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GOD, GALILEO, AND GOVERNMENT: TOWARD CONSTITUTIONAL PROTECTION FOR SCIENTIFIC INQUIRY

Richard Delgado* and David R. Millen**

I. INTRODUCTION

In a recent survey of first amendment issues, Thomas Emerson lists as one of the "hard problems . . . looming on the horizon" state regulation of scientific research.¹ "Courts must soon decide," Emerson writes, "whether certain kinds of . . . research may be prohibited or regulated. It is hard to predict where these issues will lead."²

While Emerson chose as his example the recent moratorium declared by the city of Cambridge on recombinant DNA research,³ the first legal challenge could just as easily arise from proposals to limit research on the XYY syndrome,⁴ genetic differences in IQ among population groups,⁵ or behavioral implications of the emerging discipline of sociobiology.⁶

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1. Emerson, *Colonial Intentions and Current Realities of the First Amendment*, 125 U. PA. L. REV. 737, 746 (1977); see Toulmin, *The Research and The Public Interest*, in RESEARCH WITH RECOMBINANT DNA 101 (1977). "I . . . would predict that a case raising this question will probably reach the Supreme Court sometime during the next fifteen years or so, and that the Court will probably decide that freedom of speech does, at least in general terms, embrace freedom of scientific inquiry." *Id.* at 103.

2. Emerson, *supra* note 1, at 746-47.

3. *Id.* at 746 n.25.

4. *E.g.*, Beckwith & Miller, *The XYY male: The making of a myth*, HARV. MAGAZINE, October 1976, at 30, 33 (arguing against XYY research because it distracts attention from more pressing social problems such as poverty and racism; because like all scientific investigation it occurs in a social context and inevitably influences and is influenced by social policy); Davis, *XYY: The Dangers of Regulating Research by Adverse Publicity*, HARV. MAGAZINE, October 1976, at 26 (public pressure led by political groups caused abandonment of research project designed to see how XYY syndrome affects health and behavior).

5. *E.g.*, Reinhold, *A Limit on Scholarship?*, N.Y. Times, Dec. 9, 1973, at E-5, col. 1; Wicker, *The Shockley Case*, N.Y. Times, Nov. 16, 1973, at A-41, col. 5; N.Y. Times, Nov. 18, 1973, at A-20, col. 1. See generally THE I.Q. CONTROVERSY, CRITICAL READINGS (J. Block & G. Dworkin eds. 1976) [hereinafter cited as I.Q. CONTROVERSY].

6. *E.g.*, TIME, Aug. 1, 1977, at 54; *id.*, Dec. 13, 1976, at 93.

The movement to curb DNA research proceeds on two fronts. One focuses on the threat to public health posed by the escape of newly created, harmful micro-organisms.⁷ This criticism invokes the state's police power to protect the public health and safety; in so doing, it presents few new legal problems except, possibly, the magnitude of the risk.⁸ Another, equally insistent, line of attack, however, urges that such research, even if safe, should not be carried out because it involves the exercise of a power that human beings properly ought not assume—the power to modify the evolutionary course of living species, including, potentially, our own.⁹

Other research, particularly that concerned with the genetics of human intelligence,¹⁰ has generated criticism that is even more clearly focused on the content or direction of the research rather than on any tangible, immediate risk. Such research should not be carried out,

7. E.g., Bennett & Gurin, *Science that Frightens Scientists: The Great Debate over DNA*, ATLANTIC MONTHLY, February 1977, at 43, 45. See generally SUBCOMMITTEE ON HEALTH & SCIENCE RESEARCH OF THE SENATE COMMITTEE ON HUMAN RESOURCES, 95TH CONG., 1ST SESS., BIOMEDICAL RESEARCH AND THE PUBLIC ("AIRLIE CONFERENCE") (Comm. Print 1977) [hereinafter cited as AIRLIE CONFERENCE].

8. The possible dangers, which include an epidemic of disease for which human beings have no immune mechanisms, have been described as "horrific." See, e.g., Bennett & Gurin, *supra* note 7, at 45. Others have warned that DNA research could lead to the cloning of human beings, or other forms of undesirable genetic engineering. *Id.* at 58–61. Because of these possibilities, it has been proposed that "informed consent" be obtained from the public and that the decision to proceed with such technologies be made by the widest possible social groups. See, e.g., RESEARCH WITH RECOMBINANT DNA 188 (1977); *Hearings on Regulation of Recombinant DNA Research Before Subcomm. on Science, Technology, and Space of the Senate Comm. on Commerce, Science, and Transportation*, 95th Cong., 1st Sess. 117 (1977) (statement of Marc Lappé, Ph.D.) [hereinafter cited as *Hearings*]; Dismukes, *Recombinant DNA: A Proposal for Regulation*, HASTINGS CENTER REP., April 1977, at 20, 25–27. See also Brown, *Informed Consent in Social Experimentation: Some Cautionary Notes*, in ETHICAL AND LEGAL ISSUES OF SOCIAL EXPERIMENTATION 79, 94–98 (Rivlin & Timpane eds. 1975). Such an approach would be helpful in coping with the police-power aspects of scientific inquiry—tangible, physical dangers to health and safety—but would do little to assist in dealing with objections based on the content or direction of research.

9. E.g., AIRLIE CONFERENCE, *supra* note 7, at 44–45 (remarks of Robert Sinshemer); *id.* at 89 (remarks of Jonathan King); *Hearings, supra* note 8, at 4 (statement of Philip Handler) ("Their position, in short, is that there are some factors that man should not seek to learn."). Grobstein, *The Recombinant DNA Debate*, SCIENTIFIC AMER., July 1977, at 22, 29–30; Gumpert, *Progress or Peril?: Gene Transplants Stir Communities' Fears: Scientists Are Split*, WALL ST. J., Sept. 28, 1976, at 29, col. 1 ("There is the larger, philosophical question of whether researchers should be tampering with genetic material and creating new forms of life").

10. The prime advocates of the view that IQ is determined partly by membership in racial subgroups are Arthur Jensen, professor of education at the University of California at Berkeley, and William Shockley, professor of engineering at Stanford University. Their views are discussed in I.Q. CONTROVERSY, *supra* note 5. See also sources cited at notes 17, 19, & 20 *infra*.

critics urge, because the results could alter our political or social values,¹¹ change our concept of what it means to be a member of the human community,¹² or result in a frozen, static view of society in which the range of human potentialities is limited by pre-existing design.¹³ At times, such criticism assumes a character that is overtly religious, moral, or political, as when opponents of DNA research question man's tampering with nature's processes,¹⁴ or when critics of sociobiology argue that the discipline supports a status quo that, in their view, is racist, sexist, and elitist.¹⁵

The critics' voices have not gone entirely unheard. In addition to the Cambridge moratorium, scientists have been denied research support,¹⁶ teaching opportunities,¹⁷ or, in the case of young researchers, tenured positions¹⁸ because they have pursued lines of inquiry that were seen by universities or grant-giving agencies as disfavored or

11. E.g., Chomsky, *The Fallacy of Richard Herrnstein's IQ*, in I.Q. CONTROVERSY, *supra* note 5, at 285, 294-95.

12. E.g., Stent, *The Poverty of Scientism & the Promise of Structuralist Ethics*, HASTINGS CENTER REP., December 1976, at 32; see Comment, *Law vs. Science: Legal Control of Genetic Research*, 65 KY. L. REV. 880, 891 n.76 (1977) (genetic engineering is "a threat to human integrity, dignity, and individuality").

13. Lewontin, *Race and Intelligence*, BULL. ATOM. SCI., March 1970, at 2 (likening Jensen's view to 17th century notions of predestination and limited atonement); Stent, *supra* note 12, at 32; N.Y. Times, Oct. 3, 1973, at A-48, col. 1 (New York state education commissioner laments tendency of Jensen-Shockley view to cause public to become "confused and dispirited" about education).

14. See sources cited at note 9 *supra*; *Report of Workshop No. 10: Ethical and Moral Issues of the Research*, in RESEARCH WITH RECOMBINANT DNA 209-11 (1977); *Report of Town Meeting*, in RESEARCH WITH RECOMBINANT DNA 211-14 (1977); TIME, Apr. 18, 1977, at 32 ("Beyond any immediate danger, others say, there are vast unknowns and moral implications. Do not intervene in evolution, they warn in effect, because 'it's not nice to fool Mother Nature.'"). See also Smith, *Manipulating the Genetic Code: Jurisprudential Conundrums*, 64 GEO. L.J. 697, 700 (1976); SCI. NEWS, Mar. 12, 1977, at 165 (opponents of DNA research demand inclusion of "religious leaders" in National Academy of Sciences forum). If the state's motive in imposing a limitation on research is blatantly religious, it may be susceptible to an attack on establishment grounds, as well as to a challenge based on free expression. See *Epperson v. Arkansas*, 393 U.S. 97 (1968); Friedman, *The Federal Fetal Experimentation Regulations: An Establishment Clause Analysis*, 61 MINN. L. REV. 961 (1977).

15. Chasin, *Sociobiology: A Sexist Synthesis*, SCIENCE FOR THE PEOPLE, May-June 1977, at 27, 31; Gurin, *Is Society Hereditary?*, HARV. MAGAZINE, October 1976, at 21, 23; TIME, Dec. 13, 1976, at 93.

16. Davis, *supra* note 4, at 26; Reinhold, *supra* note 5; Gumpert, *supra* note 9; see RESEARCH WITH RECOMBINANT DNA 136-37 (1977). See also Beckwith, *Recombinant DNA: Does the Fault Lie Within our Genes?*, SCIENCE FOR THE PEOPLE, May-June 1977, at 14-15.

17. N.Y. Times, Dec. 2, 1973, at A-51, col. 1; *id.*, Nov. 16, 1973, at A-41, col. 5; *id.*, May 2, 1972, at 9, col. 1 (William Shockley denied opportunity to speak or teach at Stanford, Princeton, Harvard).

18. TIME, Aug. 1, 1977, at 54 (leader of sociobiology movement denied tenure at Harvard).

sensitive. The faculties of eminent universities¹⁹ and the memberships of prestigious scientific societies²⁰ have heatedly debated the propriety of pursuing scientific inquiry in certain highly charged areas.

This article examines the applicability of existing constitutional doctrine to state action which prohibits, burdens, or declines to fund scientific research,²¹ not because of deficiencies in its research design, the credentials of the investigator, safety or health hazards, or projected cost-benefit balance of the results, but because the state considers the area of inquiry itself inappropriate or suspect. This article tenders and examines the thesis that governmental decisions to regulate scientific inquiry because of the nature of the knowledge likely to result implicate highly protected constitutional values, particularly those of the first amendment, thereby invoking the stringent model of judicial review applicable to such cases.

Although the state's power to regulate scientific activity in the public interest, either through direct enactment or the power of the purse, has yet to be tested in constitutional terms, it seems highly likely that courts will be called upon to adjudicate such controversies in the near future. A moratorium such as that recently imposed in Cambridge could be challenged by a scientist in a declaratory judgment action as

19. See Reinhold, *supra* note 5, (University of California at Berkeley faculty policy debated; requires researchers to consider "social risk" to their subjects); N.Y. Times, Nov. 18, 1973, at A-20, col. 4 (speakers at NYU conference urged that views linking race and IQ are unfit to discuss).

20. See TIME, Aug. 7, 1977, at 75 (prominent professors protest Jensen's election to American Academy for the Advancement of Science); *id.*, Dec. 13, 1976, at 93 (American Anthropological Association considers resolution that would condemn sociobiology as "an attempt to justify genetically the sexist, racist, and elitist status quo in human society"); N.Y. Times, Mar. 2, 1974, at A-32, col. 5 (American Association for the Advancement of Science hears debate concerning "whether or not there should be more research into the proposition of Dr. Arthur Jensen of the University of California at Berkeley suggesting that blacks, on the average, are inferior in intelligence to whites"; article cites "strong tendency to oppose such research as unsuitable or meaningless" within National Academy of Sciences and on university campuses). See also NEWSWEEK, July 3, 1950, at 15; 157 PUBLISHER'S WEEKLY 2739, 2739 (1950). Harvard astronomers conducted a campaign to force the publisher to withdraw Immanuel Velikovsky's book, *Worlds in Collision*, because its ideas on the origin of the solar system while not demonstrably erroneous nonetheless contradicted current orthodoxy; pressure had also been exerted on the Hayden Planetarium to force cancellation of a program based on the book.

21. The exclusion of research capable of presenting immediate health and safety or other police-power problems means that the type of research with which this article is concerned will generally be basic or fundamental research. "Basic research" has been defined as "original investigations for the advancement of scientific knowledge . . . which do not have specific [practical] objectives" or ends in view. NATIONAL SCIENCE BOARD, SCIENCE INDICATORS 53 (1975). See also notes 97-98 & 206-07 and accompanying text *infra*.

a violation of her fundamental rights. A researcher denied public money to pursue controversial studies could bring an action against the governmental funding agency to compel adoption of nondiscriminatory criteria for disbursing funds. A professor denied employment, advancement, or tenure because his employer objected to the content of his research could challenge the university's decision as a violation of his academic freedom.

In any such proceeding, it will be analytically helpful to identify the functional components of the inquiry with which the governmental action interferes. Ordinarily, scientific investigation begins with fact-gathering; constitutional right-to-know and right-to-learn cases thus become pertinent. It also involves the creation and dissemination of ideas and information. Accordingly, cases relating to freedom of thought and belief, and the right to speak and hear, are also relevant. The investigation may involve experimentation; if so, the distinction between speech and action enters into the analysis.

Two sets of background material are useful in the difficult task of applying established legal doctrine to this developing area. The first consists of historical documents and writings that shed light on the intentions of the framers in enacting the first amendment. Did they understand scientific inquiry to be comprehended in the sphere of protected expression and, if so, to what extent? The second consists of the interpretations that leading commentators have given the amendment's scope and purpose. Emerson, for example, has identified four values or objectives our system of free expression is designed to serve. Meiklejohn has advanced a theory premised on the function of free speech in a self-governing, democratic society. Others have advocated more restrictive interpretations. These theories are reviewed to determine the manner in which they argue for or against the right to pursue scientific inquiry as an aspect of free expression.

Throughout this article, a number of themes appear: scientific inquiry as expression or nonexpression, right or privilege, private activity or public good, process or product. These themes form the familiar conceptual battleground on which many first amendment struggles have been waged.²² The conclusion is reached that all three levels of analysis—constitutional history, first amendment theory, and first amendment case law—support the inclusion of many forms of

22. See generally sources cited at notes 94, 109, & 110 *infra*.

basic scientific research within the system of protected expression. The article concludes by suggesting criteria by which the appropriateness of extending such protection can be determined in individual cases.

II. SCIENTIFIC INQUIRY AND THE CONSTITUTION: THE COLONIAL UNDERSTANDING

The first amendment's terse text²³ gives little aid to one who wishes to ascertain whether and to what extent the scientific enterprise was contemplated as falling within the system of free expression. Science is not mentioned—but this is also true of literature,²⁴ philosophy,²⁵ teaching,²⁶ leafletting,²⁷ and peaceful sit-ins of segregated facilities,²⁸ activities that the courts have held to be highly protected. In deciding whether first amendment coverage should extend to scientific inquiry, one helpful indicator is the beliefs and intentions of the framers as revealed in historical documents and their personal correspondence and writings, as well as more general works of literature and history that reveal the mood and intellectual currents of the times.²⁹

A. *The Intellectual Milieu*

Several colonial figures were leading exponents of Enlightenment

23. "Congress shall make no law . . . abridging the freedom of speech, or of the press . . ." U.S. CONST. amend. I.

24. *United States v. Kennerley*, 209 F. 119 (S.D.N.Y. 1913) (*Ulysses* case); *see Kingsley Int'l Pictures Corp. v. Regents*, 360 U.S. 684 (1950) (*Lady Chatterley's Lover*).

25. *See Epperson v. Arkansas*, 393 U.S. 97 (1968) (teaching of evolutionary theory held protected by establishment clause); *American Communications Ass'n v. Douds*, 339 U.S. 382, 395-97 (1950) (holding and disseminating communist beliefs protected, but incitement to overthrow government susceptible to state sanction, prevention); *United States v. Ballard*, 322 U.S. 78 (1944) (Court will not examine truth or falsity of unusual religious beliefs); *West Va. Bd. of Educ. v. Barnette*, 319 U.S. 624, 642 (1943) (orthodox political beliefs may not be prescribed).

26. *See Meyer v. Nebraska*, 262 U.S. 390 (1923) (state may not prohibit teaching of foreign language in public schools); T. EMERSON, *THE SYSTEM OF FREEDOM OF EXPRESSION* 593-626 (1970) [hereinafter cited as *SYSTEM*].

27. *Martin v. Struthers*, 319 U.S. 141 (1943).

28. *Brown v. Louisiana*, 383 U.S. 131 (1966).

29. Courts confronted with novel or difficult problems of constitutional construction have resorted to analysis of constitutional history to determine the original understanding of particular articles, clauses, or amendments. *See, e.g., Communist Party v. Subversive Activities Control Bd.*, 367 U.S. 1, 147-48 (1961) (Black, J., dissenting); cases cited at notes 46-47 *infra*.

thought,³⁰ the principal source of the American revolutionary spirit.³¹ Central to Enlightenment thought are the notions of toleration and liberalism, and a concept of truth-seeking as a continual process subject to objective verification and correction.³² Because these are also some of the basic values of science,³³ the development and growing influence of science during the same period reinforced the rationalistic, anti-authoritarian tenor of social and political thought. Political theory borrowed basic values and assumptions from science,³⁴ while politics contributed such metaphors as the "laws" which all physical bodies were assumed to obey.³⁵ John Locke believed that natural laws for government could be derived empirically by studying nature.³⁶ Madison saw the United States Constitution as a gigantic machine for the regulation of interest groups, by means of which the struggles among social classes would be balanced by political structures in much the same manner in which the physical universe remained in equilibrium under the influence of the laws of dynamics discovered by Newton.³⁷

The principal impediments to the establishment of a rational political system were conceived to be ignorance and authoritarianism, influences which the framers assumed would be overcome by the advancing spirit of science.³⁸ Galileo's trial and the succeeding decline of the scientific spirit in the Mediterranean countries were on the minds of educated persons as examples of the evils of censorship.³⁹

Those evils were attacked in Milton's *Areopagitica*⁴⁰ and Montesquieu's *Spirit of Laws*,⁴¹ two works widely read and discussed by colonial thinkers. *Areopagitica* was written in response to a Parliamen-

30. See text accompanying notes 37, 51-53, & 58-94 *infra*.

31. B. HINDLE, *THE PURSUIT OF SCIENCE IN REVOLUTIONARY AMERICA 1735-1789*, at 381-82 (1956); Emerson, *supra* note 1, at 737, 746-48.

32. See text accompanying notes 37, 51-53, & 58-94 *infra*.

33. E.g., R. HOFSTADTER & W. METZGER, *THE DEVELOPMENT OF ACADEMIC FREEDOM IN THE UNITED STATES* 61-62 (1955).

34. J. CROWTHER, *FAMOUS AMERICAN MEN OF SCIENCE* 138, 148-49 (1937); see E. BURNS, *JAMES MADISON: PHILOSOPHER OF THE CONSTITUTION* 24-25 (1938).

35. J. CROWTHER, *supra* note 34, at 145 *passim*; B. HINDLE, *supra* note 31, at 381-82; R. HOFSTADTER & W. METZGER, *supra* note 33, at 61-62.

36. J. CROWTHER, *supra* note 34, at 148.

37. *Id.* at 141; see E. BURNS, *supra* note 34, at 24-25.

38. D. PRICE, *THE SCIENTIFIC ESTATE* 86-88 (1965). See also sources cited at note 36 *supra*, and notes 53, 58-60, & 63-66 *infra*.

39. E.g., C. PATTERSON, *THE CONSTITUTIONAL PRINCIPLES OF THOMAS JEFFERSON* 188-89 (1953).

40. J. MILTON, *AREOPAGITICA* (1898).

41. C. DE MONTESQUIEU, *SPIRIT OF LAWS* (4th ed. London 1878).

tary bill requiring the licensing of books. Montesquieu's work, a systematic defense of personal and political liberty, sought to base a doctrine of political liberalism on "the nature of things"⁴² and a view of the universe—moral as well as physical—as inherently orderly.⁴³ His book illustrates the influence of scientific ideas on political thought; it borrows heavily from Descartes and Newton in such concepts as the "motion" of bodies (political as well as physical) and the insistence that all action is explainable in terms of uniform, universal laws of conduct.⁴⁴

B. *Constitutional History and Documents*

Colonial America's respect for science is illustrated by a letter from the Continental Congress to the inhabitants of Quebec. In enumerating the virtues of free expression, the authors declared, "The importance of this consists, besides the advancement of truth, science, morality, and the arts in general, in its diffusion of liberal sentiment on the administration of Government, its ready communication of thoughts between subjects, and its consequential promotion of union among them."⁴⁵

This letter has been cited with approval by the Supreme Court in *Near v. Minnesota*⁴⁶ and *Roth v. United States*.⁴⁷ In *Near*, the letter was cited as evidence that the early colonials sought, through the Constitution, to protect against the evils of censorship and prior restraint.⁴⁸ In *Roth*, the Court faced the difficult problem of differentiating obscenity from protected expression. In language seemingly broad enough to include scientific discourse, the Court extended protection to "[a]ll ideas having . . . redeeming social importance."⁴⁹ A concurring opinion by Chief Justice Warren suggested that scientific speech is intended to be protected when he spoke of "[t]he line dividing the salacious or pornographic from literature *or science*."⁵⁰

42. M. WADDICOR, *MONTESQUIEU AND THE PHILOSOPHY OF NATURAL LAW* 192 (1970). See generally T. PANGLE, *MONTESQUIEU'S PHILOSOPHY OF LIBERALISM* (1973).

43. M. WADDICOR, *supra* note 42, at 46-65, 192.

44. *Id.* at 183, 185-92; see J. CROWTHER, *supra* note 34, at 142.

45. 1 JOURNAL OF THE CONTINENTAL CONGRESS 104, 108 (1904).

46. 283 U.S. 697, 717 (1931).

47. 354 U.S. 476, 484 (1967).

48. 283 U.S. at 716-17.

49. 354 U.S. at 484.

50. *Id.* at 495 (emphasis added).

Other colonial writings also speak of scientific activity or truth-seeking as components of the system of free expression. Jefferson's *Notes on Virginia*⁵¹ declares that "truth is great and will prevail if left to herself, and has nothing to fear from the conflict, unless by human interposition disarmed of her natural weapons, free argument and debate."⁵² Jefferson saw science as the paradigm of truth-seeking processes; a government which bridled science bridled truth.

Galileo was sent to the Inquisition for affirming that the earth was a sphere; the government had declared it to be as flat as a trencher, and Galileo was obliged to abjure his error. This error, however, at length prevailed, the earth became a globe, and Descartes declared it was whirled round its axis by a vortex.

Fortunately, however:

The government in which [Descartes] lived was wise enough to see that this was no question of civil jurisdiction, or we should all have been involved by authority in vortices. In fact, the [vortex theory has] been exploded What has been the effect [of such interferences with scientific freedom] . . . ? To make one half the world fools, and the other half hypocrites.⁵³

A further indication of the importance the founders placed on scientific activity is found in their treatment of inventors. The *Records of the Federal Convention of 1787*⁵⁴ contain an early proposal that would have vested in Congress the power "[t]o encourage, by proper premiums and provisions, the advancement of useful knowledge and discoveries."⁵⁵ This provision evolved in successive drafts into the present patent clause,⁵⁶ the purpose of which, according to the Supreme Court, is not to reward individual inventors but to encourage the arts and sciences generally.⁵⁷

The early colonials saw scientific progress as a point of national pride; science could contribute to the comfort and well-being of the citizenry and at the same time vindicate the progress of the young na-

51. 1 T. JEFFERSON, NOTES ON THE STATE OF VIRGINIA (1801).

52. *Id.* at 453.

53. C. PATTERSON, THE CONSTITUTIONAL PRINCIPLES OF THOMAS JEFFERSON 188-89 (1953) (citing III T. JEFFERSON, NOTES ON VIRGINIA 264 (1782)).

54. 2 RECORDS OF THE FEDERAL CONVENTION OF 1787 (M. Farrand ed. 1911).

55. *Id.* at 321.

56. *See id.* at 505, 506, 509, 570, 595.

57. *Sinclair v. Interchemical Corp.*, 325 U.S. 327, 330-31 (1945).

tion in the eyes of the world.⁵⁸ They provided for courses in science and medicine at schools and colleges;⁵⁹ they also chartered scientific bodies⁶⁰ and relied on them heavily for advice on matters concerning health, public works, and agriculture.⁶¹ A letter circulated among antifederalists opposed the proposed Constitution because it lacked a Bill of Rights.⁶² It warned that if measures were not taken to protect the Revolution, then "genius drags heavily its iron chain—science is neglected, and real merit flies to the shades for security."⁶³

C. *Private Writings and Correspondence of the Framers*

The private writings and correspondence of the framers give added support to the thesis that freedom of scientific inquiry occupied a prominent place in their scheme of values.

1. *Jefferson*

In a letter to Dr. Willard, Jefferson encouraged the nation's college-age youth to study science, describing liberty as "the great parent of science" and declaring that "a nation will be great in both, always in proportion as it is free."⁶⁴ Elsewhere he described freedom as "the first-born daughter of science,"⁶⁵ and equated scientific progress with forward development in government and morals.⁶⁶ His beloved University of Virginia was to be based on the "illimitable freedom of the human mind" and was to include a medical school as well as a curriculum rich in mathematics and natural science.⁶⁷ He was convinced that nothing was so conducive to intellectual and moral development as the study of science, and in language reminiscent of the account of

58. B. HINDLE, *supra* note 31, at 382.

59. R. HOFSTADTER & W. METZGER, *supra* note 33, at 194–95; see A. KOCH, MADISON'S "ADVICE TO MY COUNTRY" 35 (1966).

60. W. BELL, *EARLY AMERICAN SCIENCE: NEEDS AND OPPORTUNITIES FOR STUDY* 34 (1955); B. HINDLE, *supra* note 31, at 384. See generally R. BATES, *SCIENTIFIC SOCIETIES IN THE UNITED STATES* (1945).

61. W. BELL, *supra* note 60, at 34.

62. 1 *THE BILL OF RIGHTS: A DOCUMENTARY HISTORY* 481 (B. Schwartz ed. 1971).

63. *Id.* at 482.

64. 3 *THE WRITINGS OF THOMAS JEFFERSON* 17 (H. Washington ed. 1856) (emphasis added).

65. 7 *THE WRITINGS OF THOMAS JEFFERSON* 3 (P. Ford ed. 1867) (letter to M. D'Ivernois).

66. *Id.* at 328–29 (letter to E. Gerry).

67. R. HOFSTADTER & W. METZGER, *supra* note 33, at 238–39.

the education of philosopher kings in Plato's *Republic* he wrote, "When your mind shall be well improved with science, nothing will be necessary to place you in the highest points of view, but to pursue the interests of your country . . . with the purest integrity, the most chaste honor."⁶⁸ Indeed, Jefferson concluded that the American reaction against "monkish ignorance and superstition" in favor of the natural rights of man was caused by the general spread of the light of science.⁶⁹

2. *Franklin*

Franklin was one of the leading experimental scientists of his day.⁷⁰ His studies embraced electricity,⁷¹ magnetism,⁷² light,⁷³ sound,⁷⁴ geology,⁷⁵ and human and animal physiology.⁷⁶ His papers were read before learned societies in many countries and translated into several foreign languages.⁷⁷ He founded, with Jefferson, the American Philosophical Society, whose members included leading colonial scientists and intellectuals.⁷⁸ The organization's charter was granted in 1743 by the Pennsylvania General Assembly and signed by clerk Thomas Paine.⁷⁹ Like Jefferson, Franklin wrote of the importance of including mathematical and scientific training in the curricula of colonial schools and universities, urging that these studies would help students develop habits of tolerance, practicality, and respect for truth.⁸⁰ Although as a careful experimentalist he avoided overliteral importation of Newtonian metaphors into political theory,⁸¹ it is clear that he believed in a physically and politically ordered universe, with science as the method by which this order was to be ascertained.

68. C. BROWNE, *THOMAS JEFFERSON AND THE SCIENTIFIC TRENDS OF HIS TIMES* 59 (1943).

69. D. PRICE, *THE SCIENTIFIC ESTATE* 88 (1965) (citing and quoting letter to R. Weightman).

70. J. CROWTHER, *supra* note 34, at 151.

71. 5 *THE WORKS OF BENJAMIN FRANKLIN* 179–80 (J. Sparks ed. 1840).

72. 6 *Id.* at 571.

73. *Id.* at 114.

74. *Id.* at 250.

75. *Id.* at 1.

76. *Id.* at 222, 275.

77. 2 W. BRUCE, *BENJAMIN FRANKLIN SELF-REVEALED* 354–55 (1923).

78. D. PRICE, *supra* note 69, at 87.

79. *Id.*

80. B. FRANKLIN, *PROPOSALS RELATING TO THE EDUCATION OF YOUTH IN PENNSYLVANIA* [sic] (U. Pa. ed. 1931).

81. J. CROWTHER, *supra* note 34, at 151–53.

3. *Madison*

A thoroughgoing rationalist and exponent of Enlightenment thought, Madison conceived of the Constitution in Newtonian terms, as a collection of devices to balance and to maintain equilibrium among opposing groups and forces.⁸² Among these devices was the first amendment, of which Madison was the principal author.⁸³ He worked with Thomas Jefferson in planning the University of Virginia, a strictly secular institution which would serve as a "temple dedicated to science and liberty."⁸⁴ Outside politics, his chief interests were science and philosophy.⁸⁵ He read widely the work of Pascal, Montesquieu, Locke, and other leading natural scientists and economists.⁸⁶ He carried out his own investigations of natural history,⁸⁷ and at his death there was found among his papers an unfinished essay titled *The Symmetry of Nature*, in which he described the harmony of the physical and human realms under the universal rule of law.⁸⁸ His maxim was "Dare to Know."⁸⁹ He saw the scientific method as offering the only sure guide to progress in both social and physical spheres.⁹⁰

4. *Other colonial leaders*

Other leading colonial figures evidenced in either their personal lives or their writings the same respect for science held by Franklin, Jefferson, and Madison. Adams and Taylor corresponded about constitutional arrangements, agreeing that the idea of checks and balances borrowed from physical theory offered the best hope for political stability.⁹¹ Adams was influenced by the work of Montesquieu, whose book applied Cartesian and Newtonian ideas to sociopolitical problems.⁹² Rush, an eminent physician and signer of the Declaration

82. *Id.* at 141.

83. M. MEYERS, *THE MIND OF THE FOUNDER: SOURCE OF THE POLITICAL THOUGHT OF JAMES MADISON* 211 (1973).

84. A. KOCH, *supra* note 59, at 35.

85. E. BURNS, *supra* note 34, at 24.

86. *Id.* at 24-25, 47, 63, 125, & 175-84.

87. *Id.* at 25.

88. *Id.*

89. A. KOCH, *supra* note 59, at 13.

90. *Id.*

91. J. CROWTHER, *supra* note 34, at 135-37.

92. *Id.* at 142.

of Independence, served as trustee of Princeton University, an early center of scientific education and liberal thought.⁹³

Scientific ideas and the scientific spirit were thus central to the thinking of leading colonial figures and integral to the Revolutionary idea. The political thinking of the colonial era was steeped in the heritage of the Enlightenment, including the ideals of liberty, zeal for truth-seeking, humility in the face of error, and hatred of authoritarianism. Many of the Revolution's leaders and theorists were leading scientists in their own right; others borrowed from the prevailing scientific climate metaphors and assumptions which they applied to politics, sometimes almost uncritically. Science served as the model of truth-seeking activity; it lay at the heart of any system of free expression. As a result it seems highly unlikely that the framers intended to protect areas of endeavor such as literature, political speech, or religion, while science languished unprotected, subject to regulation at the uncontrolled discretion of the government.⁹⁴

III. SCIENCE AND THE THEORETICAL RATIONALES OF THE FIRST AMENDMENT

Constitutional history and the part-whole analysis tendered in the next section suggest that the first amendment protects scientific inquiry. It remains, however, that the two cases that posed the issue of science's status under the Constitution most clearly, *Scopes v. State*⁹⁵ and *Epperson v. Arkansas*,⁹⁶ were finally decided on other grounds. In the absence of a clear mandate in existing case law, it may be expected that courts confronted with determining the degree of protection to be afforded scientific research will turn to the writings of leading commentators on the fundamental values and policies underlying our system of free expression.

93. R. HOFSTADTER & W. METZGER, *supra* note 33, at 217-18.

94. See Z. CHAFEE, *FREEDOM OF SPEECH* (1920). Chafee regarded it as incontrovertible that the framers saw science as a first amendment activity:

It is all very well to say that religious views should be free; that scientific investigation should be free; but that political opinion cannot be free, because that is dangerous Three centuries ago, people felt just as strongly about religious views and about scientific investigation as they do now about political investigation On that we must have just as much freedom of investigation as in the old days was necessary for scientific discoveries.

Id. at 370.

95. 154 Tenn. 105, 289 S.W. 363 (1927).

96. 393 U.S. 97 (1968).

Scholarly writing on the first amendment takes place in a threefold matrix, consisting of (i) the scope of protection, that is, what is speech and what is not;⁹⁷ (ii) the degree or extent of protection to be afforded speech of various types;⁹⁸ and (iii) the stringency of review appropriate when protected speech has been infringed: is this protection absolute or may it be balanced against other interests?⁹⁹ These categories often overlap; for example, theorists who advocate a broad scope of protection for speech and speech-like conduct are frequently absolutists who oppose the idea that the interest in free expression might be overridden by countervailing concerns. The first issue—scope of protected activity—is the prime concern of this article, although types of speech and standards of review are discussed briefly in the final section.¹⁰⁰

A. "Broad Scope" Views

The current judicial trend is toward a wide scope of protection for expression.¹⁰¹ The leading theorists for this view are Emerson and Meiklejohn, each of whom, on different bases, ends by espousing a "broad scope" position.

1. Emerson

Thomas Emerson, in his article, *Toward a General Theory of the First Amendment*,¹⁰² and his book, *The System of Freedom of Expression*,¹⁰³ gives the most comprehensive exposition of a broad view of the purposes and extent of freedom of expression. Freedom of expression in a democratic society has four premises, based on fundamental values which we hold and which the first amendment is designed to protect:

- (i) Freedom of expression advances *individual self-fulfillment*. The proper end of man is the realization of his character and poten-

97. SYSTEM, *supra* note 26, at 43; Emerson, *Toward a General Theory of the First Amendment*, 72 YALE L.J. 877, 939 (1963) (mixed speech-action cases) [hereinafter cited as *General Theory*].

98. *General Theory*, *supra* note 97, at 937-39 (obscenity).

99. *Id.* at 909-16.

100. See notes 189-95, 201-07, 214-16, & 296-97 and accompanying text *infra*.

101. E.g., *Miller v. California*, 413 U.S. 15, 34 (1973).

102. *General Theory*, *supra* note 97.

103. SYSTEM, *supra* note 26.

tialities. For this the mind must be free, and this freedom includes the ability to express one's thoughts and ideas without restriction.

- (ii) Freedom of expression serves to *advance knowledge and discover the truth*.
- (iii) Freedom of expression allows *participation in decisionmaking* by all members of society. This is important in the political sphere but extends to other areas as well.
- (iv) Freedom of expression is a means of assuring a society that is acceptable to its members and therefore stable. It facilitates *orderly change*.¹⁰⁴

Emerson's first rationale, individual self-fulfillment, was cited in *Police Department v. Mosley*,¹⁰⁵ in which the Supreme Court declared, "To permit the continued building of our politics and culture, and to assure self-fulfillment for each individual, our people are guaranteed the right to express any thought, free from government censorship."¹⁰⁶ The second rationale is the familiar "marketplace of ideas" justification put forward by John Stuart Mill and many court opinions.¹⁰⁷ The third rationale stems from the principles of self-government—to vote intelligently, the citizenry of a democratic society must be well informed on all matters.¹⁰⁸ The fourth is more an aspect of the third than an independent rationale. In protecting the citizen's access to the channels of social change, it assures that the government is seen as legitimate and responsive to the wishes of its constituents.¹⁰⁹

104. See *General Theory*, *supra* note 97, at 878–86; *SYSTEM*, *supra* note 26, at 6–8.

105. 408 U.S. 92 (1972).

106. *Id.* at 96–97.

107. *Sweezy v. New Hampshire*, 354 U.S. 234, 250 (1957); *J.S. MILL, ON LIBERTY* 13–48 (R. B. McCallum ed. 1948); see *Keyishian v. Board of Regents*, 385 U.S. 589, 603 (1967).

108. *Police Dep't v. Mosley*, 408 U.S. at 96–97; A. MEIKLEJOHN, *POLITICAL FREEDOM* (1960) [hereinafter cited as *POLITICAL FREEDOM*]; see 26 NAT'L SCIENCE FOUNDATION ANN. REP. (1976). "Because one of our clear goals is a scientifically enlightened citizenry, competent to deal with important policy issues in science and technology, I believe we must give serious consideration to broadening and extending our science education programs at the secondary level . . ." *Id.* at xiii (statement of acting NSF director Richard C. Atkinson).

109. Emerson's analysis is not beyond criticism. One difficulty, which he concedes, *SYSTEM*, *supra* note 26, at 7, is that his four premises have never been proved and perhaps cannot be. He asserts, nevertheless, that we hold them. *Id.* at 8. Freedom of expression is necessary, he says, to accomplish four objectives; omitted is, "and we must accomplish these four objectives because (X)." What is the missing reason, X? Meiklejohn suggests an answer: the American polity is characterized by our compact with each other—we associate as friends and members of a union, not as stronger and weaker, ruler and ruled. Meiklejohn, *The First Amendment is an Absolute*, 1961 SUP. CT. REV. 245, 263–65 [hereinafter cited as *The First Amendment*]; see *POLITICAL FREE-*

a. *Assuring self-fulfillment and the realization of individual potential*

The right to self-fulfillment, which inheres in persons "in [their] capacity as . . . individual[s],"¹¹⁰ exists, according to Emerson, to permit them to develop fully their character and potentialities as human beings.¹¹¹ The human race is distinguished from the rest of the animal kingdom by the ability to think, to reason, and to build a culture.¹¹² It is through the exercise of our cognitive and expressive faculties that men and women find meaning in existence; it is through these faculties that persons become fully human.¹¹³

For serious scientists, science is a fully engrossing endeavor that may constitute the principal creative outlet of their lives.¹¹⁴ Einstein has written that his work represented for him a way of approaching the ultimate mysteries of the universe.¹¹⁵ Pasteur saw the joy of scien-

dom, *supra* note 108, at 14-18. Emerson, however, leaves this question unanswered. Other omissions include whether or not accomplishment of his four objectives is a goal outweighing other concerns, and whether freedom of expression as a means of achieving them is not to be superseded by any other means.

Further, Emerson's system treats freedom of expression as a means to certain ends: it has instrumental value. See L. TRIBE, *AMERICAN CONSTITUTIONAL LAW* § 12-1, at 576-77 (1978) (criticizing Emerson's instrumental approach as inadequate). Because this is so, cases could arise in which the exercise of free expression would inhibit the attainment of one or more of these ends. Just as in the economic marketplace, disparities can appear which hinder the operation of the "invisible hand," so in the marketplace of ideas, truth may not always prevail. *Id.* at 577. One person's self-fulfillment may restrict another's. Free advocacy of particular ideas may temporarily cause more unrest than orderly change. Emerson does not tell us how to resolve these difficulties, and to the extent they remain unaddressed, his approach is weakened. Nevertheless, Emerson's writings are a scholarly and systematic attempt to explicate the values that underlie our system of free expression, and any attempt to assess science's status within that system must take account of his views.

110. *General Theory*, *supra* note 97, at 879.

111. *Id.*; see *Whitney v. California*, 274 U.S. 372, 375 (1926) (Brandeis, J., concurring).

112. *General Theory*, *supra* note 97, at 879.

113. *Id.* at 879-80.

114. *E.g.*, B. NOLTINGK, *THE ART OF RESEARCH* (1965).

The exhilaration, then, that can be engendered by a successfully accomplished piece of research, is akin to that of the artist or composer. The poet wrestles with his words until at last they are obedient to him and he knows that something of his vision is enshrined in them. He has achieved. The scientist, no less, by his patience and ingenuity in marshalling the factors so that simple conclusions can be drawn from complex data, has achieved a specific aim. . . . Those who are gripped by the wonder of the universe around them, possessed of a restless curiosity and a bent to analyze, keen to pit the strength of their minds in siege against the mysteries that have held out longest . . . will find the pursuit of pure science a compelling and inspiring exercise.

Id. at 4. See also W. BEVERIDGE, *THE ART OF SCIENTIFIC INVESTIGATION* 92-93, 178 n.95, 190, 193 (1957) (joy of the scientist in discovery).

115. L. BARNETT, *THE UNIVERSE AND DR. EINSTEIN* (1948).

The most beautiful and most profound emotion we can experience is the sensation

tific discovery as "the greatest that can be felt by a human soul."¹¹⁶ To use any means to deny such individuals the opportunity to pursue their profession inhibits them in ways that are central to their existence as human beings.

The individual right to free thought and expression also has a social aspect.¹¹⁷ Because man is a social animal, Emerson writes, he must remain free to join with others in creating a common culture and experience.¹¹⁸ The obligation which individuals have in our culture to cooperate with their fellows has a counterpart in the obligation of society to permit individuals to express their views, to communicate, and to share in common decisions.¹¹⁹ Denying scientific investigators the right of free inquiry inhibits their ability to participate in an important form of societal decisionmaking. Scientific advances shape our society in countless ways; our very view of ourselves is colored by discoveries in astronomy, biology, medicine, and psychology, to name but a few of the more obvious disciplines.¹²⁰ Advances in these fields often have what Professor Tribe has called a "reconstitutive" component—they alter our perception of ourselves as individuals or as a society.¹²¹ To deny scientists the opportunity to work toward such advances deprives them of the primary means by which they may work to expand or shape the culture in which they live.

b. Attainment of truth

In expounding his second rationale, attainment of truth, Emerson sees the system of free expression as a means by which society is provided with new ideas and knowledge.¹²² This rationale is premised

of the mystical To know that what is impenetrable to us really exists, manifesting itself as the highest wisdom and the most radiant beauty which our dull faculties can comprehend only in their most primitive forms—this knowledge, this feeling is at the center of true religiousness.

. . . The cosmic religious experience is the strongest and noblest mainspring of scientific research.

Id. at 105.

116. W. BEVERIDGE, *supra* note 114, at 193.

117. *General Theory*, *supra* note 97, at 880.

118. *Id.*

119. *Id.*

120. See generally L. TRIBE, *CHANNELING TECHNOLOGY THROUGH LAW* (1973).

121. Tribe, *Technology Assessment and the Fourth Discontinuity: The Limits of Instrumental Rationality*, 46 S. CAL. L. REV. 617 (1972).

122. *General Theory*, *supra* note 97, at 881; see *Whitney v. California*, 274 U.S. 372, 375–77 (1927) (Brandeis, J., concurring).

on the belief that the best guarantee of reaching a sound opinion or belief lies in assuring that all views receive a fair hearing, that none will be suppressed.¹²³ This goal demands that discussion never be closed, that ideas remain subject to criticism and testing.

Because scientific inquiry is a prime means by which new ideas are generated in our society, the goal of attaining the truth requires that scientific inquiry be protected. Without such protection, ideas or areas of research may be labeled dangerous or sensitive, resulting in the withering of entire lines of inquiry.¹²⁴ History contains many examples of governmental or ecclesiastical suppression of scientific inquiry; rarely, if ever, has society benefited.¹²⁵

Like the goal of individual self-fulfillment, that of truth-seeking has a social aspect.¹²⁶ Free access to ideas and encouragement of the creation of new ones facilitates the formation of group judgments or consensuses essential for social cohesiveness.¹²⁷ Because collective judgments are made up of individual ones, encouraging a process by which individuals arrive at reliable views and opinions contributes to the formation of the shared views that society needs to function successfully. It is evident that scientific inquiry serves this purpose. A decision to criminalize or decriminalize a drug, for example, ought to take into account its effects on the human organism; a decision to derive energy from certain sources requires information about the consequences of various alternatives. Without scientific ideas and information these decisions cannot be made wisely; debate proceeds in a vacuum. The goal of attaining the truth, therefore, like that of achieving individual fulfillment, requires that scientific inquiry be brought within the system of protected expression.

c. *Participation in decisionmaking*

Because our society has rejected the notion of government by an

123. *General Theory*, *supra* note 97, at 881-82.

124. *Id.*

125. *Id.* at 882; Singer, *The Involvement of Scientists*, in RESEARCH WITH RECOMBINANT DNA 24, 29 (1977) ("The consequences of attempts to restrain the search for knowledge have been more fearsome than the science fiction scenarios constructed by genetic fear mongers."). See generally Stettin, *Freedom of Inquiry*, 81 GENETICS 415 (1975).

126. *General Theory*, *supra* note 97, at 882.

127. *Id.*

elite, freedom of thought and of discussion must be permitted to enable decisions to be made which truly reflect the will of the community.¹²⁸ Although this need is particularly acute in connection with political decisions, Emerson argues that the principle extends to include "religion, literature, art, science and all areas of human learning and knowledge."¹²⁹ It is in the political sphere that the government has the greatest stake in repressing ideas; as a result, it is here that the majority of battles have been fought. But open discussion of new ideas must be protected whenever they touch on "the building of the . . . culture" as a whole.¹³⁰ Because science is a major determinant of that culture as well as a supplier of the information necessary for the intelligent resolution of disputes that are expressly political, it should be entitled to protection under Emerson's third rationale.

d. Striking a balance between stability and peaceful change

Freedom of expression enables a society to achieve the twin goals of assuring stability and providing the mechanisms of peaceful change—of maintaining the "precarious balance between healthy cleavage and necessary consensus."¹³¹ Repression of ideas breeds resentment; underneath apparent conformity there lies "an intense, incessant, implacable doubt."¹³² Open discussion allows the losing side to "let off steam" and provides the assurance that if one's view has not prevailed, it has at least been heard.¹³³

This principle applies at least as much to science as to other forms of human endeavor and expression. When civil authority suppresses scientific investigation, stability is achieved at the price of stagnation,¹³⁴ if not lost to outright revolt.¹³⁵ Galileo and Lysenko are two

128. *Id.* at 882–84.

129. *Id.* at 883.

130. *Id.*

131. *Id.* at 884–86.

132. W. BAGEHOUT, *The Metaphysical Basis of Toleration*, in 2 WORKS OF WALTER BAGEHOUT 339, 357 (Hutton ed. 1889).

133. *General Theory*, *supra* note 97, at 885.

134. See Douglas, *Preface to Symposium on Law & Technology*, 45 S. CAL. L. REV. at v (1972) ("A scientist, like a poet, must have full first amendment freedoms. Otherwise, he extolls the virtues of those in power and knuckles under to do their immediate desires."); Lederberg, *The Freedoms and the Control of Science: Notes from the Ivory Tower*, 45 S. CAL. L. REV. 596, 596 (1972).

135. E.g., Stettin, *Freedom of Inquiry*, 81 GENETICS 415, 416 (1975); see Bennett & Gurin, *Science that Frightens Scientists: The Great Debate over DNA*, ATLANTIC

of the better known examples. Already, in connection with the DNA controversy, predictions have been made that curtailing research beyond the degree necessary to provide for health and safety will cause ambitious and dedicated researchers to go underground,¹³⁶ or continue their research in countries where scientific inquiry is less highly regulated.¹³⁷ Considerations of freedom of expression as an aspect of orderly change and the promotion of governmental legitimacy thus are as applicable to science as they are to areas that we expressly protect.

2. Meiklejohn

A second proponent of the "broad view" position is Alexander Meiklejohn, whose article, *The First Amendment is an Absolute*,¹³⁸ and book, *Political Freedom*,¹³⁹ set forth a view of the first amendment based on the needs of self-government. "The first amendment," he writes, "does not protect a 'freedom to speak.' It protects the freedom of those activities of thought and communication by which we 'govern.' It is concerned not with a private right, but with a public power, a governmental responsibility."¹⁴⁰

"We, the people," are a self-governing community.¹⁴¹ According to Meiklejohn, this means that we must have access to information and opinion and be free to discuss these with each other.¹⁴² These needs are self-evident requirements of government by a community. To se-

MONTHLY, February 1977, at 43, 61; Grobstein, *Recombinant DNA Research: Beyond the NIH Guidelines*, 194 SCIENCE 1133 (1976).

136. University of Washington Daily, Mar. 9, 1977, at 3, col. 1 (chairperson of campus DNA committee warns that excessive regulation will simply cause researchers to go underground); Comment, *supra* note 12, at 887 (citing Wade, *Gene-Splicing: At Grass Roots Level a Hundred Flowers Bloom*, 195 SCIENCE 558 (1977)). Such underground experimentation would be even more difficult to control for the purposes of public health and safety.

137. See Watson, *In Defense of DNA*, NEW REPUBLIC, June 25, 1977, at 11.

DNA research is condemned to be impressed in chains . . . our only hope can be that Europe and the Eastern Bloc will not follow our madness. Perhaps when we see that no Andromeda strain or doomsday bug has been produced abroad, but that progress continues to be made, the United States will resume free inquiry.

Id. at 14.

138. *The First Amendment*, *supra* note 109.

139. *POLITICAL FREEDOM*, *supra* note 108.

140. *The First Amendment*, *supra* note 109, at 255.

141. *POLITICAL FREEDOM*, *supra* note 108, at 14-19.

142. *Id.* at 25-27.

cure these rights from encroachment by our delegated agents, the government, we have the first amendment. The subjects of a monarch or tyrant could also be granted a "freedom of speech," but their freedom would be of a different kind because it would not have its origin in a self-governing community.

Free speech assumes its protected status because it is an essential component of intelligent self-government—not essential as a means to an end, but rather because this is what self-government consists of.¹⁴³ We are constituted by the manner in which we agree to "speak" to one another; this agreement creates our polity.

Meiklejohn's emphasis on governing could be taken to mean that the first amendment applies only to political speech, such as criticisms of laws, leaders, and national policy. But Meiklejohn expressly rejects this narrow interpretation.¹⁴⁴ There are many forms of thought and expression from which the voter acquires the ability and the intelligence to form wise judgments. These include "[t]he achievements of philosophy and the sciences in creating knowledge and understanding of men and their world," which achievements "must be made available, without abridgement to every citizen."¹⁴⁵ Unless these are protected, citizens will not be able to participate fully and actively in the affairs of the nation. The right of free expression must therefore extend to these areas as well. Meiklejohn's view of first amendment purposes, like Emerson's, thus implies that scientific inquiry deserves protection as an aspect of our system of free expression.

B. *The "Narrow Scope" View*

Emerson and Meiklejohn represent the majority position among scholars concerning the scope of first amendment protection, although some commentators and not a few courts take issue with their absolutist approach to the degree of protection afforded. The main advocate of the opposing "narrow scope" view in recent years has been Robert Bork, whose article, *Neutral Principles and Some First Amendment Problems*,¹⁴⁶ published in 1971, urges that constitutional

143. *Id.* at 8–28 ("The Rulers and the Ruled").

144. *The First Amendment*, *supra* note 109, at 256–57.

145. *Id.*

146. Bork, *Neutral Principles and Some First Amendment Problems*, 47 *IND. L.J.* 1 (1971).

protection be accorded only speech that is expressly political.¹⁴⁷ Conceding that this view "departs drastically" from the mainstream position, Bork urges that outside the realm of political speech, the majority should be free to regulate speech as it chooses.¹⁴⁸ This view is based largely on his belief that as a nondemocratic institution, the Supreme Court should not attempt to impose its view on the majority.¹⁴⁹ Unless the Constitution clearly mandates protection for a given type of speech, Bork urges, the Court may not legitimately tell the majority what it must hear.

Although Bork briefly adverts to science as an activity which falls outside any "principled stopping point,"¹⁵⁰ it is clear that his main target is pornography. Because pornography is nonpolitical, it may be regulated as the community sees fit.¹⁵¹ Echoes of this view appear in some of the "balancing" cases, a few of which hint that political speech is more protected than other types. *Young v. American Mini Theatres, Inc.*,¹⁵² for example, declares: "It is manifest that society's interest in protecting this type of expression [erotic material] is of a wholly different, and lesser magnitude than the interest in untrammelled political debate."¹⁵³

How will those who advocate that speech is more protectible the more it approaches political discourse view scientific speech? It is difficult to predict the implications of Bork's view for such speech and activity. Scientific utterances are certainly more like political speech than is pornography, yet they clearly are not expressly political. Still, science often affects national policy in significant ways.¹⁵⁴ Scientists supply the information on which intelligent resolution of many political judgments rests.¹⁵⁵ Scientific information also will often be necessary to enable speech of a political—or any other—nature to be effective. Because science supplies the evidentiary material needed to support claims and opinions,¹⁵⁶ and because no listener is likely to be-

147. *Id.* at 20.

148. *Id.* at 6, 20–32.

149. *Id.* at 6–7.

150. *Id.* at 27.

151. *Id.* at 23–29.

152. 427 U.S. 50 (1976).

153. *Id.* at 70.

154. See notes 122–34, 144–45 and accompanying text *supra*; note 166 and accompanying text *infra*.

155. *Id.*

156. Compare *Brown v. Board of Educ.*, 347 U.S. 483, 494 n.11 (1955), with *In re Quinlan*, 70 N.J. 10, 355 A.2d 647, 653–60 (1976). Scientific and medical infor-

lieve opinions unsupported by evidence, depriving a speaker of access to the evidence he needs effectively deprives him of being taken seriously. Even on the narrow view, therefore, a strong case can be made for affording scientific speech and activity protection under the first amendment. It thus appears that the major views of the first amendment that have been set forth by modern commentators incline toward first amendment protection of the right to engage in scientific research and inquiry.

IV. SCIENCE AND THE CASE LAW: FUNCTIONAL AND CONSTITUTIONAL ANALYSIS

Although the Court has never specifically considered the scientist's right to conduct basic research, it has dealt with most, if not all, of the elements of the scientific process.¹⁵⁷ The precise components of a given scientific investigation will vary depending on the discipline, the problem under study, and the researcher's choice of methodology. In general, however, the process will include many of the following elements: thinking, consulting with colleagues, experimentation, publishing results, and teaching. The process is a continuous cycle; it can be interrupted by interference with any of the component activities.¹⁵⁸ New ideas and theories are often sparked by experimentation or by discussion of the research results of colleagues. The testing of one hypothesis may unexpectedly produce evidence suggesting a completely different theory or casting doubt on an established principle. Because of this interconnectedness, each stage of the process must be protected if the entire enterprise is to be protected. Conversely, if each step in the process is protected, the whole must be protected as well.¹⁵⁹

mation was used to support claims regarding effects of segregated schooling on children in *Brown*, and regarding privacy-based rights of comatose, dying patients in *Quinlan*.

157. The authors are indebted to Robert B. McKinstry, Jr., who proposed such a functional analysis in an unpublished paper, *Constitutional Problems of the Regulation of DNA Recombinant Experimentation* (May 9, 1976) (seminar paper, Yale Law School) (copy on file with *Washington Law Review*).

158. See text accompanying note 239 *infra*.

159. Part-whole analyses are sometimes criticized for ignoring the possibility that the whole may be greater than the sum of its parts. Living organisms, for example, are more than their inert components taken together. The assumption that the behavior of complex organisms or systems may be deduced from the laws governing their parts has been called the "reductionist fallacy." It is also possible to mention activities—conspiracies, for instance—each element of which is protected but which as a whole pose peculiar problems demanding special treatment. These wholes may be less than

*A. The Scientific Process: First Amendment Analysis**1. Firsthand experience: creation and discovery of information**a. Mentation*

Generation of an idea is the initial step in each cycle of the scientific process. Based on accumulated experience or intuition, the scientist posits a theory or hypothesis. This part of the process should, by its very nature, be beyond the control of government. One Supreme Court Justice wrote that "[f]reedom to think is absolute of its own nature; the most tyrannical government is powerless to control the inward workings of the mind."¹⁶⁰ This statement, perhaps self-evident in 1941, is less axiomatic today. The advent of psychosurgery and sophisticated brainwashing techniques renders the "inward workings of the mind" vulnerable to invasion, modification, and control.¹⁶¹

The problem is beginning to come before the courts;¹⁶² it is important, therefore, to note that the Supreme Court has spoken directly to

the sum of their parts. While recognizing the dangers inherent in part-whole reasoning, the authors nevertheless believe that a useful beginning for determining the appropriate degree of constitutional protection due a complex process like scientific research can be made by examining the status of its component parts.

160. *Jones v. Opelika*, 316 U.S. 584, 618 (1941) (Murphy, J., dissenting). *vacated*, 319 U.S. 103 (1943).

161. See Shapiro, *Legislating the Control of Behavior Control: Autonomy and the Coercive Use of Organic Therapies*, 47 S. CAL. L. REV. 237 (1974).

162. A lower court decision directly on point is *Kaimowitz v. Department of Mental Health*, Civil No. 73-19434-AW (Cir. Ct. Wayne County, Mich., July 10, 1973), reprinted in 1 ABA MENTAL DISABILITY L. REP. 147 (1976) (copy of original opinion on file with *Washington Law Review*). *Kaimowitz* involved a "criminal sexual psychopath" allegedly subjected illegally to experimental psychosurgery. The court held that "[a] person's mental processes, the communication of ideas, and the generation of ideas, come within the ambit of the First Amendment. To the extent that the First Amendment protects the dissemination of ideas and the expression of thoughts, it equally must protect the individual's right to generate ideas." 1 ABA MENTAL DISABILITY L. REP. at 151. See generally Shapiro, *supra* note 161, at 258 & nn.55-57.

It is unlikely that a government would attempt to control a scientist's work by subjecting her to psychosurgery; nevertheless, *Kaimowitz* reaffirms the notion that mentation enjoys the full protections of the first amendment. The court in *Kaimowitz* also found a protection grounded in the due process right to privacy. For a discussion of that aspect of the opinion, see notes 251-52 and accompanying text *infra*.

The *Kaimowitz* court relied in part on *Stanley v. Georgia*, 394 U.S. 557 (1969), in which the Court stated, "Whatever the power of the state to control public dissemination of ideas inimical to the public morality, it cannot constitutionally premise legislation on the desirability of controlling a person's private thoughts." *Id.* at 566.

This notion finds analogous expression in criminal law in the principle that people may not be criminally punished for what they think; a *mens rea* (guilty mind) must be coupled with an *actus reus* (culpable deed) before criminal sanctions may be imposed. *E.g.*, R. PERKINS, CRIMINAL LAW 741-42 (2d ed. 1969).

the issue. Freedom of thought, though not expressly mentioned in the first amendment (in 1791, who would have thought the problem would ever arise?), has uniformly been held to be an essential concomitant of freedom of expression.¹⁶³ One cannot speak without first having thought of something to say.

b. Experimentation

Once the scientist has developed a hypothesis, the next task is testing it. This step generally involves gathering information through experimentation: the geneticist reconstructs *E. coli*, the sociologist conducts surveys and interviews. At this point, the process moves from the relatively inaccessible domain of the mind and becomes physical action, traditionally susceptible of government regulation and prohibition.¹⁶⁴

In the conduct of their affairs, scientists enjoy the same freedoms and are subject to the same limitations as other citizens. The most significant of these limitations is the police power. Reserved to the states under our constitutional system,¹⁶⁵ this power enables states to enact statutes and take action to promote "the peace, good order, morals,

163. See, e.g., *Palko v. Connecticut*, 302 U.S. 319 (1937), in which Justice Cardozo, in dictum, wrote that "freedom of thought and speech . . . is the matrix, the indispensable condition, of nearly every other form of freedom. With rare aberrations a pervasive recognition of that truth can be traced in our history, political and legal." *Id.* at 326-27.

164. "[T]raditional law has developed a fashion of controlling only the power actually in our hands. We distinguish between physical acts on the one hand, and speech or thoughts on the other . . ." Lederberg, *supra* note 134, at 606-07. The dichotomy between speech and action has been criticized by writers as simplistic and conclusory: attaching the label "action" to a course of conduct avoids the necessity of confronting the policy choices inherent in the situation before the court. See Note, *The Public Forum: Minimum Access, Equal Access, and the First Amendment*, 28 STAN. L. REV. 117, 126 n.58 (1975); cf. the "symbolic speech" cases, e.g., *Spence v. Washington*, 418 U.S. 405, 409-10 (1974) (although display of American flag with superimposed peace symbol was conduct, not speech, such conduct was protected because it was "essentially" a form of expression). In *United States v. O'Brien*, 391 U.S. 367 (1968), the Court applied what it called the "same course of conduct" test to uphold convictions for draft card burning by antiwar protesters: "[W]hen 'speech' and 'nonspeech' elements are combined in the same course of conduct, a sufficiently important governmental interest in regulating the nonspeech element can justify incidental limitations on First Amendment freedoms." *Id.* at 376 (emphasis added).

165. To the extent that the federal government does become involved in "police-power" protection of public health and safety, it does so under the commerce clause, see *Gibbons v. Ogden*, 22 U.S. (9 Wheat.) 1 (1824); Green, *The Risk-Benefit Calculus in Safety Determinations*, 43 GEO. WASH. L. REV. 791, 794-95 n.6 (1975), and the general welfare clause, see *Helvering v. Davis*, 301 U.S. 619 (1937); Steward Mach.

and health of the community.”¹⁶⁶ The police power is not without limits; it is “subordinate to constitutional limitations Under it there is no unrestricted authority to accomplish whatever the public may presently desire.”¹⁶⁷ Moreover, the power only enables states to interfere with the conduct of individuals to the extent necessary to se-

Co. v. Davis, 301 U.S. 548 (1937); Chapman & Talmadge, *Historical and Political Background of Federal Health Care Legislation*, 35 LAW & CONTEMP. PROB. 334, 342 (1970).

166. *Munn v. Illinois*, 94 U.S. 113, 145-46 (1876). Almost all formulations of the proper concerns of the police power include a reference to the public morality. Conceivably, government regulation of science might be framed in terms of protecting the public morality, see notes 9 & 14 and accompanying text *supra*; that is, scientific research into certain areas might assertedly be ethically, philosophically, or spiritually immoral and therefore susceptible of governmental control.

It is unclear precisely how far a state may go in regulating conduct perceived to be immoral; a critical threshold distinction may, however, be drawn from the constitutional case law. State action taken to protect the public morality often is upheld in the absence of a fundamental interest. For instance, expressive activity such as pornography is subject to regulation because its value as an “essential part of any exposition of ideas” and “as a step to truth” is “outweighed by the social interest in order and morality.” *Chaplinsky v. New Hampshire*, 315 U.S. 568, 572 (1942). Moral objections to expressive activity cannot, however, justify repression of works having “serious literary, artistic, political, or scientific value.” *Miller v. California*, 413 U.S. 15, 34 (1973) (emphasis added). The conclusion is that state action taken in the name of public morality will not be tolerated when it threatens fundamental liberties respecting expression—that is, the state may not impose what amounts to ethical, philosophical, or religious orthodoxies upon the exercise of free expression.

The Court’s opinion in *Epperson v. Arkansas*, 393 U.S. 97 (1968), is directly on point. In *Epperson*, the Court ruled unconstitutional a state statute imposing criminal liability on public school teachers who taught Darwin’s theory of evolution. The Court said that the state could not permissibly impose a moral orthodoxy framed in religious terms without violating constitutional guarantees:

In the present case, there can be no doubt that Arkansas has sought to prevent its teachers from discussing the theory of evolution because it is contrary to the belief of some that the Book of Genesis must be the exclusive source of doctrine as to the origin of man. No suggestion has been made that Arkansas’ law may be justified by considerations of state policy other than the religious views of some of its citizens. It is clear that fundamentalist sectarian conviction was and is the law’s reason for existence.

. . . . Plainly, the law is contrary to the mandate of the First, and in violation of the Fourteenth, Amendment to the Constitution.
Id. at 107-09 (footnotes omitted).

The state’s authority to regulate in the name of public morality has also been circumscribed when it conflicts with the fundamental right to personal privacy under the substantive due process protections of the fifth and fourteenth amendments: “Whatever the power of the state to control public dissemination of ideas inimical to the public morality, it cannot constitutionally premise legislation on the desirability of controlling a person’s private thoughts.” *Stanley v. Georgia*, 394 U.S. 557, 566 (1969).

This article proposes that basic scientific research is an activity protected by the first amendment. If that is true, these cases make it clear that state action to ban or control scientific research will not be upheld solely as within the police power to preserve the public morality.

167. *Panhandle E. Pipe Line Co. v. State Highway Comm’n*, 294 U.S. 613, 622 (1935). See also *New York ex rel. Silz v. Hesterberg*, 211 U.S. 31 (1908).

cure the objects of the power. Clearly, then, the police power must yield to constitutional protection,¹⁶⁸ and cannot be used to suppress activities simply because the government disapproves of them.¹⁶⁹

Experimentation is the information-gathering step in the scientific process; it may profitably be compared to the news-gathering operation of the press. The right of journalists to gather news was explicitly recognized by the Supreme Court in *Branzburg v. Hayes*:¹⁷⁰ "[We do not suggest] that news gathering does not qualify for First Amendment protection; without some protection for seeking out the news, freedom of the press could be eviscerated . . . [R]eporters remain free to seek news from any source by any means within the law."¹⁷¹

168. Police power "necessarily . . . has its limits and must stop when it encounters the prohibitions of the Constitution." *Eubank v. City of Richmond*, 226 U.S. 137, 143 (1912).

169. "Legislatures may not, under the guise of the police power, impose restrictions that are unnecessary and unreasonable upon . . . the pursuit of useful activities." *Washington ex rel. Seattle Title Trust Co. v. Roberge*, 278 U.S. 116, 121 (1928).

170. 408 U.S. 665 (1972).

171. *Id.* at 681-82. *Branzburg* dealt with the so-called "reporter's privilege"—the right not to divulge confidential sources. The Court held that requiring a reporter to testify before state or federal grand juries did not abridge first amendment guarantees. The Court reached that result by applying a balancing test: whatever intrusion there was on the reporter's first amendment rights was outweighed by the state's interest in obtaining otherwise unavailable information in a criminal proceeding.

Strictly speaking, *Branzburg* did not address the right to gather information in the first instance. The narrow issue presented in *Branzburg* is unlikely to arise in connection with research in the physical sciences. In the social sciences, however, as in the case of the reporter, the problem arguably would arise if a sociologist were compelled to reveal the identity of her subjects. If her subjects are less likely to cooperate without a guarantee of anonymity, compelled disclosure of their identities would constitute an indirect restriction on her freedom to conduct research.

The Supreme Court has never ruled directly on the right of a researcher to protect his sources. There is lower court dictum supporting the privilege in *United States v. Doe*, 460 F.2d 328 (1st Cir. 1972), *cert. denied sub nom. Popkin v. United States*, 411 U.S. 909 (1973). In *Doe*, the court assumed arguing a researcher's right to protect sources, but declined to extend the privilege to a researcher's conversation with colleagues. *Id.* at 333-34.

A more recent lower court ruling in *Richards of Rockford, Inc. v. Pacific Gas & Elec. Co.*, 71 F.R.D. 388 (N.D. Cal. 1976), is squarely on point. There, in a civil suit, the court denied an order which would have compelled an economist to divulge the names of defendant's employees interviewed by the economist in connection with a research project. The judge in *Richards* followed a balancing process similar to that used by the Supreme Court in *Branzburg*.

For a detailed discussion of the researcher's privilege to protect sources, see Nejelski & Lerman, *A Researcher-Subject Testimonial Privilege: What to Do Before the Subpoena Arrives*, 1971 Wis. L. Rev. 1085; Note, *The Researcher-Subject Relationship: The Need for Protection and a Model Statute*, 62 GEO. L.J. 243 (1973); Note, *The Public Scholar and the First Amendment: A Compelling Need for Compelling Testimony?*, 40 GEO. WASH. L. REV. 995 (1972); Comment, *Academic Researchers and the First Amendment: Constitutional Protection for their Confidential*

Branzburg did not limit the right to gather information to the press: "The informative function asserted by representatives of the organized press . . . is also performed by lecturers, political pollsters, novelists, *academic researchers*, and dramatists."¹⁷² The implication is clear: anyone engaged in an informative process has a concomitant first amendment right to gather grist for his mill.

The right is not absolute, however; it must yield whenever it is outweighed by a sufficiently important state interest. The companion cases of *Pell v. Procunier*¹⁷³ and *Saxbe v. Washington Post Co.*¹⁷⁴ illustrate the types of state interests which outweigh the right to gather information. In these cases, reporters unsuccessfully challenged regulations prohibiting interviews with prison inmates;¹⁷⁵ the asserted state interests in both cases consisted of security and related administrative problems, as well as policy objectives of the correctional system itself. Justice Stewart, writing for the majority in both cases, found no first amendment violation, both because of the primacy of these state interests and because the regulations did not "deny the press access to sources of information available to members of the general public."¹⁷⁶

Restrictions on the right to gather information have also been upheld in a number of passport cases.¹⁷⁷ In *Zemel v. Rusk*,¹⁷⁸ the Court upheld the Secretary of State's refusal to grant the plaintiff a passport to Cuba. In the face of plaintiff's asserted interest in learning about Cuba in order to become a better informed citizen, Chief Justice Warren observed that "[t]here are few restrictions on action which could not be clothed by ingenious argument in the garb of decreased data flow. . . . The right to speak and publish does not carry with it the *unrestrained* right to gather information."¹⁷⁹ In *Zemel*, two important circumstances underlying the Court's decision help to explain its result: first, press passports were available to bona fide mem-

Sources?, 14 SAN DIEGO L. REV. 876 (1977); Note, *Social Research and Privileged Data*, 4 VAL. U.L. REV. 368 (1970).

172. 408 U.S. at 705 (emphasis added).

173. 417 U.S. 817 (1974).

174. 417 U.S. 843 (1974).

175. *Pell* involved a state rule, and *Saxbe* a federal rule, prohibiting personal interviews between reporters and individually named prisoners.

176. *Pell*, 417 U.S. at 835.

177. *E.g.*, *Aptheker v. Secretary of State*, 378 U.S. 500 (1964); *Kent v. Dulles*, 357 U.S. 116 (1958).

178. 381 U.S. 1 (1965).

179. *Id.* at 16-17 (emphasis added).

bers of the news media; second, control of travel to and from foreign nations involves a special sovereign interest not present elsewhere.¹⁸⁰

Taking these cases together, one may conclude that the first amendment does in fact protect the gathering of information, but that the information-gathering process may permissibly be regulated when such regulation is necessary to further an important state interest. In *Branzburg*, the state's interest consisted of obtaining information in connection with a grand jury investigation. In *Pell*, *Zemel*, and *Saxbe*, the state's interest lay in regulating the time and place of the information-gathering activity so as not to frustrate prison security or foreign policy objectives. In none of these cases did the government assert an interest in controlling the content of the reportage.

Scientists rarely, if ever, would assert a right to withhold vital information from grand juries or to gain access to information by means unavailable to the public generally. Scientists would assert only the right to gather information to test their hypotheses free from governmental restrictions based on the nature of the theory. It seems clear that the first amendment protects this right. Governmental interference with a journalist's right to gather information could not be based solely on the social or political content of the story he proposed to write. Restrictions on the scientist's right to experiment should not be founded on similar considerations.¹⁸¹

180. The result in *Zemel* conflicts with the result in an earlier decision, *Kent v. Dulles*, 357 U.S. 116 (1958), which has never been overruled and which has been cited with approval in a number of cases. In *Kent*, the Court ruled unconstitutional the Secretary of State's denial of passports because of petitioners' alleged communist beliefs, on the grounds that denying the passports violated petitioners' right to travel. However, the holding seemed to be at least partially based on an asserted first amendment interest in gathering information. The *Kent* Court cited *Z. CHAFEE, THREE HUMAN RIGHTS IN THE CONSTITUTION OF 1787*, at 195 (1965): "Foreign correspondents and lecturers on public affairs need first-hand information. Scientists and scholars gain greatly from consultations with colleagues in other countries. . . . [T]ravel abroad enables American citizens to understand that people like themselves live in Europe and helps them to be well-informed on public issues." 357 U.S. at 126-27. Because *Kent* has never been overturned, and has been quoted with approval in several other cases, *Zemel* might reasonably be regarded as an aberration.

181. A final variant of this "nexus" argument looks at scientific experimentation in terms of its relationship to the generation of scientific ideas and knowledge. By analogy, as communication by conduct is to communication by pure speech, so generation of ideas by conduct is to generation of ideas by pure thinking and talking. Expressive conduct decisions hold that conduct—generally susceptible of regulation under the police power—becomes protected if such conduct is essential for the expression of certain ideas, and even more highly protected if it appears that the state's purpose in regulating it is to suppress such ideas. Thus, the rationale of speech-by-conduct decisions suggests that scientific conduct, such as research, surveys, and other forms of investigation requiring activity in the world, is entitled to first amend-

Experimentation and fact gathering are critical to the scientific process in more than the sequential sense; they are also essential to the integrity of scientific expression. Experimentation is the only way researchers can test and substantiate their theories. Who would credit a scientist's assertions that could not be supported by objective evidence? Reputable scientific journals will not publish a researcher's findings unless they are accompanied by a description of the verifying experimentation sufficiently detailed to allow others to duplicate the procedure.¹⁸² Reporters, on the other hand, particularly investigative reporters, may write credible stories based on partial information, informed speculation, and information from anonymous sources. Consequently, restrictions on the liberty of scientists to experiment freely would be more onerous than restrictions on journalists' access to particular sources of information¹⁸³ and should be subject to even more searching examination than that carried out in *Branzburg*, *Saxbe*, and *Pell*.

ment protection as an aspect of the amendment's protection of pure thought. It is idle to posit theories without the liberty to test them and inquire into their validity. As Justice Brandeis pointed out in the context of social experimentation:

Denial of the right to experiment may be fraught with serious consequences This Court has the power to prevent an experiment But, in the exercise of this high power, we must ever be on our guard, lest we erect our prejudices into legal principles. If we would guide by the light of reason, we must let our minds be bold.

THE WORDS OF JUSTICE BRANDEIS 76-78 (S. Goldman ed. 1953), cited in Morris, *What is Man?*, 19 CASE W. RES. L. REV. 45, 49-50 (1967).

182. "Sufficient information must be included to permit repetition of the experimental work." 169 BIOCHEMICAL J. 2 (1978) (instructions to authors). "[P]apers which describe only a new technique or method without presenting substantial quantities of data resulting from the use of the new method cannot be accepted for publication." 153 BIOLOGICAL BULL. at inside front cover (1977).

183. One important element that courts can and do take into account in assessing free expression cases is the extent to which governmental regulation deprives the speaker of an alternative forum. For example, in *Linmark Assocs., Inc. v. Willingboro*, 431 U.S. 85 (1977), the Court invalidated a municipal ordinance which banned "For Sale" and "Sold" signs on real property within the township. The Court questioned whether the ordinance left open satisfactory "alternative channels for communication":

Although in theory sellers [of real estate] remain free to employ a number of different alternatives, in practice, realty is not marketed through leaflets, sound-trucks, demonstrations, or the like. The options to which sellers realistically are relegated—primarily newspaper advertising and listing with real estate agents—involve more cost and less autonomy than "For Sale" signs

Id. at 95 (citations omitted). See Alfange, *Free Speech and Symbolic Conduct: The Draft-Card Burning Cases*, in FREE SPEECH AND THE FIRST AMENDMENT 250, 276 (P. Kurland ed. 1975).

c. Knowing: drawing conclusions

The object of conducting experiments is to prove or disprove a hypothesis; scientists seek to draw certain conclusions from the results of their experimentation. In this sense, “knowing” is the purely intellectual operation of the scientist as observer; it is a process closely akin to mentation, and the first amendment considerations applicable to mentation¹⁸⁴ apply equally here. As a practical matter, the operations of the mind are largely beyond the reach of government; attempts to restrain research probably will not come at this point in the process.

d. The content of firsthand experience

The preceding analysis suggests that powerful support can be found in existing case law for affording first amendment protection to the firsthand experience aspect of scientific research: conceiving an idea, testing the idea, drawing conclusions about the validity of the idea. This result is firmly grounded in our political traditions as well. Justice Holmes observed that “if there is any principle of the Constitution that more imperatively calls for attachment than any other, it is the principle of free thought—not free thought for those who agree with us but freedom for thought that we hate.”¹⁸⁵ The first amendment is designed, said Justice Brandeis, to protect “doctrine which a vast majority of . . . citizens believes to be false and fraught with evil consequence.”¹⁸⁶ Protection does not turn on “the truth, popularity, or social utility of the ideas and beliefs which are offered”;¹⁸⁷ rather, “[a]ll ideas having even the slightest redeeming social importance—unorthodox

184. See Part IV—A—1—a *supra*.

185. *United States v. Schwimmer*, 279 U.S. 644, 654–55 (1929) (Holmes, J., dissenting).

186. *Whitney v. California*, 274 U.S. 357, 374 (1927) (concurring opinion in which Holmes, J., joined). Justice Brandeis continued, “Those who won our independence believed that the final end of the State was to make men free to develop their faculties They recognized the risks to which all human institutions are subject. . . .

Fear of serious injury cannot alone justify suppression of free speech. . . . Men feared witches and burnt women. It is the function of free speech to free men from the bondage of irrational fears.
Id. at 375–76.

187. *New York Times Co. v. Sullivan*, 376 U.S. 254, 271 (1964) (citing *NAACP v. Button*, 371 U.S. 415, 445 (1963)).

ideas, controversial ideas, even ideas hateful to the prevailing climate of opinion—have the full protection of the [first amendment] guarantees, unless excludable because they encroach upon the limited area of more important interests.”¹⁸⁸ None of these comments was written with science expressly in mind,¹⁸⁹ yet their declarations of protection for unpopular ideas clearly ought to be applicable to scientific thinking sought to be suppressed because its content is novel or controversial.

The same may be said for the content of the essential firsthand activity of science—experimentation. Expressive activities involving libel,¹⁹⁰ pornography,¹⁹¹ fighting words,¹⁹² or incitement to violence¹⁹³ are subject to regulation because their content is “no *essential part of any exposition of ideas*, and [is] of such slight social value as a *step to truth* that any benefit that may be derived . . . is clearly outweighed by the social interest in order and morality.”¹⁹⁴ Experimentation, on the other hand, is essential to the exposition of scientific ideas, and is indispensable as a step to scientific truth.

Scientific ideas and experimentation, at least at the stage of basic research, pose few immediate, tangible, content-related dangers to the social order. In most cases, harmful impacts will be remote and conjectural;¹⁹⁵ if danger appears later, when new scientific knowledge

188. *Roth v. United States*, 354 U.S. 476, 484 (1957).

189. *Schwimmer* involved the right of a pacifist to become a naturalized citizen; *Whitney* involved a state criminal syndicalism act; *Sullivan* dealt with libel; *Roth* with pornography.

190. *See, e.g., Gertz v. Robert Welch, Inc.*, 418 U.S. 323 (1974).

191. *See, e.g., Roth v. United States*, 354 U.S. 476 (1957).

192. *See, e.g., Chaplinsky v. New Hampshire*, 315 U.S. 568 (1942).

193. *See, e.g., Brandenburg v. Ohio*, 395 U.S. 444 (1969).

194. *Chaplinsky v. New Hampshire*, 315 U.S. 568, 572 (1942) (footnote omitted) (emphasis added) (citing *Z. CHAFEE, FREE SPEECH IN THE UNITED STATES* 149 (1941)).

A recent expression of the Court's attitude toward content-based regulation of expression came in a decision dealing with advertising, *Virginia State Bd. of Pharmacy v. Virginia Citizens Consumer Council, Inc.*, 425 U.S. 748 (1976). The Court pointed out that advertising cannot be regulated merely because it is “tasteless or excessive,” *id.* at 765, but that controls may permissibly be invoked to prevent dissemination of “deceptive or misleading” advertising: “Untruthful speech, commercial or otherwise, has never been protected for its own sake. . . . The First Amendment . . . does not prohibit the State from insuring that the stream of commercial information flow cleanly as well as freely.” *Id.* at 771–72 (citations omitted).

195. Obviously, harmful impacts of scientific research are not always remote or conjectural; an example of inherently hazardous research is that involving recombinant DNA, *see* notes 7 & 8 and accompanying text *supra*. Such inherently hazardous scientific activity clearly may be regulated under the police power, *see* notes 165–69 and accompanying text *supra*; however, police-power interference with free exercise

is applied, the state will have the opportunity to intervene in a constitutionally acceptable manner.¹⁹⁶

2. *Secondhand experience: learning from others*

Free exchange of information is vital to scientific progress because the scientific method is inherently cumulative or collective in nature. Researchers absorb the experience of others and use it as the foundation for their own work. In turn, these researchers pass on to others their own new knowledge through publishing, talks, and seminars.

All these functions involve reciprocal relationships. The right to teach is a corollary of the right to know; the rights to hear and read are on the opposite side of the coin from the rights to speak and publish. Scientists have an interest in both the passive and active aspects of these activities. As disseminators of new information, they have an

of a fundamental liberty will not be tolerated absent a justifying state interest. The requisite importance of the asserted state interest will vary with the circumstances; a useful formula was articulated by Professor Tribe in connection with free expression:

[W]henever it can be demonstrated that the result of the government's rule or policy is to limit in some significant degree the ease or effectiveness with which a speaker can reach a specific audience with a particular message, the government should lose the case unless it can establish that an important public objective *unrelated to the message* would be sacrificed by *any less restrictive alternative*.

L. TRIBE, AMERICAN CONSTITUTIONAL LAW § 12-20, at 686 (1978) (emphasis added). See Z. CHAFEE, FREE SPEECH IN THE UNITED STATES 149-50 (1941) (suggesting that expression is regulatable to the extent it causes *immediate* injury to those affected thereby); *General Theory*, *supra* note 97, at 921 (same).

196. The authors acknowledge what one observer has called "the new power, rapidity, and momentum of technological development; the diminishing lead time between initial innovation and widespread application." L. TRIBE, CHANNELING TECHNOLOGY THROUGH LAW 8 (1973). At the same time, government clearly cannot permissibly premise regulation of scientific research on a generalized fear that if something is not done right now, it will be too late. The point at which government may permissibly intervene will have to be determined with regard to the kinds of considerations discussed at note 195 *supra*.

The issue is whether government ought to intervene at the point of an idea's inception and initial development, on the theory that the idea *may* have harmful consequences, or wait to intervene until a harmful consequence in fact appears. One commentator has framed the question using as a model the discovery of fire:

The issue was settled in principle, as I see it, in prehistory, and the outcome is enshrined in the legend of Prometheus. In its own time and in its own terms, discovering ways of producing fire artificially was as daunting as discovering techniques for producing artificial radioactivity, nuclear power, or synthetic forms of DNA is today.

As people very soon came to recognize, the proper response was not to outlaw the very use of fire. Rather it was to invent the legal concept of arson. [That is,] to develop effective legal sanctions, institutional mechanisms, public sentiments, and other practical safeguards against the misuse of fire.

S. Toulmin, *The Research and the Public Interest*, in RESEARCH WITH RECOMBINANT DNA 101, 105 (1977).

interest in freedoms of speech and of publication, and in academic freedom. As recipients, they have an interest in the rights to read, to hear, and to know. At various times and in various contexts, the Supreme Court has declared that all these activities fall within the bounds of protected expression.¹⁹⁷

a. Dissemination: the right to speak and publish

The constitutional status of speech and the press is too clearly drawn to require extensive analysis; these rights are, after all, the freedoms explicitly embraced by the first amendment. Scientific information is unlikely to produce the undesirable effects around which the narrow first amendment exceptions—libel, obscenity, civil disorder, insurrection¹⁹⁸—are drawn.¹⁹⁹

b. Reception: the right to know

The passive right to know—as distinguished from the active right to seek out information²⁰⁰—has been protected by the Supreme Court as a necessarily implied reciprocal of the right to speak and to publish.²⁰¹ Bill of Rights protections extend beyond the enumerated

197. *E.g.*, *Griswold v. Connecticut*, 381 U.S. 479 (1965).

[T]he State may not, consistently with the spirit of the First Amendment, contract the spectrum of available knowledge. The right of freedom of speech and press includes not only the right to utter or to print, but the right to distribute, the right to receive, the right to read . . . and freedom of inquiry, freedom of thought, and freedom to teach . . . Without those *peripheral* rights, the *specific* rights would be less secure.

Id. at 482 (citations omitted) (emphasis added). For a discussion of *Griswold* in a due process setting, see notes 242–43 and accompanying text *infra*.

198. See cases cited at notes 190–93 *supra*. In all of these areas, particularly obscenity and libel, constitutional law has been fluid to say the least. Because the dissemination of scientific information does not involve any of these narrowly drawn areas, more extensive discussion of them is omitted.

199. Scientific speech often *sounds* as though undesirable effects were involved: it has a foreign quality which tends to be equated with irreligion; it sometimes invokes fears of Andromeda Strains and Frankensteinian inventions in the minds of the uninitiated. For example, “[t]he nonmathematician is seized by a mysterious shuddering when he hears of ‘four-dimensional’ things, by a feeling not unlike that awakened by thoughts of the occult.” L. BARNETT, *supra* note 115, at 61. This peculiar quality of scientific speech, coupled with the growing reliance of science on government funding, see note 272 *infra*, could make scientific expression more susceptible to governmental regulation than other forms of expression.

200. The right to know as an active search for new knowledge is discussed in Part IV–A–1–b *supra*.

201. In his newly published analysis of constitutional law, Professor Laurence Tribe wrote,

guarantees to include "those equally fundamental personal rights necessary to make the express guarantees . . . meaningful."²⁰² In the case of expression, this extension is justified because "[t]he dissemination of ideas can accomplish nothing if otherwise willing addressees are not free to receive and consider them. It would be a barren marketplace of ideas that had only sellers and no buyers."²⁰³

This right to know has received protection in a wide variety of contexts, including academic freedom,²⁰⁴ criticism of public officials,²⁰⁵ broadcasting,²⁰⁶ advertising,²⁰⁷ and religious pamphleteering.²⁰⁸ One leading commentator has suggested that this right to read, listen, and see should be protected absolutely, because "any danger to the social order at this point [of receipt of information] is so inchoate and so unascertainable that it cannot be given substance or taken into account."²⁰⁹ A scientist, simply by virtue of being a scientist, poses no

[T]he Supreme Court has flatly rejected governmental measures whose justification "rests . . . on the advantages of [people] being kept in ignorance." The choice "between the dangers of suppressing information, and the dangers of its misuse if freely available," the Court has said, is one "that the first amendment makes for us."

L. TRIBE, *AMERICAN CONSTITUTIONAL LAW* § 15-7, at 904-05 & n.18 (1978) (footnotes omitted) (quoting *Virginia State Bd. of Pharmacy v. Virginia Citizens Consumer Council, Inc.*, 425 U.S. 748, 769, 770 (1976)).

202. *Lamont v. Postmaster General*, 381 U.S. 301, 308 (1965) (Brennan, J., concurring).

203. *Id.*

204. "When academic teaching-freedom and its corollary learning-freedom, so essential to the well-being of the Nation, are claimed, this Court will always be on the alert against intrusion . . . into this constitutionally protected domain." *Barenblatt v. United States*, 360 U.S. 109, 112 (1959) (congressional investigation of communist activities on college campuses). See note 220 *infra*.

205. "[D]ebate on public issues should be uninhibited, robust, and wide-open, . . . it may well include vehement, caustic, and sometimes unpleasantly sharp attacks on government and public officials." *New York Times Co. v. Sullivan*, 376 U.S. 254, 270 (1964).

206. *Red Lion Broadcasting Co. v. FCC*, 395 U.S. 367 (1969). "It is the purpose of the First Amendment to preserve an uninhibited marketplace of ideas in which truth will ultimately prevail It is the right of the public to receive suitable access to social, political, esthetic, moral, and other ideas and experiences which is crucial here." *Id.* at 390. This decision upheld the FCC's "fairness doctrine," requiring broadcast licensees to give equal "air" time to representatives for various sides of public issues under certain circumstances.

207. *Virginia State Bd. of Pharmacy v. Virginia Citizens Consumer Council, Inc.*, 425 U.S. 748 (1976). "[T]he particular consumer's interest in the free flow of commercial information . . . may be as keen, if not keener by far, than his interest in the day's most urgent political debate. . . . Generalizing, society also may have a strong interest in the free flow of commercial information." *Id.* at 763-64 (footnote omitted).

208. *Martin v. City of Struthers*, 319 U.S. 141 (1943). The Court invalidated an ordinance banning door-to-door distribution of leaflets as impermissibly restricting the "dissemination of knowledge." *Id.* at 143.

209. Emerson, *Legal Foundations of the Right to Know*, 1976 WASH. U.L.Q. 1, 6;

more threat to the social order in the receipt of information than does a nonscientist. His right to receive information should therefore be as thoroughly protected as that enjoyed by anyone else.

Courts have protected the right to know not only because of its logical nexus with the active rights mentioned above, but also to promote valued policy objectives: expanding knowledge, discovering truth, and informing the body politic.²¹⁰ Because of the "historic function[s]" served by this right, "freedom of discussion . . . must embrace all issues about which information is needed or appropriate to enable the members of society to cope with the exigencies of their period."²¹¹

These concerns argue for unimpeded flow of scientific information at least as much as they do for free flow of other forms of information. Furthermore, providing the citizenry with data that will enable them to make political decisions more wisely is not the only consideration. There is also the danger that depriving the cumulative scientific process of complete information will result in decisions that are positively harmful. Aerosol propellants are in widespread use today because of incomplete information about the effects of fluorocarbons on the earth's ozone layer. The hazards of incompleteness thus argue for extending to scientific information the widest possible scope of constitutional protection.

Once the right to know is established, it follows immediately that constitutional protection must be afforded the means by which we receive knowledge—hearing and reading.²¹² "[T]he First Amendment protects the right to receive information and ideas, the freedom to hear as well as the freedom to speak. . . . [These rights] are inseparable; they are two sides of the same coin."²¹³ These notions apply equally to reading, which is to print as hearing is to speech.

see *General Theory*, *supra* note 97, at 919 (immediacy of impact as test for differentiating between "speech" and "action").

210. See Part III—*A supra*.

211. *Thornhill v. Alabama*, 310 U.S. 88, 102 (1940).

212. "The [first amendment] protection afforded is to the communication, to its source and to its recipients both." *Virginia State Bd. of Pharmacy v. Virginia Citizens Consumer Council, Inc.*, 425 U.S. 748, 756 (1976) (right to advertise necessarily involves reciprocal right to receive advertising). See also *Thomas v. Collins*, 323 U.S. 516, 534 (1954) (workers' right to hear union organizer); *Kovacs v. Cooper*, 336 U.S. 77 (1949) (dealing in part with right to hear or not to hear messages broadcast by sound trucks).

213. *Kleindienst v. Mandel*, 408 U.S. 753, 775 (1972) (Marshall, J., dissenting). In this case, the right to hear was asserted unsuccessfully in connection with the

The right to receive information and ideas has been held to exist without regard to content or the perceived social worth of the message conveyed.²¹⁴ In the case of obscenity, which the Court has held to fall outside the ambit of first amendment protection,²¹⁵ the Court has been careful to point out that obscene material "by definition lacks any serious literary, artistic, or scientific value."²¹⁶ Control of obscenity has been carefully differentiated from "control of reason and intellect."²¹⁷ It seems clear, then, that so long as material does have serious scientific value, objections to its content based on moral or political preferences would be held insufficient to justify governmental interference with either the receipt or the dissemination of such information.

In practice, governmental interference with the scientific process is least likely to occur at the dissemination or reception stages. Suppression of pure expression in either its active or passive aspect cannot easily be disguised as anything but what it is: censorship.²¹⁸ Governmental suppression of information with scientific content would be difficult to justify to a citizenry with its roots in the Enlightenment.²¹⁹

denial of a visa for a foreign communist invited to speak in the United States. The Court's decision upholding the denial turned on the traditional "plenary" power of Congress to exclude aliens. See discussion of *Zemel v. Rusk*, 381 U.S. 1 (1965), and *Kent v. Dulles*, 357 U.S. 116 (1958), at notes 178-80 and accompanying text *supra*.

214. *Stanley v. Georgia*, 394 U.S. 557, 564 (1969).

215. See, e.g., *Paris Adult Theatre I v. Slaton*, 413 U.S. 49, 61 (1973); *Roth v. United States*, 354 U.S. 476, 485 (1957). The power to control obscenity is based, said the Court, on "a State's broad power to regulate commerce and protect the public environment." *Paris Adult Theatre*, 413 U.S. at 68-69.

216. *Paris Adult Theatre*, 413 U.S. 49, 67 (1973) (quoting language from *Miller v. California*, 413 U.S. 15, 24, 34 (1973) (emphasis added)).

217. *Paris Adult Theatre*, 413 U.S. 49, 67 (1973).

218. Suppression at the experimentation stage, on the other hand, could relatively easily be cloaked in improper assertion of the police power, see notes 165-69 and accompanying text *supra*, or in the rhetoric of cost-benefit analysis for legislative or administrative funding decisions, see notes 237 & 272 and accompanying text *infra*.

219. An exception to this statement might arise when access to scientific information is restricted for reasons of national security; however, the government has yet to assert national security successfully as justification for prior restraint on expression. As Professor Tribe observed, "The Supreme Court has spoken of constitutionally permissible prior restraints as 'exceptional cases' [quoting dictum in *Near v. Minnesota*, 283 U.S. 697, 716 (1931)]. This impression has been reinforced by the Court's decisions refusing to perceive [alleged] threats to national security [citing *New York Times v. United States* (The Pentagon Papers Case), 403 U.S. 713 (1971)]" L. TRIBE, *AMERICAN CONSTITUTIONAL LAW* § 12-33, at 728-29 & nn.1-2 (1978).

3. *The scientist as informational conduit: the right to teach*

To this point, we have been concerned with the right of scientists to express themselves in a general way, speaking in the marketplace of ideas like other citizens. Another important element of the scientific process is organized dissemination; that is, formal teaching in the classroom and laboratory.²²⁰

The Court on a single occasion had the opportunity to rule on a teacher's first amendment right to teach unpopular scientific theory—Darwin's theory of evolution—but declined to do so, deciding the case instead on establishment of religion grounds.²²¹ Earlier, however, in *Meyer v. Nebraska*,²²² the Court found that a state statute forbidding the teaching of German violated the due process clause because it attempted "to interfere with the calling of modern language teachers, with the opportunities of pupils to acquire knowledge, and with the power of parents to control the education of their own [children]." ²²³ The state's power over the content of curriculum, while substantial, could not be exercised unreasonably so as to deprive

220. The Court generally has extolled the virtues of academic freedom and erected demanding standards for testing the validity of governmental encroachment. For example, the Court in *Sweezy v. New Hampshire*, 354 U.S. 234 (1957) (plurality), said that governmental action must be "carefully circumscribed when [it] tends to impinge upon such highly sensitive areas as freedom of speech or press . . . and freedom of communication of ideas, particularly in the academic community." *Id.* at 245. "Teachers and students always remain free to inquire, to study and to evaluate, to gain new maturity and understanding; otherwise our civilization will stagnate and die." *Id.* at 250. The principles which govern the classroom ought to apply equally to physical and social science laboratories. See *Barenblatt v. United States*, 360 U.S. 109 (1959). See also Murphy, *Academic Freedom—An Emerging Constitutional Right*, 28 LAW & CONTEMP. PROB. 447 (1963) (discussing *Barenblatt*). Murphy concludes that, as of 1959, "all nine Justices of the Supreme Court had expressly recognized academic freedom as being within the area of constitutional protection." *Id.* at 457.

In a case decided a year after *Barenblatt*, the Court clarified what it meant by "academic freedom":

By limiting the power of the States to interfere with freedom of speech and freedom of inquiry . . . , the Fourteenth Amendment protects all persons, no matter what their calling. . . . [I]n view of the nature of the teacher's relation to the effective exercise of the rights which are safeguarded by the Bill of Rights and by the Fourteenth Amendment, inhibition of thought, and of action upon thought, in the case of teachers brings the safeguards of those amendments vividly into operation.

Shelton v. Tucker, 364 U.S. 479, 487 (1960) (quoting *Wieman v. Updegraff*, 344 U.S. 183, 195 (1952) (concurring opinion of Frankfurter and Douglas, JJ.)) (emphasis added).

221. *Epperson v. Arkansas*, 393 U.S. 97 (1968).

222. 262 U.S. 390 (1923).

223. *Id.* at 401.

learners of knowledge not clearly harmful.²²⁴ The decision was premised not on the first amendment, which at the time had not yet been held to apply to state legislatures, but rather on substantive due process grounds. Today, the decision in *Meyer* would more likely be based on first amendment principles because of the increased willingness of courts to rely on first amendment doctrine directly to accomplish results formerly achieved under different theories.²²⁵ For example, *Meyer's* due process holding was recently recast in first amendment terms in a right-to-contraception case: "[T]he state may not, consistently with the spirit of the First Amendment, contract the spectrum of available knowledge. . . . And so we reaffirm the *principle* of [*Meyer*]" ²²⁶

More recent opinions have also tended to strengthen the rights of teachers to speak and teach without excessive or unreasonable restrictions. In *Sweezy v. New Hampshire*,²²⁷ the Supreme Court considered a case involving a contempt citation issued a state university teacher in part because he refused to answer questions asked by the state legislature about a lecture he had given on socialism. In reversing the teacher's conviction, the Supreme Court emphasized the importance of academic freedom:

The essentiality of freedom in the community of American universities is almost self-evident Scholarship cannot flourish in an atmosphere of suspicion and distrust. Teachers and students must always remain free to inquire, to study and to evaluate, to gain new maturity and understanding; otherwise our civilization will stagnate and die.²²⁸

Although *Sweezy* involved political rather than scientific speech, and after-the-fact criminal penalties rather than prospective state regulation, the underlying principles are stated broadly enough to leave little doubt they would be held applicable to limitations placed on the freedom of scientific inquiry of teachers. A concurring opinion of Justice Frankfurter in the same case makes this evident. Applying a balancing test, and expressly mentioning science, he gives overriding

224. *Id.* at 402.

225. See SYSTEM, *supra* note 26, at 600.

226. *Griswold v. Connecticut*, 381 U.S. 479, 482 (1965) (Douglas, J.) (emphasis added).

227. 354 U.S. 234 (1957).

228. *Id.* at 250.

weight to the harm that would result to the university if the penalty were upheld:

Progress in the natural sciences is not remotely confined to findings made in the laboratory. Insights into the mysteries of nature are born of hypothesis and speculation For society's good—if understanding be an essential need of society—inquiries into these problems, speculations about them, stimulation in others of reflection upon them, must be left as unfettered as possible. Political power must abstain from intrusion into this activity of freedom . . . except for reasons that are exigent and obviously compelling.²²⁹

Later cases involving loyalty oaths demanded of public school teachers,²³⁰ teaching materials,²³¹ criticism by teachers of school administrators,²³² and the wearing of symbolic armbands by students²³³ provide additional support for the proposition that scientific speech uttered in a teaching context ought to receive first amendment protection.²³⁴

4. *Framing the challenge: direct and indirect interference*

Governmental interference would be most vulnerable to constitutional challenge were it to be direct—that is, in the form of an

229. *Id.* at 261–62.

230. *Keyishian v. Board of Regents*, 385 U.S. 589 (1967).

231. *Parducci v. Rutland*, 316 F. Supp. 352 (M.D. Ala. 1970). *See Keefe v. Geanakos*, 418 F.2d 359 (1st Cir. 1969).

232. *Pickering v. Board of Educ.*, 391 U.S. 563 (1968).

233. *Tinker v. Des Moines Independent School Dist.*, 393 U.S. 503 (1969).

234. *See SYSTEM*, *supra* note 26, at 613, which argues that any system of free expression depends on the existence of an educated, independent citizenry trained in handling ideas, judging arguments and facts, thinking independently, and participating in the marketplace of ideas, and that the satisfaction of these needs requires academic freedom. That the Court has refused to extend to education the status of a fundamental interest for equal protection purposes does not necessarily affect this conclusion. In *San Antonio Independent School Dist. v. Rodriguez*, 411 U.S. 1 (1973), the Court expressly held that

education . . . is not among the rights afforded explicit protection under our Federal Constitution. Nor do we find any basis for saying it is implicitly so protected. As we have said, the undisputed importance of education will not *alone* cause this Court to depart from the usual [rational relationship to legitimate state purpose] standard for reviewing a State's social and economic legislation. *Id.* at 35 (emphasis added). The language in *Rodriguez* leaves room for protection of scientific education for two reasons. First, it is not the importance of education alone that is being asserted here, but also the critical nexus between the scientific process and the rights to teach and to learn. Second, restriction of scientific inquiry on the basis of content alone would not be a legitimate state purpose, much less a compelling one.

outright ban on certain kinds of research on the basis of its content. It is axiomatic that what government cannot do directly, it ought not be permitted to do indirectly. The most obvious method of indirect regulation of scientific research would be denial of funding by government agencies.²³⁵ There is little question that the Supreme Court could find indirect regulation in such a denial: "It is too late in the day to doubt that the liberties of religion and expression may be infringed by the denial of or placing of conditions upon a benefit or privilege."²³⁶

In the case of the scientist, unfettered pursuit of scientific knowledge is the asserted fundamental right, while governmental research funding is the asserted benefit. A constitutional challenge should lie if the scientist has been either denied funding or compelled to forego research in certain areas as a condition of receiving funding, and if he can demonstrate that the funding decision was based on *impermissible* considerations of the content of his proposed research.²³⁷ The scien-

235. Public monies disbursed by various government agencies are by far the largest source of funding for scientific research. See note 272 *infra*. It is arguable that government enjoys what amounts to a monopoly of the science funding field; at the least, government's dominance of the field gives it potentially powerful control over what is and what is not undertaken by scientific investigators.

236. *Sherbert v. Verner*, 374 U.S. 398, 404 (1963) (footnote omitted). In *Sherbert*, the Court ruled that a state could not deprive petitioner of unemployment benefits for failure to meet qualification requirements, when that failure resulted from religious convictions respecting the day of rest. See *id.* n.6 (listing "examples of conditions and qualifications upon governmental privileges and benefits which have been invalidated because of their tendency to inhibit constitutionally protected activity"). Other examples include *Speiser v. Randall*, 357 U.S. 513 (1958), in which the Court struck down a condition limiting the availability of a tax exemption to those members of the exempted class who affirmed their loyalty to the state government granting the exemption, and *Keyishian v. Board of Regents*, 385 U.S. 589 (1967), in which the Court ruled that teachers at a state university could not be deprived of their employment for refusal to comply with regulations requiring disclosure of their association with the Communist Party.

237. Legislatures obviously must apply some kind of cost-benefit analysis when they evaluate spending requests; such cost-benefit analyses in connection with requests for research grants will necessarily involve consideration of the content of the research proposed. When evaluation of content is restricted to a rational weighing of the benefits likely to be derived from a given research project, courts should defer to legislative judgment regarding funding. If, however, evaluation of content includes consideration either directly or indirectly of moral, ethical, or philosophical values, then first amendment questions arise and courts should require a showing of a compelling state interest. See generally L. TRIBE, *AMERICAN CONSTITUTIONAL LAW* § 12-8, at 602-05 (1978). Courts should be sure that an asserted permissible basis for denial of funding does not veil an impermissible basis:

In first amendment cases, the Supreme Court is least likely to take into account governmental interests which, though conceivable, . . . were not *actually considered* by the relevant decision maker. The Court also requires an especially close nexus between ends and means. A statute must be narrowly drawn so that

tist should prevail unless the government can prove that the decision to deny or condition funding was made to further a compelling state interest.²³⁸

The foregoing discussion assumes that scientific research may be analytically parsed into discrete functions. In actuality, however, the various components are not discrete, but rather are inextricably bound with one another in a complex, dynamic process in which each part is dependent on the others and the whole dependent on the proper operation of each part.²³⁹ A sizable measure of first amendment protection cloaks each element in the process; logic compels the conclusion that the entire process must therefore be protected.

5. *Applying the proper standard*

Although the Court has never declared unequivocally what constitutional standard is appropriate in first amendment cases, it is agreed that "freedom of expression is a liberty that comes to the Court 'with a momentum for respect.' . . . [A]ll modern Justices have agreed that the First Amendment is 'special' in some senses; the disputes have been over the implementation of that 'specialness.' "²⁴⁰

Because the scientific process includes many elements, some of which are and some of which are not pure speech, perhaps the following formulation will be the most helpful in setting forth the proper test:

a challenged act of government is clearly an efficacious means to achieve *permissible* objectives of government and is narrowly aimed at those permissible objectives so as not unnecessarily to reach expressive conduct protected by the first amendment.

Id. at 602 (emphasis added) (footnotes omitted). See cases cited *id.* nn. 1 & 2.

238. Generally speaking, governmental actions carry a presumption of validity, and anyone challenging a statute, regulation, or governmental practice has the burden of proving that the state has acted irrationally. If, however, the challenger alleges state infringement upon a fundamental liberty or interest, the burden shifts: the government must demonstrate at least a legitimate, and perhaps a compelling, state interest, and usually must show that it has chosen the least restrictive means available to accomplish its legitimate objective. See, e.g., *Roe v. Wade*, 410 U.S. 133, 155 (1973); *Shapiro v. Thompson*, 394 U.S. 618, 634 (1969); *Sherbert v. Verner*, 374 U.S. 398, 406 (1963). See generally Note, *The Right to Decide—Individual Liberty Versus State Police Powers*, 18 ARIZ. L. REV. 207, 224–25 (1976).

239. On the synergy of scientific discovery, see notes 228–29 and accompanying text *supra*. See generally W. BEVERIDGE, *supra* note 114.

240. G. GUNTHER, *CASES AND MATERIALS ON CONSTITUTIONAL LAW* 1053 (9th ed. 1975) (quoting Frankfurter, J., concurring in *Kovacs v. Cooper*, 336 U.S. 77, 95 (1949)).

This Court has held that when "speech" and "nonspeech" elements are combined in the same course of conduct, a sufficiently important governmental interest in regulating the nonspeech element can justify incidental limitations on First Amendment freedoms. To characterize the quality of the governmental interest which must appear, the Court has employed a variety of descriptive terms: compelling; substantial; subordinating; paramount; cogent; strong. Whatever imprecision inheres in these terms, we think it clear that a governmental regulation is sufficiently justified if it is within the constitutional power of the Government; if it furthers an important or substantial governmental interest; if the governmental interest is unrelated to the suppression of free expression; and if the incidental restriction on alleged First Amendment freedoms is no greater than is essential to the furtherance of that interest.²⁴¹

It seems likely that any suppression, either direct or indirect, of research on the basis of its content alone would be impermissible under this standard.²⁴² As has been pointed out, there is no constitutional

241. *United States v. O'Brien*, 391 U.S. 367, 376-77 (1969) (footnotes omitted).

242. See *Erznoznik v. City of Jacksonville*, 422 U.S. 205, 210 (1975); *Police Dep't v. Mosley*, 408 U.S. 92, 96 (1972). The government may, of course, dissimulate, concealing a discriminatory purpose under an ostensibly neutral objective. Judicial history shows, however, that courts will pierce an announced objective if a discriminatory purpose is obvious. *Bailey v. Drexel Furniture Co.*, 259 U.S. 20 (1922); see *Hague v. CIO*, 307 U.S. 496, 515-16 (1939); *Developments in the Law—Academic Freedom*, 81 HARV. L. REV. 1045, 1054-55 (1968). At times the courts will do this without declaring their mistrust of the legislative motive, but rather will strike down the law for overbreadth, under a balancing-of-interests analysis, or because of the "necessary effect" of the statute—thus achieving their purpose without inviting a confrontation with the legislature or inviting the charge that they are engaging in judicial psychoanalysis. *E.g.*, *SYSTEM*, *supra* note 26, at 280-81.

Alternatively, the government might concede that its concern in curbing research in such sensitive areas as those mentioned in Part I is to suppress knowledge that might be disquieting or disillusioning, but deny that this constitutes an attack on inquiry based on content. Rather, the government could argue, the need to repress such research stems from the likelihood that, if carried out, it would result in deleterious changes in human values and self-concepts, see generally *Tribe*, *supra* note 121; and that changes in values always imply changes in behavior. Thus, an objection which appears to be based on content can be rephrased as one based on physical consequences. There appear to be a number of answers to this approach:

(1) Changes in society's structure which take place through the mediating power of speech are expressly protected by the first amendment, even though the government might disapprove of the changes. See *GENERAL THEORY*, *supra* note 97, at 924 (such concerns not legitimate state interests).

(2) The argument "proves too much." Since all ideas have consequences, upholding governmental regulation of scientific ideas because of the possibility of remote consequences invites the state to become the regulator of all speech that could cause social change—a result clearly at odds with one of the central purposes of the first amendment.

(3) Even if resisting certain changes in social attitudes and beliefs is a legiti-

power to interfere with a given course of conduct simply because it may produce information which is unpopular, unsettling, or politically inexpedient. The government has no proper interest in interfering with such conduct, and such interference would certainly be "related to the suppression of free expression."

B. *Other Constitutional Rationales*

The foregoing discussion suggests that in the first amendment, the scientist finds the necessary legal tools to ward off impermissible governmental encroachment. Depending on the manner in which the infringement occurs, other constitutional theories may also be available.

1. *Due process*²⁴³

a. *Substantive due process*

When, in the early part of this century, the Supreme Court forged a shield for individual rights from the due process clauses of the fifth and fourteenth amendments, it "pour[ed] into the due process clause

mate concern of the state, banning fundamental research will generally not be essential to the accomplishment of this objective (although it will, of course, be sufficient). Usually there will be a time interval between the commencement of such research and the appearance of the undesired effect, during which the state may institute countermeasures designed to minimize the impact of the new findings or ideas, including, for example, funding or encouraging research aimed at challenging the questioned research or developing alternative interpretations of the data, thereby bringing about a more balanced view.

243. Constitutional due process analysis revolves around specific language in the fifth and fourteenth amendments: "No person shall be . . . deprived of life, liberty, or property, without due process of law" U.S. CONST. amend. V. "No State shall . . . deprive any person of life, liberty, or property, without due process of law" U.S. CONST. amend. XIV, § 1. The Supreme Court has developed two major lines of due process analysis: substantive due process, *see* Part IV-B-1-a *infra*, and procedural due process, *see* Part IV-B-1-b *infra*.

Broadly speaking, substantive due process addresses the substantive content of the words "life, liberty, or property" in the two amendments. This line of due process analysis first emerged in connection with state regulation of economic activity. *See, e.g.,* *Lochner v. New York*, 198 U.S. 45 (1905) (freedom of contract held to be within the liberties protected by the fourteenth amendment). The Court has since retreated from its due process activism in the economic sphere and become quite deferential to legislative regulation. *See, e.g.,* *Nebbia v. New York*, 291 U.S. 502 (1934) (dairy price controls upheld as not arbitrary, discriminatory, or irrelevant to a legitimate legislative objective). In the 1920's, substantive due process was applied to personal rights: that is, the Court read into the word "liberty" certain "fundamental rights"—such as freedom of association and rights involving privacy and personal

fundamental values not readily traceable to constitutional text or history or structure.”²⁴⁴ One such fundamental value was freedom to gain useful knowledge:

Without doubt, [the “liberty” protected by the fourteenth amendment] denotes not merely freedom from bodily restraint but also the right of the individual to . . . engage in any of the common occupations of life, *to acquire useful knowledge* . . . and generally to enjoy those privileges long recognized at common law as essential to the orderly pursuit of happiness by free men.²⁴⁵

This comment on the breadth of substantive due process was made in *Meyer v. Nebraska*,²⁴⁶ in which the Court found a state statute prohibiting the teaching of a foreign language to young children to interfere unjustifiably with the interest of the teachers in following their calling, as well as the rights of the pupils to acquire knowledge.²⁴⁷

autonomy—to go along with the express constitutional guarantees of freedom of speech, press, and religion. When governmental action threatens one of these fundamental interests, the Court will apply a more strict standard of review than the relatively deferential reasonable relation-minimum rationality test reserved for other legislative decisions. As Justice Harlan explained,

[w]here due process merely a procedural safeguard it would fail to reach those situations where the deprivation of life, liberty or property was accomplished by legislation which by operating in the future could, given even the fairest possible procedure in application to individuals, nevertheless destroy the enjoyment of all three.

Poe v. Ullman, 367 U.S. 497, 541 (1961) (Harlan, J., dissenting). See generally G. GUNTHER, *supra* note 240, at 616 *passim*; L. TRIBE, *AMERICAN CONSTITUTIONAL LAW* §§ 15-1 to -21 (1978).

In contrast with the concern of substantive due process for the *content* of legislative action, procedural due process

delineates the constitutional limits on the judicial, executive, and administrative *enforcement* of [legislative action]. This has traditionally involved the elaboration of procedural safeguards designed to accord to the individual “the right to be heard before being condemned to suffer grievous loss of any kind” [Joint Anti-Fascist Refugee Comm. v. McGrath, 341 U.S. 123, 168 (1951) (Frankfurter, J., concurring)] as a result of governmental choices—which can take the form of acts or, less commonly, of omissions. The extent to which one may require officials to submit to judicial or quasi-judicial review of conduct which disadvantages the individual depends upon the range of personal interests qualifying as protected “life,” “liberty,” and “property,” and upon the sort of hearing which threatens to such interests trigger.

L. TRIBE, *AMERICAN CONSTITUTIONAL LAW* § 10-7, at 502 (1978) (emphasis in original) (footnotes omitted). See G. GUNTHER, *supra* at 486 *passim*.

244. G. GUNTHER, *supra* note 240, at 616.

245. *Meyer v. Nebraska*, 262 U.S. 390, 399 (1923) (emphasis added), “[T]he word ‘liberty’ contained in the [fourteenth] amendment embraces . . . the right of a person . . . to be free in the enjoyment of all his faculties . . .” *Grosjean v. American Press Co.*, 297 U.S. 233, 244 (1936) (voiding a state tax on certain publications as an unconstitutional “tax on knowledge”).

246. 262 U.S. 390 (1923).

247. *Id.* at 401. The Court also cited the parents’ right to control the education of

The Court characterized the statute as "an infringement of rights long freely enjoyed."²⁴⁸ There is no reason to suppose that the *Meyer* Court's assertion of rights on behalf of teachers and students with respect to foreign language should apply with any less force to science.

Two years later, the Court arrived at a similar conclusion in *Pierce v. Society of Sisters*,²⁴⁹ sustaining a challenge by parochial and private schools to a state law requiring children to attend public school. The Court held that the law interfered with "the liberty of parents and guardians to direct the upbringing and education of children under their control"²⁵⁰ and rejected the assertion of "any general power of the State to standardize its children by forcing them to accept instruction from public teachers only."²⁵¹

Pierce and *Meyer* were cited with approval thirty years later in *Griswold v. Connecticut*,²⁵² but the fundamental freedoms involved in those cases were declared in *Griswold* to be protected primarily by the first rather than the fourteenth amendment:

[T]he State may not, consistently with the First Amendment, contract the spectrum of available knowledge. The right of freedom of speech and press includes not only the right to utter or to print, but . . . the right to receive, the right to read [and] freedom of inquiry, freedom of thought, and freedom to teach²⁵³

Another important substantive due process right, a right to privacy, has been recognized only recently. In *Stanley v. Georgia*,²⁵⁴ the Court overturned a state law making private possession of allegedly obscene material a crime. The decision turned on the first amendment right to receive information as well as the due process privacy right to be left alone:

[A]lso fundamental is the right to be free, except in very limited circumstances, from unwanted governmental intrusions into one's privacy. "The makers of our Constitution undertook to secure conditions

their own children. See notes 222-26 *supra* for a discussion of *Meyer* in a first amendment setting.

248. 262 U.S. at 403.

249. 268 U.S. 510 (1925).

250. *Id.* at 534-35.

251. *Id.* The Court also found unreasonable interference with the business and property interests of the private schools. *Id.* at 535-36.

252. 381 U.S. 479 (1965).

253. *Id.* at 482 (citations omitted).

254. 394 U.S. 557 (1969).

favorable to the pursuit of happiness. . . . They sought to protect Americans in their beliefs, their thoughts, their emotions and their sensations.”²⁵⁵

The individual, said the Court, may constitutionally “satisfy his intellectual . . . needs in the privacy of his own home”;²⁵⁶ he has a right “to read or observe what he pleases.”²⁵⁷

Griswold and *Stanley* have been cited by lower courts to support the conclusion that an individual’s mental processes are protected by due process rights of privacy as well as by the first amendment.²⁵⁸ In *Kaimowitz v. Department of Mental Health*,²⁵⁹ the court said that “[t]here is no privacy more deserving of constitutional protection than that of one’s mind.”²⁶⁰ The Ninth Circuit Court of Appeals has also recognized a privacy-based right to control one’s own mental processes. Citing a line of privacy cases including *Stanley*, the court held that a prisoner had stated a proper cause of action in a complaint alleging violation of his civil rights when the staff at the state medical facility subjected him to behavior modification by aversive conditioning.²⁶¹

Taken together, these cases suggest that both the scientist and the public could assert a substantive due process right to pursue scientific inquiry, both as a matter of acquiring useful knowledge and as a matter of mental privacy. The scientist ought to be left alone to generate and communicate ideas, and to “observe what he pleases.”²⁶²

b. Procedural due process

In general, governmental action which deprives any person of his liberty or property without the benefit of a hearing is a violation of procedural due process.²⁶³ In the preceding section, the conclusion

255. *Id.* at 564 (quoting Brandeis, J., dissenting in *Olmstead v. United States*, 277 U.S. 438, 478 (1928)).

256. 394 U.S. at 565.

257. *Id.* at 568.

258. See discussion of mentation and the first amendment in Part IV—A—I—a *supra*.

259. Civil No. 73-19434-AW (Cir. Ct. Wayne County, Mich., July 10, 1973), reprinted in 1 ABA MENTAL DISABILITY L. REP. 147 (1976). See note 162 *supra*.

260. 1 ABA MENTAL DISABILITY L. REP. at 153. See Shapiro, *supra* note 161, at 258.

261. *Mackey v. Procunier*, 477 F.2d 877 (9th Cir. 1973).

262. *Stanley v. Georgia*, 394 U.S. 557, 568 (1969).

263. See note 243 *supra*.

was reached that the freedom to acquire useful knowledge is not only protected by the first amendment, but is also within the meaning of "liberty" as set forth in the due process clauses of the fifth and fourteenth amendments. Thus, any governmental action which has the effect of denying or impairing the constitutionally guaranteed freedom of inquiry enjoyed by scientists must be preceded by notice and an appropriate opportunity to be heard.

Furthermore, the Supreme Court has recently acknowledged that citizens may acquire a property interest—a "legitimate claim of entitlement"—in certain kinds of government largesse.²⁶⁴ In terms of procedural due process, the issue is whether such an entitlement may be taken away without a proper evidentiary hearing. The Court has held that such a hearing must be provided before wages can be garnished,²⁶⁵ welfare benefits terminated,²⁶⁶ driver's licenses revoked,²⁶⁷ consumer goods repossessed,²⁶⁸ parole revoked,²⁶⁹ or a tenured college professor fired by a public educational institution.²⁷⁰

In the case of scientific research, entitlements might be asserted in connection with faculty hiring and tenure in public institutions of higher learning,²⁷¹ and in connection with governmental decisions to

264. The Supreme Court has stated, "To have a property interest in a benefit, a person . . . must . . . have a legitimate claim of entitlement to it. It is a purpose of the ancient institution of property to protect those claims upon which people rely in their daily lives, reliance that must not be arbitrarily undermined." *Board of Regents v. Roth*, 408 U.S. 564, 577 (1972). In order to assert a property right in a benefit, "a person clearly must have more than an abstract need or desire for it. . . . He must, instead, have a legitimate claim of entitlement to it." *Id.*

Professor Charles Reich, who wrote the seminal article on the notion of entitlements, see Reich, *The New Property*, 73 YALE L.J. 733 (1964), has written that "[s]ociety today is built around entitlement [and m]any of the most important of these entitlements now flow from the government Such sources of security . . . are no longer regarded as luxuries or gratuities; to the recipients they are essentials, fully deserved" Reich, *Individual Rights and Social Welfare: The Emerging Legal Issues*, 74 YALE L.J. 1254, 1255 (1965), quoted in *Arnett v. Kennedy*, 416 U.S. 134, 208 n.2 (1974) (Marshall, J., dissenting).

265. *Sniadach v. Family Fin. Corp.*, 395 U.S. 337 (1969).

266. *Goldberg v. Kelly*, 397 U.S. 254 (1970).

267. *Bell v. Burson*, 402 U.S. 535 (1971).

268. *Fuentes v. Shevin*, 407 U.S. 67 (1972).

269. *Morrissey v. Brewer*, 408 U.S. 471 (1972).

270. *Perry v. Sindermann*, 408 U.S. 593 (1972); *Board of Regents v. Roth*, 408 U.S. 564 (1972). See also *Wieman v. Updegraff*, 344 U.S. 183 (1952) (college professors and staff members dismissed during the terms of their employment contracts have an interest in continued employment).

271. See text accompanying notes 17-18 *supra* (teacher either fired or denied tenure due to content of his research as presenting possible first amendment issues of scientific liberty). See also *Developments in the Law—Academic Freedom*, 81 HARV. L. REV. 1045, 1081 (1968); cases cited at note 270 *supra*.

condition, deny, or withdraw funding with respect to a given area of scientific inquiry.²⁷²

272. Apart from private industry, which is primarily oriented toward technology and therefore is outside our discussion, the bulk of scientific research is dependent on public monies. See, e.g., David, *Toward a National Science Policy*, 61 AMER. SCI. 20 (1973); Symington, *Science in a Political Context: One View by a Politician*, 194 SCIENCE 402 (1976). There is little doubt that "[i]n the post-World War II period, the Federal Government has become the dominant source of support for basic research." NATIONAL SCIENCE FOUNDATION, 26TH ANNUAL REPORT FOR FISCAL YEAR 1976, at xi (1976) (statement of acting NSF director Richard C. Atkinson).

In 1974, the latest year for which complete statistical data are available, the total estimated expenditure for basic research in the United States was \$4 billion. Of that amount, 68% was supplied by the federal government, 15% by private industry, 11% by colleges and universities (including state and local taxes), and 6% by nonprofit institutions. While colleges and universities supplied only 11% of the total, they spent 54% of the total; at these institutions of higher learning, where the case for freedom of inquiry is presumably strongest, the federal government supplied more than 70% of the funds spent on basic research. There are no figures showing how much of the remainder was supplied by state and local taxes, which also would be subject to state regulation and give rise to entitlement claims. See NAT'L SCIENCE BOARD, NAT'L SCIENCE FOUNDATION, SCIENCE INDICATORS 1974, at 50, 185-87, 193 (1974). See also SYSTEM, *supra* note 26, at 596, 624-26 (mentioning potential impact of federal grant-giving policy on academic freedom).

The federal government's financial commitment to the funding of basic science continues to grow, according to a recent report on the proposed budget of the National Science Foundation for fiscal 1979: "Basic research, which constitutes 91 per cent of NSF's budget, totals about \$755 million, a 9.7 increase over 1978" SCIENCE NEWS, Jan. 28, 1978, at 53.

The argument based on federal funding can also be made in first amendment terms. Emerson and others have called attention to the potential impact on the marketplace of ideas of large-scale governmental entry into this area, either through the funding of particular "speakers," or through action taken on its own behalf. See, e.g., SYSTEM, *supra* note 26, at 627-75 (Chapter 17, "Affirmative Promotion of Freedom of Expression"), 697-716 (Chapter 19, "Government Participation in the System of Free Expression"). Emerson suggests that entry by the government into the marketplace of ideas is legitimate—the government is as entitled to speak as anyone—but that its entry can result in the marketplace becoming less free. *Id.* and cases cited therein. Thus, large-scale entry by the state, through funding or otherwise, into areas of expression should be accompanied by protections such as requirements of fairness and support of diverse points of view. See notes 279-97 and accompanying text *infra* (equal protection analysis).

Whether the argument is made in due process or first amendment terms, a key issue would appear to be the extent to which the government exercises a funding monopoly, such that an investigator in a particular area can only obtain funds from the government. To the extent this is true, the marketplace-of-ideas model is no longer serviceable. Presumably, prior to development of such a monopoly, a scientist denied government money could take her research proposal elsewhere and, if it were found meritorious, expect to find support—for example, funding from a private foundation. The "marketplace" would still remain effective, because an idea unpopular to the government might be subsidized elsewhere. Arguably, the heavy governmental incursion into the area of scientific research has reversed this situation, however, with the result that ideas and proposals of which the government disapproves stand little chance of being developed. To the extent this is so, there is a danger that investigations of which governmental grant-givers disapprove will never be carried out. The effect is thus the same as if the ideas were directly prohibited. This argument, of course, rests on the assumption that government should not be permitted to do indirectly what it cannot do directly.

Procedural due process is a relatively weak weapon in the scientist's protective arsenal because it affords, at most, a right to a hearing. Thus, governmental action could survive challenge upon a showing that its decisionmaking procedure comported with the due process requirement that "there shall be notice and opportunity for hearing given the parties."²⁷³ Furthermore, governmental action which "applies to more than a few people" is immune to a procedural due process challenge on the grounds that there was no notice or opportunity to be heard.²⁷⁴ Consequently, an individual scientist would be unable to mount a procedural due process challenge to governmental action applicable to scientists generally.

A final due process argument involves a series of cases invalidating government action on procedural due process grounds because of so-called "irrebuttable presumptions." Perhaps the best example of the irrebuttable presumption analysis is *Cleveland Board of Education v. LaFleur*,²⁷⁵ in which the Court overturned a school board's mandatory maternity leave rules requiring pregnant teachers to leave their jobs without pay several months before the expected date of birth. The Court found that the rules raised a conclusive presumption that teachers were physically incapable of doing their jobs after a certain point in their pregnancies. Because there was no opportunity given an individual teacher to rebut the presumption as applied to her, the rule was held to violate due process requirements.²⁷⁶

It would seem that a scientist could raise a similar challenge to any governmental decision interfering with research on the basis of a presumption. For example, a government funding agency might announce a cutoff of funds allocated to a certain area of research, because of a stated or unstated presumption that nothing productive or useful could come of research in that area, or that research in that

273. *Twining v. New Jersey*, 211 U.S. 78, 110-11 (1908).

274. *Bi-Metallic Inv. Co. v. Colorado*, 239 U.S. 441, 445 (1915) (state property tax increase sustained over procedural due process challenge by individual owners).

275. 414 U.S. 632 (1974).

276. This approach has its critics, who claim that it is really not a due process analysis at all, but rather an equal protection analysis. For example, the dissenters in *LaFleur* argued that the proper way to frame the issue would have been in terms of sex discrimination under the equal protection clause. *Id.* at 657. For other recent examples of irrebuttable presumption analyses, see *Department of Agriculture v. Murry*, 413 U.S. 508 (1973) (limitations on federal food stamp eligibility); *Vlandis v. Kline*, 412 U.S. 441 (1973) (durational residency requirements for reduced state university tuition); *Eisenstadt v. Baird*, 405 U.S. 438 (1972) (distribution of contraceptives).

area would be too dangerous or socially disruptive.²⁷⁷ If no opportunity were afforded interested scientists to rebut the presumption, the cutoff could be vulnerable to a procedural due process challenge. This assumes, of course, that a scientist could be found who satisfied the requirements of expectancy and claim of entitlement.²⁷⁸

Apart from the first amendment, these due process arguments provide the best avenue of redress for individual researchers with whose work the government has impermissibly interfered. Other theories are also available when the government interferes with large numbers or groups of researchers, or treats them less favorably than members of other groups.

2. *Equal protection*

Equal protection challenges arise in connection with legislative classifications alleged to be unconstitutional under the fourteenth amendment.²⁷⁹ Broadly speaking, equal protection challenges trigger one of two levels of judicial review: a more or less deferential "rationality" standard applicable to classifications established by most economic and social legislation,²⁸⁰ and a stiffer "strict scrutiny" stan-

277. The "too dangerous" presumption is a very real possibility in connection with recombinant DNA research. Procedural due process would require that a scientist be allowed the opportunity to rebut the presumption by showing that various containment safeguards have eliminated the danger or reduced it to an acceptable level.

278. The plaintiffs in *Cleveland Bd. of Educ. v. LaFleur*, 414 U.S. 632, 634-37 (1974), were pregnant women who had been terminated from their teaching positions under a mandatory leave provision; in *Vlandis v. Kline*, 412 U.S. 441, 443-44 (1973), they were college students required to pay nonresident tuition under a provision that presumed a continuing nonresident status. Similarly, it would seem that scientists would need to show that they were in imminent danger of being deprived of research opportunities in order to be able to assert an irrebuttable presumption challenge.

279. "No State shall . . . deny to any person within its jurisdiction the equal protection of the laws." U.S. CONST. amend. XIV, § 1.

280. Under the "mere rationality" standard, the classification must bear a rational relationship to the stated legislative purpose; it is a standard which deals almost totally with legislative means with little regard to the ends in view. Under the Warren Court, according to Professor Gunther, this tended to be "minimal scrutiny in theory and virtually none in fact." Gunther, *Foreword: In Search of Evolving Doctrine on a Changing Court: A Model for a Newer Equal Protection*, 86 HARV. L. REV. 1, 8 (1972). The Burger Court has often abandoned the very deferential rationality standard of the Warren era to embrace instead what Gunther calls "minimum scrutiny with bite," which demands that the classification rationally and *substantially* further some legitimate, *articulated* (rather than conceivable) state interest. G. GUNTHER, *supra* note 240, at 661-63.

dard²⁸¹ in the presence of either a "suspect" classification—race,²⁸² alienage,²⁸³ or one of certain sex-based classifications²⁸⁴—or a classification having an impact on "fundamental" rights or interests.²⁸⁵

Conceptually, the major difference between these two broad levels of review has to do with whether means or ends are being reviewed.²⁸⁶ The rationality standard examines legislative means, proceeding from a notion that similarly situated persons must be similarly treated by the government,²⁸⁷ and requiring only that legislative means be rationally congruent with legitimate legislative ends. Any legislative classification which is reasonably calculated to accomplish the stated objective is deemed to be permissible.

Strict scrutiny, on the other hand, is not concerned so much with legislative means as with legislative ends: it proceeds from a notion that the consequences stemming from certain classifications render those classifications impermissible. The fundamental interest strand of strict scrutiny analysis presumes that legislative classifications which have the effect of burdening enjoyment of a fundamental liberty violate equal protection regardless of whether they bear a rational relation to the stated legislative purpose. Such classifications will be struck down unless the state can show a compelling interest in their continued application.

To illustrate, suppose the government were to impose an outright

281. Strict scrutiny deals with legislative ends as well as means: the classification must further a compelling state interest, and must be closely congruent with the stated purpose of the statute. Gunther writes that during the Warren era this level of scrutiny generally was "'strict' in theory and fatal in fact." Gunther, *supra* note 280, at 8. The Burger Court has shown gathering disenchantment with the Warren Court's rigid two-tier system, but has declined to abandon it. See G. GUNTHER, *supra* note 240, at 660-61.

282. *E.g.*, *Korematsu v. United States*, 323 U.S. 214 (1944).

283. *E.g.*, *Graham v. Richardson*, 403 U.S. 365 (1971).

284. *E.g.*, *Weinberger v. Wiesenfeld*, 420 U.S. 636 (1975); *Frontiero v. Richardson*, 411 U.S. 677 (1973).

285. "The list of interests identified as fundamental by the Warren Court was in fact quite modest: voting [*e.g.*, *Harper v. Virginia Bd. of Elections*, 383 U.S. 663 (1966)], criminal appeals [*e.g.*, *Griffin v. Illinois*, 351 U.S. 12 (1956)], and the right of interstate travel [*e.g.*, *Shapiro v. Thompson*, 394 U.S. 618 (1969)] were the prime examples." G. GUNTHER, *supra* note 240, at 659. The Burger Court has declined to expand this list of fundamental interests, refusing to extend strict scrutiny to equal protection challenges involving welfare, *e.g.*, *Dandridge v. Williams*, 397 U.S. 471 (1970); housing, *e.g.*, *Lindsey v. Normet*, 405 U.S. 56 (1972); and education, *e.g.*, *San Antonio Independent School Dist. v. Rodriguez*, 411 U.S. 1 (1973).

286. See generally G. GUNTHER, *supra* note 240, at 657-65.

287. See Tussman & TenBroek, *The Equal Protection of the Laws*, 37 CALIF. L. REV. 341, 345-46 (1949).

ban on recombinant DNA research. On its face, such a prohibition might appear to be immune to an equal protection challenge, because it would apply equally to all scientists. In practical application, however, it arguably would create a class of scientists—those who wished to engage in recombinant DNA research—which would be treated dissimilarly from other scientists. Framing the challenge in this manner, recombinant DNA researchers could allege a governmental classification which impinges on their fundamental first amendment liberties, thereby invoking strict judicial scrutiny under the fundamental rights strand of equal protection analysis.

As was observed earlier, government ought not be allowed to do indirectly what it cannot do directly.²⁸⁸ Consequently, grounds for a similar equal protection challenge would arise in connection with a governmental decision to deny funding to scientists working in certain areas.²⁸⁹ The argument would revolve around the proposition that, although a scientist may not assert an unqualified right to be granted government funds,²⁹⁰ he may assert a right not to be denied *otherwise available* funds because of objections to the content (rather than the merit)²⁹¹ of his proposed research.

Imagine, for example, a statute appropriating funds to be allocated among researchers on the basis of the merits of their proposed projects, but with a proviso forbidding allocation of any funds for investigations into the genetic components of intelligence.²⁹² With respect to scientists generally, such a statute arguably would create a classification which discriminates against certain geneticists as potential recipients of government funds. It seems likely that geneticists challenging such a classification could persuade the courts to invoke strict judicial scrutiny, because they would be impeded in their attempt to

288. See Part IV-A-4 *supra*.

289. See note 235 and accompanying text *supra*.

290. The Court has made it clear that citizens have no fundamental right to demand public funds, even if sought to finance the exercise of an acknowledged fundamental right. In the area of welfare spending, for example, the Court ruled that although women have a fundamental right to procure abortions, *Roe v. Wade*, 410 U.S. 113 (1973), the government is under no obligation to subsidize abortions for women who cannot afford them. The Abortion Funding Cases: *Beal v. Doe*, 432 U.S. 438 (1977); *Maher v. Roe*, 432 U.S. 464 (1977); *Poelker v. Doe*, 432 U.S. 519 (1977). Similarly, even though scientists may assert a fundamental right to pursue scientific research, it seems clear they cannot assert an unqualified fundamental right to government funding.

291. See note 237 *supra*.

292. See note 20 *supra*.

exercise fundamental first amendment liberties while scientists pursuing research in other areas would not be so impeded.

Certainly they could persuade the courts to invoke at least the rationality standard applicable to all legislative classifications.²⁹³ In *Department of Agriculture v. Moreno*,²⁹⁴ the Court held that a "bare congressional desire to harm a politically unpopular group cannot constitute a *legitimate* governmental interest."²⁹⁵ In *Moreno*, the Court held unconstitutional a provision in the federal food stamp program of assistance to "households." The provision defined "households" as limited to related persons; any household with an unrelated person was ineligible for food stamps. The Court found that this definition created an irrational classification aimed at excluding "hippie communes" from the food stamp program.²⁹⁶ The Court's reasoning in *Moreno*²⁹⁷ appears to open the door for rationality-standard equal protection challenges to governmental funding decisions that can be shown to be based on a legislative desire to stifle unpopular or potentially sensitive research. Because of the heavier burden of proof placed on challengers who assert simply that legislative action fails for lack of rationality,²⁹⁸ scientists who wish to challenge such action should, whenever possible, couch their attack in fundamental-interest terms.

V. CONCLUSION

The foregoing review of constitutional history, first amendment theoretical rationales, and first amendment case law suggests that a

293. See note 280 and accompanying text *supra*.

294. 413 U.S. 528 (1973).

295. *Id.* at 534 (emphasis in original).

296. *Id.* According to Professor Gunther, *Moreno* is an example of the intermediate "minimal scrutiny with bite," see note 280 *supra*, a stiffer test than "mere rationality" but not as stiff as "strict scrutiny." G. GUNTHER, *supra* note 240, at 871. See also *Jimenez v. Weinberger*, 417 U.S. 628 (1974) (arguably applying intermediate scrutiny), discussed in G. GUNTHER, *supra* at 872-74.

297. The reasoning in *Moreno* has been cited with approval in at least two cases, *Mathews v. Diaz*, 426 U.S. 67 (1976), and *Weinberger v. Salfi*, 422 U.S. 749 (1975). In neither case, however, was *Moreno's* rationale applied to invalidate the challenged statutory classifications.

298. See note 238 *supra* for a discussion of the different burdens of proof required to sustain a constitutional challenge. A rationality-standard challenge would have a better chance of succeeding if the Court applied the "minimal scrutiny with bite" analysis of *Moreno*, see notes 280 & 296 *supra*, than if it applied the traditionally deferential "mere rationality" analysis of the Warren era. Certainly any scientist mounting an equal protection challenge ought to argue for the stiffer standard.

persuasive case can be made for including scientific inquiry within the field of protected expression. The additional due process and equal protection arguments merely serve to buttress the central first amendment structure for a constitutional challenge to governmental interference in the conduct of basic research. To the extent that governmental action trenches on an individual scientist's right to carry out basic research and does so on grounds of content rather than concerns legitimately falling within the state's funding or police power, such action should be examined under the more stringent model of judicial review courts have developed in cases involving infringement of fundamental interests.

In any such review, elements which should militate in favor of protection of basic research include (i) the extent to which the research at issue is essential to the generation of new ideas or theories; (ii) the extent to which the inquiry contains as an essential component teaching, learning, writing, or other protected activity; (iii) the extent to which the research contributes to social or political discourse essential to self-government; (iv) the extent to which the research is fundamental, or basic, thus affording the state an opportunity to intervene at a later point should harmful effects appear. From the point of view of the government, action will be least likely to raise constitutional problems if it (v) is demonstrably predicated on the police power or power of the purse, rather than on an intent to quell legitimate inquiry; (vi) as a corollary, is aimed at negative externalities or consequences of the research rather than its content.

When the individual researcher's interest is high in the elements which argue for protection and the state's interest in intervening is low in those that confer legitimacy, courts should not hesitate to exercise their historic function of interceding on behalf of critical liberty interests. This would seem particularly true when the inquiry touches on social or political decisionmaking; these, after all, are the essential mechanisms of democratic functioning, which courts have never hesitated to protect.

Surely there will be difficult cases; the contours of the decisional law relating to speech and expression have been to a large extent drawn by such difficult or borderline cases and there is no reason to hope that regulation of scientific inquiry will prove any less difficult. Nevertheless, polar issues will arise and, if Emerson's prediction is correct, this may well happen soon. If so, the conceptual approach

suggested herein may prove helpful to courts faced with the difficult task of assessing the degree of protection appropriate to an old interest in modern dress.