cert. denied, 371 U.S. 962 (1963).
- 29 a) In newsgathering: see the charge of Alex Rose that a *New York Herald Tribune* reporter had rented an adjoining hotel room to eavesdrop on a political meeting. *New York Times*, 20 June 1965, § 1, p. 46, col. 1.
- b) In public safety: consider the number of apartments, office buildings, hospitals, laboratories, jails, and other public buildings that have electronic systems to cover entrances, elevators, reception rooms, conference rooms, corridors and tellers' windows with television cameras or sound monitoring and recording sys-

tems; also the FAA rule on the installation of voice recorders in the cockpits of large airplanes as proposed, 28 Fed. Reg. 13786 (1963). For the regulation as enacted, see 29 Fed. Reg. 19209 (1964).

c) In education: see authorities cited in notes 31, 37 *infra*, for some aspects of the use of personality tests in schools; consider also the two-way communication system that enables a school principal to speak directly to a class or, at his choice, to monitor, unobserved and unannounced, the classroom proceedings.

d) In social welfare: see Reich, Individual Rights and Social Welfare: The Emerging Legal Issues, 74 *Yale L.J.* 1245, 1254 (1965); Sokol, Due Process in the Protection of Adults and Children (paper presented 11 September 1964, at the Northeast Regional Conference of the American Public Welfare Association).

e) In entertainment: consider the television programs which have used hidden cameras to photograph unsuspecting subjects; see N.Y. Pen. Law § 834 dealing with exhibitions, and particularly the prohibition of "any act . . . whereby any . . . citizen . . . is held up to contempt or ridicule."

- 30 See *Matter of Hyman v. Jewish Chronic Disease Hosp.*, 15 N.Y. 2d 317, 206 N.E. 2d 338, 258 N.Y.S. 2d 397 (1965). See also, Carley, Research and Ethics, *Wall Street Journal*, 10 June 1965, p. 1, col. 1; *New York Times*, 20 March 1965, p. 56, col. 1.
- 31 See Eron and Walder, Test Burning II, 16 *American Psychologist* 237-44 (1961); Nettler, Test Burning in Texas, 14 *American Psychologist* 682-83 (1959).
- 32 Although this article is concerned with individual privacy, the claim to institutional and collective (or group) privacy should be noted. Institutional privacy is more than the sum of the claims to privacy of the members of a particular institution. For example, even had each of the members of the jury in the University of Chicago experiment consented to the recording of the jury room proceedings, the tone of the public response indicates that such recording would still have been viewed as tampering with a sacred institution and, therefore, offensive. See Shils, *supra* note 1, at 132-39. The individual claim to privacy is plainly paralleled by the institutional claim, and both are rooted in the need of an organism to learn and grow by quiet trial and error (sometimes called practice) without loss of dignity or public accountability, or risk of punishment. Both involve the concepts of consent and confidentiality discussed later in this article. But the conditions under which the claim may be asserted—by private institutions as well as public—and the determination of who may consent (if the judge cannot consent for the jury, can the President consent to the disclosure of his cabinet discussions?) raise the privacy issues in a different context worthy of separate analysis. The public accountability of institutions (both government and private) must be weighed and balanced with the institutional need for privacy to maintain their effectiveness and integrity. This is well appreciated by all who are responsible for the destiny of an institution and who have dealt, for example, with journalists' inquiries, congressional investigations, government questionnaires, judicial subpoenas, FBI interviews or stockholders' demands. A recent illustration of a lack of sensitivity to this claim of institutions for privacy is afforded by a bill introduced in the New York State Senate on 9 March 1965 (Senate print 2832, Intro. 2691) which would have declared "all books . . . bills, vouchers, checks, contracts or other *papers connected with or used or filed* in the office of every authority or commission . . . or with any officer acting for or on its behalf . . . public records . . . *open to public inspection* at all times. . . ." (Emphasis added.)

- 33 18 U.S.C. § 1508 (1964); see, e.g., Mass. Ann. Laws c. 272, § 99A (Supp. 1964).
- 34 N.Y. Pen. Law § 738. The new penal law, effective 1 September 1967, replaced Section 738 with a general provision prohibiting "wiretapping or mechanical overhearing of a conversation." N.Y. Sess. Laws 1965, c. 1030, § 250.05. The memory of the Chicago experiment lingers on. See the antieavesdropping bill introduced in the Minnesota Legislature on 4 March 1965, S.F. No. 915, § 2(d) (Phillips Legislative Service).
- 35 N.Y. Pen. Law § 740. The new penal law makes no substantial change in this provision. N.Y. Sess. Laws 1965, c. 1030, § 250.05.
- 36 Lee J. Cronbach, one of the nation's outstanding authorities on psychological testing, in his book, *Essentials of Psychological Testing* (2nd ed. 1960) observes:

Any test is an invasion of privacy for the subject who does not wish to reveal himself to the psychologist. While this problem may be encountered in testing knowledge and intelligence of persons who have left school, the personality test is much more often regarded as a violation of the subject's rights. Every man has two personalities: the role he plays in his social interactions and his "true self." In a culture where open expression of emotion is discouraged and a taboo is placed on aggressive feelings, for example, there is certain to be some discrepancy between these two personalities. The personality test obtains its most significant information by probing deeply into feelings and attitudes which the individual normally conceals. One test purports to assess whether an adolescent boy resents authority. Another tries to determine whether a mother really loves her child. A third has a score indicating the strength of sexual needs. These, and virtually all measures of personality, seek information on areas which the subject has every reason to regard as private, in normal social intercourse. He is willing to admit the psychologist into these private areas only if he sees the relevance of the questions to the attainment of his goals in working with the psychologist. The psychologist is not "invading privacy" where he is freely admitted and where he has a genuine need for the information obtained.

Id. at 459-60.

- 37 See S. Rep. No. 553, 88th Congress, 1st Session 41 (1963) for the legislative proposal (H.R. 4955) of Representative Ashbrook of Ohio. In New York, Assemblyman Russo introduced a bill in 1964 (A.I. 1701) to preclude the testing of a school child without the consent of a parent or guardian.
- 38 In addition to the restrictions that may be imposed on the uses of science and technology, there should also be considered the prospect of legal liability for any injury that may be suffered from their use. See Rheingold, *supra* note 27; Comment, Legal Implications of Psychological Research with Human Subjects, 1960 *Duke L.J.* 265. See also note 65 *infra* for statutes which make eavesdropping—including eavesdropping by behavioral scientists in the course of research—a crime.
- 39 Messick, Personality Measurement and the Ethics of Assessment, 20 *American Psychologist* 136, 140 (1965).
- 40 See a not unrelated discussion in West, *The New Meaning of Treason* 158-61 (1965).
- 41 Morison, Foundations and Universities, 93 *Daedalus* 1109, 1137 (1964).
- 42 Mill, *On Liberty* 7-8 (Bobbs-Merrill, 1956).
- 43 See notes 24-29 *supra* and accompanying text.
- 44 They may also involve the invasion of group or institutional privacy. One example is provided by research on minority groups or associations. See note 32 *supra*.
- 45 The Public Health Law of New York, for example, requires physicians and others to report communicable diseases to the local health officer (§ 2101), permits health officers to seek court orders to compel persons to be examined for venereal diseases (§ 2301), and requires vaccination of school children for smallpox (§ 2130).

- 46 The New York statute, for example, contains provisions designed to preserve the confidentiality of the private information obtained about the venereal diseases with which a person may be infected. See N.Y. Pub. Health Law § 2306.
- 47 See Gross, *Social Science Techniques: a Problem of Power and Responsibility*, 83 *The Scientific Monthly* 242 (1956); Mead, *The Human Study of Human Beings*, 133 *Science* 163 (1961).
- 48 The tribunal in the Nuremberg trials considered at some length the circumstances under which medical research conducted with human beings would conform to the ethics of the medical profession. It evolved ten basic principles that "all agree . . . must be observed in order to satisfy moral, ethical and legal concepts." The first of these ten Nuremberg commandments was that: "The voluntary consent of the human subject is absolutely essential." II. *Trials of War Criminals Before the Nuremberg Military Tribunals under Control Council Law No. 10, The Medical Case (United States v. Brandt)* 181 (U.S. Government Printing Office 1949). See generally Lewis, *supra* note 27.
- 49 How many people, for example, could be expected to participate willingly in a test to devise a standard of homosexual tendencies? Or to measure intrafamily hostility?
- 50 See Cronbach, *op. cit. supra* note 25, at 459-62.
- 51 For an interesting commentary on some of the subtle ethical problems involved, see Mace, *Privacy in Danger*, 171 *The Twentieth Century* 173, 176-77 (1962). Compare *State v. Kinderman*, 136 N.W. 2d 577 (Minnesota 1965), where the court held that an adult home owner could effectively consent to a search of his *adult* child's room notwithstanding the absence of *both* a court warrant and the consent of the adult child. This is another instance of a judicial preoccupation with the concepts of property when the claim to privacy is involved. See cases cited note 3 *supra* and accompanying text.
- 52 It is apparent that this view is not yet fully shared by the behavioral scientists. For example, Dr. Lee J. Cronbach, who has given thoughtful consideration to the problems of ethics in psychological testing, and who sensitively perceives the ethical issues involved in the use of psychological tests in other contexts, with respect to scientific research, has stated:
- No ethical objection can be raised to the use of subtle techniques and even of misleading instructions when the information so obtained will be used entirely for research purposes, the subject's identity being concealed in any report.
- Cronbach, *op. cit. supra* note 25, at 461. Even for research purposes, however, Cronbach raises a caution where the investigator occupies a position of authority over the person being tested. *Id.* at 462.
- 53 An excellent example of a responsible attitude toward behavioral research in schools is to be found in Kohn and Beker, *Special Methodological Considerations in Conducting Field Research in a School Setting*, 1 *Psychology in the Schools* 31 (1964). See also Castaneda and Fahel, *The Relationship between the Psychological Investigator and the Public Schools*, 16 *American Psychologist* 201-03 (1961). While neither of these articles deals with the claim to privacy as such, Messrs. Kohn and Beker show a lively appreciation of it, and recognize the importance of consent, anonymity, and confidentiality in, and for, behavioral research.
- 54 Examples of the range of protections available in the judicial process are:
- (a) Court orders to protect confidential information obtained for evidentiary

purposes from being improperly used for other purposes. See *Covey Oil Co. v. Continental Oil Co.*, 340 F.2d 993 (10th Cir. 1965), cert. denied, 380 U.S. 964 (1965); *United States v. Lever Brothers Co.*, 193 F. Supp. 254 (S.D.N.Y. 1961), appeal dismissed, 371 U.S. 207 (1962), cert. denied, 371 U.S. 932 (1962). See also N.Y. CPLR § 3103 (preventing the abuse of pretrial disclosure proceedings).

(b) Statutory provisions relating to the disposition of the evidence submitted to the Tax Court, see Int. Rev. Code of 1954, § 746; or the reception of certain evidence by the Civil Rights Commission. See Civil Rights Act of 1957, 102(g), as amended, 78 Stat. 249 (1964), 42 U.S.C. § 1975a(e) (1964).

(c) Statutory provisions for the sealing of records in judicial proceedings and limiting access thereto. See N.Y. Dom. Rel. Law §§ 114 (adoption), 235 (matrimonial actions); N.Y. Family Ct. Act § 166 (privacy of records); N.Y. Soc. Welfare Law §§ 372(4) (records as to children), 132, 136 (welfare records).

(d) Statutory provisions for the exclusion of the public from court proceedings. See N.Y. Judiciary Law § 4; N.Y. Family Ct. Act § 531 (paternity proceedings).

(e) Statutory provisions restricting the availability of information obtained by the Department of Justice under a Civil Investigative Demand, see Antitrust Civil Process Act § 4(c), 76 Stat. 550 (1962), 15 U.S.C. § 1313(c) (1964), or obtained by the Department of Commerce. See 13 U.S.C. § 9 (1964).

(f) Statutory prohibitions against televising or broadcasting of judicial proceedings, such as N.Y. Civ. Rights Law § 52.

55 See Sokol, *supra* note 29; see also Coser, *The Sociology of Poverty*, 13 *Social Problems* (October 1965).

56 See note 45 *supra*.

57 It should be borne in mind that there are various degrees of anonymity in the gathering of research data, and it may be useful to distinguish between them in balancing the values of particular research with the costs in privacy that may be involved. Dr. Isidor Chein, Professor of Psychology at New York University's Graduate School of Arts and Science, in a letter to the authors making this point, identified, among the possible levels of anonymity, the following six:

(a) The particular subject is never identifiable, not even by the investigator or his agents; (b) the particular subject is temporarily identifiable, but his identity is never ascertained up to and including the point at which the data that he has provided are consolidated in some meaningful and interpretable form; (c) the particular subject is temporarily identifiable and his identity is known up to, but not including, the point at which the data that he has provided are consolidated in some meaningful and interpretable form; (d) the particular subject is temporarily identifiable and can be associated with data that are in themselves meaningful and interpretable, but his identity is not ascertained; (e) the identity of the particular subject is known in conjunction with meaningful and interpretable data, but his identifiability and identity are submerged in the treatment of the data from many subjects and his own data are never scrutinized from the point of view of interpreting or drawing any inferences about him or his behavior; and (f) the identity of the particular subject is known in conjunction with meaningful and interpretable data and these data are scrutinized from the point of view of interpreting some aspect of the individual or his behavior, but his identity is thereafter submerged in the collection of similar processes of interpretation for many subjects.

58 See, e.g., Johnson, *Retain the Original Data!*, 19 *American Psychologist* 350-51 (1964). See also de Mille, *Central Data Storage*, 19 *American Psychologist* 772-73 (1964). The prospect of the use of computers for central recording, storage, and retrieval of research data in the behavioral sciences adds a troublesome new

dimension to the protection of privacy. Computerized central storage of information would remove what surely has been one of the strongest allies of the claim to privacy—the inefficiency of man and the fallibility of his memory.

- 59 The eighteen states are: Alabama, Ala. Code tit. 46, § 297(36) (Supp. 1963); Arkansas, Ark. Stat. Ann. § 72-1516 (1957); California, Cal. Bus. & Prof. Code § 2904; Colorado, Colo. Rev. Stat. Ann. § 154-1-7(8) (1963); Delaware, Del. Code Ann. tit. 24, § 3534 (Supp. 1964); Georgia, Ga. Code Ann. § 84-3118 (1955); Idaho, Idaho Code Ann. § 54-2314 (Supp. 1965); Illinois, Ill. Ann. Stat. c. 91½, § 406 (Smith-Hurd Supp. 1964); Kentucky, Ky. Rev. Stat. Ann. § 319.111 (Supp. 1965); Michigan, Mich. Comp. Laws § 338.1018 (Supp. 1961); Nevada, Nev. Rev. Stat. § 48.085 (1963); New Hampshire, N.H. Rev. Stat. Ann. § 330-A:19 (Supp. 1963); New Mexico, N.M. Stat. Ann. § 67-30-17 (Supp. 1965); New York, N.Y. Educ. Law § 7611; Oregon, Ore. Rev. Stat. § 44.040 (1963); Tennessee, Tenn. Code Ann. § 63-1117 (1955); Utah, Utah Code Ann. § 58-25-9 (1963); Washington, Wash. Rev. Code § 18.83.110 (1957).

- 60 A Montana statute does, however, seem to extend a limited privilege to certain types of behavioral research if conducted by a person teaching psychology in a school. The Montana statute reads as follows:

Any person engaged in teaching psychology in any school, or who acting as such is engaged in the study and observation of child mentality, shall not without the consent of the parent or guardian of such child being so taught or observed testify in any civil action as to any information so obtained.

Mont. Rev. Codes Ann. § 93-701-4(6) (1964).

- 61 See generally 8 Wigmore, Evidence §§ 2332-41 (McNaughten rev. 1961).
- 62 See, e.g., *Hurlburt v. Hurlburt*, 128 N.Y. 420, 424, 28 N.E. 651, 652 (1891) (dictum). See also Louissell, Confidentiality, Conformity and Confusion: Privileges in Federal Court Today, 31 *Tul. L. Rev.* 101 (1956). See generally 8 Wigmore, op. cit. supra note 61, §§ 2290-2329. It is unlikely that testimonial privilege will be judicially extended to situations that do not fully satisfy Dean Wigmore's four conditions for the existence of a privilege: 1) the privileged communication must originate in a confidence that it will not be disclosed; 2) the element of confidentiality must be essential to the relationship of the parties to the communication; 3) the relationship is one which is to be assiduously fostered; and 4) the injury that would inure to the relationship by disclosure of the communication must be greater than the benefit to be gained from its contribution to the disposition of the litigation. *Id.* § 2285.
- 63 This, nevertheless, seems to be the situation in those eighteen states which accord the privilege only to licensed or registered psychologists. See Geiser and Rheingold, Psychology and the Legal Process: Testimonial Privileged Communications, 19 *American Psychologist* 831 (1964).
- 64 See Ethical Standards of Psychologists, 18 *American Psychologist* 56 (1963).
- 65 Remedies for the breach of this right are already available in many states:
- (a) See the list of states which recognize a common-law right of privacy in Prosser, supra note 14, at 386-89.
- (b) Oregon and Maryland have statutes which make eavesdropping, without the consent of all persons being overheard, a crime. Neither accords any exemption for

behavioral research. Thus, in Oregon, it is unlawful to obtain any part of a conversation by an eavesdropping device "if all participants in the conversation are not specifically informed that their conversation is being obtained." Ore. Rev. Stat. § 165.540(1)(c) (1963). Violation of this Oregon statute is punishable by fine or imprisonment and renders the violator liable for damages in a civil suit. Ore. Rev. Stat. §§ 30.780, 165.540(6) (1963). In Maryland it is unlawful to use any device "to overhear or record any part of the conversation or words spoken to or by any person in private conversation without the knowledge or consent, expressed or implied, of that other person." Md. Ann. Code art. 27, § 125A(a) (Supp. 1964).

(c) See the statutes in five other states which make eavesdropping unlawful without the consent of a party to the conversation—again without an exemption for scientific research: Cal. Pen. Code § 653j; Ill. Ann. Stat. c. 38, §§ 14-2, 14-4 (Smith-Hurd 1964); Mass. Gen. Laws Ann. c. 272, § 99 (Supp. 1964); Nev. Rev. Stat. § 200.650 (1957); N.Y. Pen. Law § 738.

(d) See also the comparable but more limited statutes in six other states: Ark. Stat. Ann. § 41-1426 (1964) (loitering for purposes of invading privacy); Ga. Code Ann. § 26-2001 (1953) (peeping or similar acts tending to invade privacy); N.D. Cent. Code § 12-42-05 (Supp. 1965) (using any mechanical or electronic device to overhear or record and to repeat with intent to vex or injure); Okla. Stat. tit. 21, § 1202 (1941) (loitering with intent to overhear and repeat to vex or injure); S.C. Code Ann. § 16-554 (1962) (peeping or similar acts tending to invade privacy); S.D. Code § 13.1425 (1939) (loitering with intent to overhear and repeat to vex or injure).

(e) See Restatement (Second), Torts § 286 (1965), which reflects the judicial acceptance of such statutory standards as a basis for civil liability.

- 66 See, e.g., Antitrust Civil Process Act § 4(c), 76 Stat. 550 (1962), 15 U.S.C. § 1313(c) (1964); N.Y. Educ. Law § 1007; N.Y. Lab. Law § 537; N.Y. Pen. Law § 762; N.Y. Pub. Officers Law § 74(b).
- 67 The Swedish Ombudsman suggests another interesting possibility. See A State Statute to Create the Office of Ombudsman, 2 *Harv. J. Legis.* 213 (1965).
- 68 Maryland, by House Bill 1197, approved by the Governor on 8 April 1965, added a new ¶ 125D to Article 27 of its Annotated Code and thereby became the first state to require "every person possessing any eavesdropping and/or wiretapping device" to register such device with the State Police. Unless registered it is unlawful to manufacture or possess any such device. It will be interesting to see how vigorously and effectively this new statute is enforced. Will it be applied, for example, as it would seem was intended, to the manufacturers of tape recorders or dictaphones? Or to the lawyers or scientists who use them?

The Interrelationships of Law and Social Science [pages 106-119]

- 1 See Cowan, Decision Theory in Law, Science and Technology, *Science* 1065-75 (7 June 1963); Hurst, Perspectives upon Research into Legal Order, 3 *Wis. L. Rev.* 356-67 (1961); Cowan, What Law Can Do for Social Science in *Law and Sociology* (1962).
- 2 Relevant to the general point in this paragraph are the following: Selznick, The Sociology of Law in *Sociology Today: Problems and Prospects* (1959); Cohen, Robson,

- and Bates, *Parental Authority: The Community and the Law* (1938) (see especially the Preface and Chapter I); Pound, *Social Control through Law* (1942); *ibid.*, A Survey of Social Interests, 57 *Harv. L. Rev.* 1-39 (1943).
- 3 Mark Massel of The Brookings Institution remarked in conversation that the interpenetration appeared to be relatively slight. See his book *Competition and Monopoly*, The Brookings Institution, Washington, D.C., 1962. See also the issues of *Law and Contemporary Problems*, published by Duke University Law School as an exception to the general rule of insularity. From 1959 through the Spring issue of 1964 this journal published over two hundred articles on subjects of convergent law and social science interests in economics, political science, sociology, and applications of social science methodology to the study of legal processes.
 - 4 For a useful review and bibliography see Clinard, *Criminological Research in Sociology Today: Problems and Prospects*, *op. cit.* For an instance of an attempt to integrate the social science and legal approaches, see Donnelly, Schwartz, and Goldstein, *Criminal Law* (1962).
 - 5 Exemplified in the collaborative works of the legal scholar, Karl Llewellyn, and the anthropologist, Edward Hoebel; e.g., Llewellyn and Hoebel, *The Cheyenne Way* (1941).
 - 6 For details, see Annual Reports of the Foundation, beginning with the 1959-60 issue.
 - 7 See Selznick, *op. cit.*
 - 8 See Annual Reports of the Foundation beginning with 1947-48; see also Young, Sociology and the Practicing Professions, *American Sociological Review*, 641-48, (December, 1955).
 - 9 University of California at Berkeley; University of Wisconsin; Northwestern University; and the University of Denver.
 - 10 Columbia University; Rutgers, The State University; University of Chicago; and Western Reserve University.
 - 11 See Stone, *The Province and Function of Law* (1950); Pound, *Law and Morals* (1926); Cohen, *op. cit.*; Hurst, *Growth of American Law* (1950).
 - 12 See Jones (ed.), *The Courts, the Public, and the Law Explosion* (1965).
 - 13 Planning reports and progress reports on demonstration projects under this program are available at the Office of Juvenile Delinquency and Youth Development, Department of Health, Education and Welfare, Washington, D. C.
 - 14 See Goodenough, *Cooperation in Change* (1963).
 - 15 See Carlin and Howard, Legal Representation and Class Justice, 12 *U. Calif. L. Rev.* 381-437; Conference Proceedings on the Extension of Legal Services to the Poor, sponsored by the U. S. Department of Health, Education and Welfare, November 1964, U. S. Government Printing Office, Washington, D. C.; Cheatham, *A Lawyer When Needed* (1963).
 - 16 See Foote and Cottrell, Jr., *Identity and Interpersonal Competence* (1955).

Legal Inquiry and the Methods of Science [pages 120-131]

- 1 "The various forms of human culture are not held together by an identity in their nature but by a conformity in their fundamental task." Cassirer, *An Essay On Man* 279 (Doubleday Anchor ed. 1955). I have always regretted that Cassirer did not include law as one of the "forms" (myth and religion, language, art, his-

- tory and science) dealt with explicitly in this perceptive introduction to the philosophy of culture.
- 2 The "scientific" presuppositions of the case method of law study are examined critically in Patterson, *The Case Method in American Legal Education: Its Origins and Objectives*, 4 *J. Legal Ed.* 1 (1951).
 - 3 The quoted words are from Adler's contribution to *Law and the Modern Mind: A Symposium*, 31 *Colum. L. Rev.* 82 (1931), reprinted in *Essays on Jurisprudence from the Columbia Law Review* 363, 375 (1963).
 - 4 Here, as at many other points throughout this paper, I have drawn on the thoughtful law and science writings of my distinguished predecessor, the late Edwin W. Patterson, and particularly on his 1962 Carpentier Lectures, published as *Law in a Scientific Age* (1963).
 - 5 *Law and the Modern Mind* (1930).
 - 6 10 *Cornell L. Q.* 17 (1924).
 - 7 On the function of rules of correspondence in scientific inquiry, see Nagel, *The Structure of Science: Problems in the Logic of Scientific Explanation* 97-105 (1960). Is it far-fetched to suggest that the notion or concept of rules of correspondence can be carried over, by analogy, from scientific to legal and behavioral inquiry?
 - 8 The materials brought together in Barber and Hirsch, *The Sociology of Science* (1962) have been a valuable source in the preparation of this paper.
 - 9 Admirable recent examples include Rosenberg, *The Pretrial Conference and Effective Justice: A Controlled Test in Personal Injury Litigation* (1964); and Conard, Morgan, Pratt, Voltz, and Bombaugh, *Automobile Accident Costs and Payments* (1964).
 - 10 See Barrett, *Criminal Justice: The Problem of Mass Production in The Courts, the Public, and the Law Explosion*, ed. H. W. Jones. 85 (1965) and the studies cited by Barrett therein.
 - 11 For an incisive and balanced analysis of the logic of judicial explanation, see Levi, *An Introduction to Legal Reasoning* (1949).
 - 12 Jones, *Law and the Behavioral Sciences: The Case for Partnership*, 47 *J. Am. Jud. Soc'y* 109 (1963).
 - 13 I am in full agreement with the views expressed by Dr. Cottrell in his paper on *The Interrelationships of Law and Social Sciences*, except that I may be considerably more conservative than he in my appraisal of the present methodological maturity and "scientific" status of the social sciences.
 - 14 If I had my way about it, Nagel's Chapter 13 (*Methodological Problems of the Social Sciences*) and Chapter 14 (*Explanation and Understanding in the Social Sciences*) would be required reading in every program designed to train students for careers in legal or behavioral research.
 - 15 "Since science is my profession, and hence the most important thing in my life, justice, to me, is that social order under whose protection the search for truth can prosper. 'My' justice, then, is the justice of freedom, the justice of peace, the justice of democracy—the justice of tolerance." Kelsen, *What is Justice?* 24 (1957).

Part III · Literature of the Law-Science Confrontation

- 1 *Supra*, page 6. These categories, with some modification and expansion, also provided the organizational outline for the bibliographies in this section.
- 2 Jewish Courts of Justice from ancient times employed physicians as expert witnesses with respect to the injuries sustained in certain criminal matters (*Jewish Encyclopedia*. Vol. 8. New York: Funk & Wagnalls Co., Inc., 1904, 409). In Roman law specialized fact finders were sometimes employed for particularly esoteric matters and in Jewish law the Judges of the Sanhedrin were themselves required to possess knowledge of the general sciences (*Code of Maimonides, Book 14, the Book of Judges*. Translated by Abraham M. Hershman. New Haven: Yale University Press, 1949, 7). Learned Hand, later a distinguished judge, wrote an interesting survey of the development of expert testimony, *Historical and Practical Considerations Regarding Expert Testimony*, 15 *Harv. L. Rev.* 40-58 (1901).
- 3 *Law, or a Discourse Thereof*. London, 1678, 6.
- 4 Benjamin Farrington's *Science and Politics in the Ancient World* (London: Allen & Unwin, 1939) is perhaps the best study of this problem in the classical period. See also Hayward R. Alher, *Mathematics and Politics* (New York: The Macmillan Company, 1965).
- 5 Bell, E. T. *Men of Mathematics*. New York: Simon and Schuster, Inc., 1937, 29.
- 6 Sarton, George. *A History of Science, Ancient Science Through the Golden Age of Greece*. Cambridge: Harvard University Press, 1952, 244.
- 7 New York: Blaisdell, 1964. The trial material is set out at pages 346-348.
- 8 *Supra* note 4.
- 9 *Ibid.*, page 69.
- 10 New York: George Braziller, Inc., 1955.
- 11 New York: Appleton, 1900.
- 12 New York: R. R. Bowker Co., 1955, 6.
- 13 Quoted in Draper, *supra* note 11, page 180.
- 14 Chicago: University of Chicago Press, 1955.
- 15 New York: Alfred A. Knopf, Inc., 1927.
- 16 See, for example, Ray Ginger, *Six Days or Forever? Tennessee v. John Thomas Scopes* (Boston: Beacon Press, 1958) and Jerry R. Tompkins, ed., *D-Days at Dayton: Reflections on the Scopes Trial* (Baton Rouge, Louisiana State University Press, 1965).
- 17 Haight, Anne L. *supra* note 12, page 121.
- 18 In *Versions of Censorship, An Anthology*, ed. John McCormick and Mairi MacInnes. Garden City, New York: Anchor Books, 1962, 96-115.
- 19 For detailed discussion of that problem, see Walter Gellhorn, *Security, Loyalty and Science* (Ithaca: Cornell University Press, 1950); Eleanor Bontecore, *Federal Loyalty-Security Program* (Ithaca: Cornell University Press, 1953); and Don Price, *Government and Science: Their Dynamic Relation in American Democracy* (New York: New York University Press, 1954).
- 20 *Supra* note 15, page viii.
- 21 Cambridge: Harvard University Press, 1965.
- 22 104 *Journal of the American Medical Association* 1057 (1935) reprinted in *On the Sociology of Medicine*, edited by Milton I. Roemer (New York: MD Publications, 1960) 308-318.
- 23 In *The Sacred Books of the East*. Vol. 4. Ed. F. M. Müller (Oxford University Press, 1880).

- 24 Driver, G. R., and Miles, John C. *The Babylonian Laws*. Vol. 2. London: Oxford University Press, 1955, 79–81.
- 25 Philadelphia: F. A. Davis Co., 1949, chapter 25.
- 26 Castiglioni, A. The Contribution of the Jews to Medicine, in *The Jews, Their History, Culture and Religion*. Vol. 2. ed. Louis Finkelstein. Philadelphia: Jewish Publication Society of America, 1960, page 1355.
- 27 Berlin: S. Karger, 1911.
- 28 New York: Bloch Publishing Co., Inc., 1959.
- 29 Supra note 20, page 1058.
- 30 3 Henry VIII chapter 11.
- 31 Castiglioni, supra note 26, page 1353.
- 32 See Driver and Miles, supra note 24, Vol. 2, 27–33 and 87–93.
- 33 Driver, G. R., and Miles, John C. *The Assyrian Laws*. London, Oxford University Press, 1935, 293–320.
- 34 The *Encyclopaedia Hebraica* (Jerusalem: Encyclopaedia Publishing Co., 1965) notes in its article, Agriculture, Vol. 17, 978, that “a substantial part of the precepts of the Torah deals, directly or indirectly, with agricultural subjects.”
- 35 Driver and Miles, supra note 24, Vol. 1, 127.
- 36 Philadelphia: Jewish Publication Society of America, 1958, Vol. 8: *Philosophy and Science*, chapter 35, Scientific Exploration, 153–4. See also, W. M. Feldman, *Rabbinical Mathematics and Astronomy* (London: M. L. Cailingold, 1931).
- 37 Sarton, supra note 6, page 416.

Illustrations

Page 3 copper engraving of Sir Francis Bacon, reproduced with the permission of The Bettmann Archive. Page 67 pencil rendering of atomic reactor plant, reproduced through the courtesy of Yankee Atomic Electric Company, Boston, Massachusetts. Page 133 early engraving of library of the University of Leyden, reproduced with the permission of Culver Pictures, Inc. End papers: woodblocks from the *Consilia* of Bartolus de Saxoferrato, reproduced through the courtesy of The New York Public Library. End papers: Nuclear Test Ban Treaty, reproduced through the courtesy of Columbia University Law Library.

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Program

I. WHERE LAW AND SCIENCE MEET Thursday, April 8, 1965

9:30-10:40 Caspary Auditorium

Chairman: John E. Lockwood,
Milbank, Tweed, Hadley & McCloy

*Science and Law: Some Points of
Confrontation*

David F. Cavers, Fessenden Professor of
Law, Harvard University

*Legal Distinctions between
Research Administered by Commercial
and Nonprofit Institutions*

Joe H. Munster, Jr., and Justin C.
Smith, Professors of Law, Western
Reserve University

10:40-11:00 Coffee Break

11:00-12:00 Discussion

12:00- 2:00 Luncheon, Abby Aldrich
Rockefeller Hall

2:00- 4:30 Caspary Auditorium

Chairman: Barklie McKee Henry
*The Law and Research Supported
by Government*

Arthur W. Murphy, Professor of Law,
Columbia University

*Federal Tax Policy and the Support
of Science*

Bernard Wolfman, Professor of Law,
University of Pennsylvania; Visiting
Professor of Law, Harvard University

5:00- 6:00 Cocktails, the Club Room,
Abby Aldrich Rockefeller Hall

6:00- 8:00 Dinner, Welch Hall

8:00- 9:15 Caspary Auditorium

Chairman: Maclyn McCarty,
Vice President and Physician-in-
Chief, The Rockefeller University

Confidentiality and Research

Oscar M. Ruebhausen: Debevoise,
Plimpton, Lyons & Gates; Orville

G. Brim, Jr.: President, Russell Sage
Foundation

*Restrictions on the Use of Drugs,
Animals, and Persons in Research*

Ovid C. Lewis, Associate Professor of
Law, Western Reserve University

9:15-10:00 Discussion

II. TOWARDS INTERDISCIPLINARY UNDERSTANDING

Friday, April 9, 1965

9:30-10:40 Caspary Auditorium

Chairman: Eli Whitney Debevoise,
Debevoise, Plimpton, Lyons & Gates

*The Advantages and Problems of
Collegueship in Law and Science*

John G. Palfrey, Commissioner,
United States Atomic Energy
Commission. Discussion

*The Interrelationships of Law and
Social Science*

Leonard S. Cottrell, Jr., Social
Psychologist and Secretary, Russell
Sage Foundation

10:40-11:00 Coffee Break

11:00-12:00 Discussion

12:00- 2:00 Luncheon, Abby Aldrich
Rockefeller Hall

2:00- 4:30 Caspary Auditorium

Chairman: Donald R. Young,
Visiting Professor, The Rockefeller
University

*Legal Inquiry and the Methods of
Science*

Harry W. Jones, Cardozo Professor of
Jurisprudence, Columbia University

*Science and Law in a Changing
Society*

Detlev W. Bronk, President, The
Rockefeller University

Discussion

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Fourteenth century law-science confrontation: these woodblocks from the *Consilia* of Bartolus de Saxoferrato, an eminent Italian jurist (1313–1357), illustrate the problems of alluvion, or the changes in property rights caused by silt deposits or by recession of water from the land.

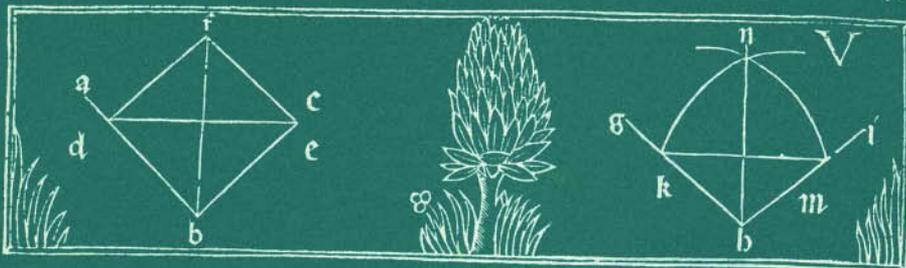
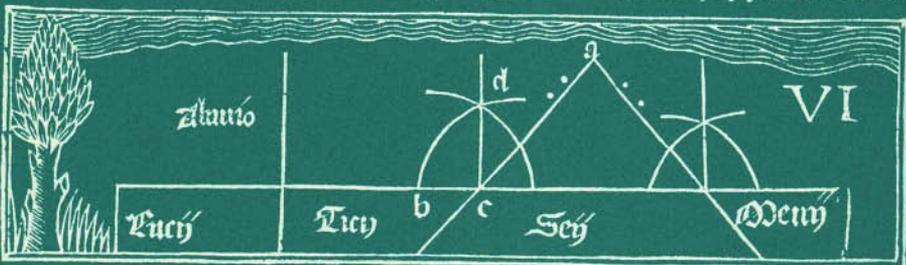


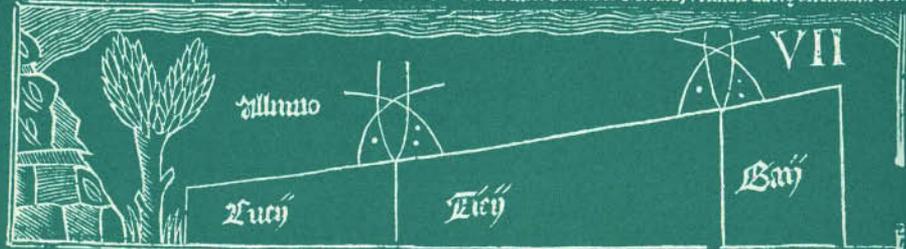
Figura ista est facta ad designandū circuli, q̄ in i. fuit q̄si
 f. i. si ponat vnus p̄ctus i angulo duarū linearū, & s. il
 lū volo ducere lineā rectā seu ppendicularit, qualis fiat, q̄ do
 cet hec figura. ponant ergo duę lineę, f. a. b. & b. c. q̄ cōueniūt
 i vno p̄cto, et ibi faciūt angulū cuiuslibet q̄ cōditōis sit ille an
 gulus. & sup illū p̄ctū volo ducere lineā rectā, & faciā igit̄ ab
 vtraq̄ pte angulū i illis lineis p̄ctū b. q̄ d. patet: si ducat̄ à p̄
 cto f. vsq̄ ad p̄ctū b. q̄ illa lineā rectē & ppendicularit cadit
 sup b. q̄ d. patet: q̄ si ducat̄ alia lineā rectā à p̄cto d. illa tēcat̄
 p. m. l. i. & ibi iij. angulū rectū, vt pbat̄ in lib. Euclidis. ppter
 ea i ip̄o angulo b. sunt duo angulū equales. vel si vis alit̄ pba
 re, & operari ponas duas lineas g. h. & h. i. quę cōueniūt in p̄

cto h. s. quę vis ducere lineā rectā, faciā ab vtraq̄ pte in illis li
 neis, punctū æquē distantē k. m. deinde pone pedē circini in
 puncto quę prætendā vsq̄ ad n. & voluā supra, versus illam
 partē, sup er quā volo dicere lineā, deinde pone pedem circini
 ille duę lineę circulares se p̄secindūt in p̄cto n. ducat̄ ergo
 lineā rectā à p̄cto h. vsq̄ ad punctū n. dico q̄ illa rectē & p̄
 p̄dicularit cadit s. punctū n. eadē rōne qua præcedēs. & si
 ducat̄ alia lineā rectā à p̄cto k. vsq̄ ad punctū m. illa tēcat̄ p
 mediu p lineā n. h. & erūt ibi iij. angulū rectū. Et in p̄cto h.
 similit̄ hūt duo angulū equales. His p̄missis ad euidentā nūc
 ad p̄positū veniamus ponēdo ripas p̄c̄tia & alluiones & c.



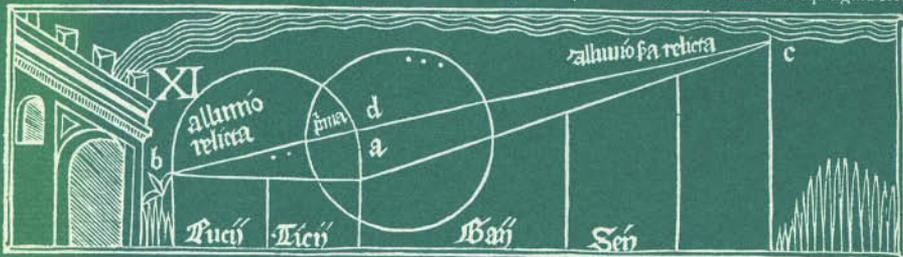
De euidentā dicendorū præmitto q̄ flumē designabit̄
 per colorē azureū, & caput flu. erit ab illa parte à qua
 erat caput alicuius animalis, & vltus illā pte illat̄ præ
 diorū ripę per colorē nigrū. illud q̄ est mediū inter prædia &
 flumē intelligat̄ alluio. Itē per alluionē. Itē lineę ruberę fa
 ctę sunt ille quęverē diuidūt per alluionē. Lineę hancę siue
 crocę faciē sunt causa demonstratiōis, vel disputatiōis, & si
 quando q̄ fuerit aliqua lineā azurea, & in ipsa figura declara
 bitur ad quē finē hat. Nunc ad p̄sentē figurā veniamus. &
 aduertendū est q̄ lineā quę est ripa oim̄ prædiorū est rectā cū
 rectitudine. Itē duo prædia paria hūt cōfinia directā adē q̄
 lineā diuidēs prædia directā, cadit in lineā ripę. qd̄ patet, q̄ a
 ab vtraq̄ pte facit angulū rectū in illis duobus prædijs, diuis
 io est clara q̄ p̄trahit̄ lineā directā per alluionē vsq̄ ad flu
 uū, vt ostēdit̄ lineā ruberę & illa lineā est directā resp̄ctū ri
 pę: & directē cōiungit̄ cū ripa diuidente prædia. Vidēdū est
 de ripa, quę est inter prædia Titij, & prædia Scij, & inter præ
 dia Mœuij. in illis est dubiū. nam lineę diuidentes prædia, si
 cet̄ sint directę in se, nō t̄ cadūt directę in illā lineā quę est
 ripa, vt patet: quę ab vna p̄ficūt̄ angulū acutū, ab alia v

tusum. Si igit̄ per alluionē ducit̄ lineā, secundū rectitudi
 nē lineę nō t̄ret vsq̄ ad flumē, sed iungeretur in puncto a. vt
 ostendunt lineę zale, & sic prædiū Scij qd̄ est maiōris latitudo
 dinis iuxta ripā, haberet minus de alluione: nec p̄cederet
 vsq̄ ad flumē. dicēdū est ergo q̄ lineę cōfiniū diuidētē cōiun
 gunt, nullatenus attēdēdę sunt, qm̄ in d. l. iter eos. ff. de acq̄ re
 do. dicit̄ p̄ mō latitudinis q̄ ripę latitudo, p̄pe ripā lit̄. Si ergo
 fuerit diuisio cōsideret̄ lineā q̄ est ripa, & cōsideret̄ lineā vbi ca
 dit lineā diuidēs cōfinia & ibi allumāt̄ vnus p̄ctus i aduū
 bilis, vt ostēdit̄ lineę nigrę, & ab vtraq̄ pte illius puncti, hant̄
 duo p̄cti æquē distantes b. c. & ponat̄ pes circini in puncto
 b. & extēdat̄ ad p̄ctū c. & voluāt̄ versus alluionē, & poli
 ca ponat̄ in p̄cto c. & extēdat̄ ad p̄ctū d. & similit̄ mō ver
 sus alluionē quę duę lineę reuoluit̄ p̄ctē indēt̄ in p̄cto d.
 deinde ducat̄ lineā rectā à p̄cto a. vsq̄ ad p̄ctū d. & p̄trahi
 tur vsq̄ ad flumē, vt ostēdit̄ lineā ruberę. Dico igit̄ q̄ illa rectē
 cadit̄ s. lineę quę est ripa, vt p̄bat̄ ut̄ s. in ipsa figura, & est re
 ctā à puncto d. vsq̄ ad lineā assumptā quātum vltra p̄trahi
 tur rectā erit, vt dictum est s. in prima figura, & similit̄ diuis
 io est inter Scium & Mœuij, vt lineę ductę ostendunt & c.



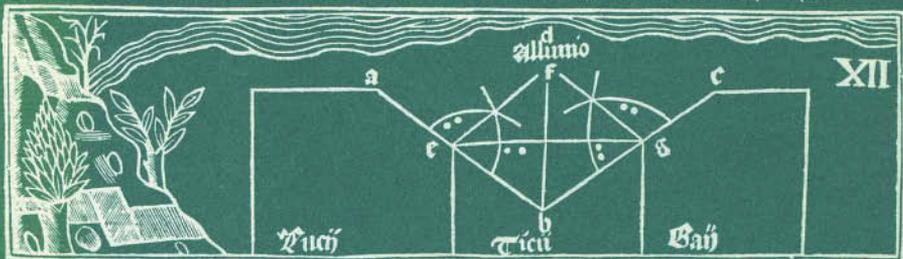
In hac figura sunt due linee recte f.a.b.& b.c. q̄ in p̄nc̄to b. faciūt angulū, verūtam̄ linea a.b. est minor: quā linea b. c. & in hoc differt à præcedētī. Dico igit̄, ducendā esse lineā rectā à puncto a. vsq̄ ad punctū c. vt ostendit linea crocea, & quicqd̄ est j. dictas lineas proculdubio habet ripas ab vtraq̄ parte, & ideo debet diuidi iure proximitatis vt patet ex præcedētī, & ideo ducatur linea rubea per mediū diuidēs à puncto b. vsq̄ ad lineā crocā in p̄nc̄to. d. Illud verò q̄ à linea crocea s̄. habet Ripā tm̄ ab vno latere & p̄ illā recitū

dine quā ostēdit linea crocea e.a. et ideo debet diuidi ducēdo lineā rectā rubeā à p̄nc̄to b. vsq̄ ad lineā azureā à p̄nc̄to c. illud verò q̄ est à linea azurea d.e. debet diuidi ducēdo lineā rectā super illā azureā, sicut sibi esset Ripa, & hoc per illam rationē, q̄ additū additō est diuidendū, sicut additū antiquo prædio, vt dictū est in præcedētibus. & prædicta vera, si p̄ponatur questio sic simpliciter, & per quem mediū alluio accesserit sit incertū. Si verò constaret q̄ primò alluio addit certā partem, postea altam̄tūc declarabit in sequ. figura &c.



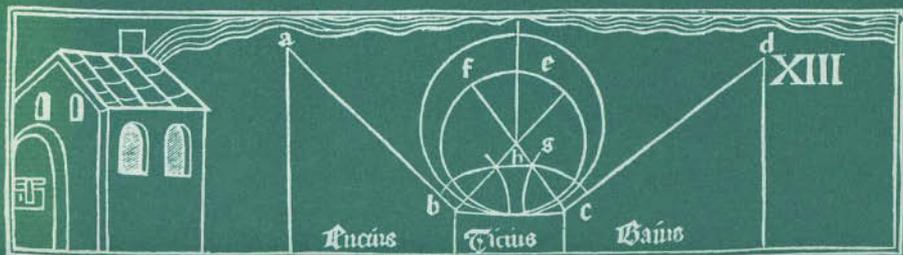
Ista figura facta est ad declarādū illud q̄ dictū est in præcedētī. si em̄ poneretur simpliciter totā alluio nē esse diuisam, qualiter esset fienda diuisio. apparet ex dictis in tribus præc. figuris. Sed pone flumen primò per alluionē diuisisse illā partē que continetur j. lineā rubeā ducam s̄. prædiū Ticij & Lucij. dico primò q̄ tota illa alluio esset Lucij & Ticij quorum prædijs adhaeret, & Casus nihil habebit facere ibi. Secunda verò alluio, diuidetur ponendo alluionem primam pro Ripa. vt sic inter ipsam & prædiū. Caij & Seij ducatur linea per mediū secans ex doctrina data in præc. Sed opponitur q̄ de alluione prima debeatur prædijs Caij. nam inter prædia Lucij Ticij, Caij & Seij sunt

due linee q̄ faciūt angulū in p̄nc̄to d. & sic pars alluionis habet duo latera, vt ostēdit li. crocea b.c. ergo illa debet diuidi iure p̄p̄nquitatis, vt dictū est. Sed pars illius alluionis est magis p̄p̄nquitæ prædio Caij, q̄ patet: q̄ super p̄nc̄to lineæ alluionis primæ posito in li. rub. secat per li. crocā, vt in puncto d. fiat ergo circulus q̄ tangit punctualiter prædiū Ticij, tantū occupabit partē de prædio Caij, vt ostēdit circulus azureus. Reipon. hoc quod alicui accreuerat iure propinquitatis, habet locum, quando illud de quo acquirendo ageretur neutrius fundo coheret, vt insula quando vni coheret, & alij nō, semper illi cedit cui coheret: nec attenditur proximitas alterius, vt ff. de acquiten. re. do. l. insula. in principio &c.



Igura ista facta est vt ostendat q̄ f̄dia quædā possunt esse q̄bus de alluio nō debet vsq̄ ad flumē, sed añ in termin orit̄, vt si ripa cōtineat inter duas lineas, f.a.b. & b.c. factū angulū in puncto b. q̄ angulus cadit quasi in p̄nc̄to prædiij Ticij. Primò ergo fiat linea rubea diuidēs per mediū, vt linea b. vt pbatū est s̄. in viij. figu. Ex quo patet q̄ quicqd̄ est ad eā lineā s̄. versus caput fluminis, cedit illi ripe a.b. quicqd̄ est ab illa lineā infra versus finē fluminis cedit illi ripe b.c. & hoc rōne propinquitatis, vt dictū erit, nec prædiū Ticij habet diuidere superiori vicino, & inferiori, & si bñ respicias p̄nc̄tus

diuidēs prædia cadit in lineis rectis secūdū se. Debet ergo diuidi, ducendo super eā lineā rectam. vt ostensum est s̄. in vj. figura, vt ostendit linea e.f. & linea g.f. & sic in puncto f. portio contingens agrū Ticij finitur, & intermorit̄. Si em̄ trāliret vltra, vel si linea torq̄ret̄, nec iter recta, vt si volueres lineā e. f. versus caput fluminis, vel si trāliret vltra b.d. dares primē tripe plusq̄ deberes iure proximitatis, q̄ iura prohibēt. & si ponat̄ per alluionē sic simpliciter accreuisse. Sed si poneret q̄ primò accreuisset in totum angulum prædiij Ticij, vsq̄ ad lineam crocā. e.g. tūc deberet fieri diuisio, vt in seq. figu. &c.



Continued from front flap

are to be introduced and the conditions to be imposed on their introduction. There are crucial decisions, too, as to the extent to which government should support scientific and technological research and as to the form—outright grant, contract, or preferential tax treatment—in which this support should be extended. In our system and our day, these and others like them are political decisions, and they will be reached and implemented through government's instrument, the law.

The nine reports brought together in this book were prepared for a conference on *Law and the Social Role of Science* held at The Rockefeller University on 8 and 9 April 1965, under the joint auspices of The Rockefeller University and the Walter E. Meyer Research Institute of Law.

To supplement this book's textual coverage, readers may turn to the timely and penetrating bibliography of law and science materials prepared by Morris L. Cohen and Betty J. Warner of the University of Pennsylvania Law School in Part III.



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