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SCIENTIFIC INQUIRY AND THE FIRST AMENDMENT

James R. Ferguson*

It is now apparent that American science will be faced in coming years with a persistent challenge to what is perhaps its most fundamental value—freedom of inquiry. This emerging theme has been clearly signalled by recent proposals for federal control of recombinant-DNA technology, the first piece of basic research to expose the public-at-large to an immediate threat of harm.2 But more important, perhaps, are signs that state and federal officials are now moving to restrict other areas of scientific investigation, and for reasons that touch on a broad range of public concerns. In recent years, for example, the Commerce Department has imposed a "secrecy order" on a computer research study that appears to implicate national security interests; 3 a House subcommittee has held hearings on the "moral, ethical and legal" implications of cloning technology; 4 and several states have enacted measures to prohibit fetal research either before or after induced abortion.5

In these emerging efforts to impose restrictions on the scientific endeavor there lies quietly buried an absorbing constitutional question: to what extent, if at all, is scientific research a constitutionally protected activity? ⁶ It is one effort of this Article to

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¹ See, e.g., H.R. 11192, 95th Cong., 2d Sess. (1978); S. 1217, Amend. No. 1713, 95th Cong., 2d Sess. (1978); S. 1217, Amend. No. 754, 95th Cong., 1st Sess. (1977).

² Toulmin, DNA and the Public Interest, N.Y. Times, Mar. 12, 1977, at 23, col. 3.

³ N.Y. Times, May 31, 1978, at 1, col. 1. See note 70 and accompanying text infra.

⁴ Developments in Cell Biology and Genetics: Hearings Before the Subcomm. on Health and Environment of the House Comm. on Interstate and Foreign Commerce, 95th Cong., 2d Sess. (1978).

⁵ See, e.g., Cal. Health & Safety Code § 25956 (West Supp. 1979); Mass. Cen. Laws Ann. ch. 112, § 12j (West Supp. 1978).

⁶ While this issue has not yet been adjudicated, it has begun to attract the attention of commentators. See Delgado & Miller, God, Galileo and Government: Toward Constitutional Protection for Scientific Inquiry, 53 Wash. L. Rev. 349 (1978); Robertson, The Scientist's Right to Research: A Constitutional Analysis, 51 S. Cal. L. Rev. 1203 (1978); Note, First Amendment Protection for Biomedical Research, 19 Ariz. L. Rev. 893 (1977); Note, Considerations in the Regulation of Biological Research, 126 U. Pa. L. Rev. 1420, 1427-35 (1978).

suggest that scientific inquiry—the actual process of experimental investigation—merits some degree of protection under the free speech clause of the first amendment because it is essential to the ability of individuals to engage in protected scientific expression.

This alone is not enough, however, for if scientific inquiry does indeed fall within the bounds of the first amendment, the problem is then to determine precisely when the state may permissibly intrude on this protected activity. To what extent, for example, may the state restrain or prohibit a given line of inquiry because the research procedure imperils the health and safety of the general population, or because the resulting knowledge might be used in ways that endanger the public welfare, or because the research activity conflicts with certain ethical views that are held by the larger society? As we shall see, the body of established first amendment law provides a satisfactory analytical framework for resolving these and other conflicts that are sure to arise between the claims of scientific freedom and the legitimate interests of the public-at-large.

I

At the heart of current calls for restrictions on the scientific endeavor lies the growing recognition that modern science has become too consequential to be left to its own devices. Therefore, as a first step in approaching the regulation of scientific research from a constitutional perspective, we must undertake a more general inquiry into the relationship between basic science and the larger society, examining in particular the ways in which newly acquired scientific information can carry far-reaching implications for the public-at-large.

We may begin with the historic mission of basic science—the effort to comprehend the behavior of nature. It is in this effort that scientific discoveries have important implications for what might be described as the realm of ideas. That is, a newly acquired body of experimental data may occasion a significant revision in scientific theory by explaining what had previously been an imperfectly understood phenomenon. This, to be sure, is not a common occurrence, for the outcome of most research fits neatly within the framework of established theory, contributing only additional details to the general fund of knowledge. But there are times when the results of investigation cast a new and unexpected

light on some natural condition, and so demand an adjustment in theory.7

By the same token, newly acquired knowledge may alter not only the particulars of scientific theory, but also the perceptions, values and attitudes of the larger society. For it occasionally happens that new information leads to an explanation of natural behavior that is so inconsistent with inherited faiths or widely accepted truths as to cast serious doubt on their validity. It is for this reason that major scientific advances have sometimes met with significant social resistance. The well-known opposition to the work of Copernicus, Galileo and Darwin, for example, arose in each case from a widely shared belief that the knowledge was in some sense "dangerous" because it conflicted with central assumptions of received tradition.

But the lessons drawn from these historic efforts to restrict the scientific endeavor have informed a Western liberal tradition that takes as its central tenets the inherent dignity of ideas, the sanctity of knowledge and the value of intellectual freedom.⁸ Rooted in the rationalist spirit of the eighteenth century Enlightenment, this liberal tradition holds that the essence of human nature lies in the life of the mind; that the acquisition of knowledge is therefore the highest of human pursuits; and that the free exchange of ideas is thus the sine qua non of liberty.⁹ From this perspective, the scientific endeavor stands as its own justification, commanding a full measure of protection from the pressures of public opinion and the constraints of official power.

Importantly, however, the implications of basic science are not always confined to the realm of ideas, for there is another dimension to scientific knowledge. In particular, an explanation for the behavior of physical or biological phenomena may sometimes reveal the ways in which nature can be given a disciplined direction through informed intervention. It often happens, therefore, that a newly acquired body of scientific data has a practical use in the material world, an application that shapes in beneficial

⁷ For an account of the ways in which unexpected discoveries precipitate fundamental changes in scientific theory, see T.S. Kuhn, The STRUCTURE OF SCIENTIFIC REVOLUTIONS 52-91 (1970).

⁸ Jonas, Freedom of Scientific Inquiry and the Public Interest, HASTINGS CENTER REP., Aug. 1976, at 15, 16.

⁹ See generally P. Gay, The Enlightenment: An Interpretation, The Science of Freedom (1969).

ways the conditions of everyday life. Thus, in the twentieth century, major scientific advances have furnished a wide range of important social benefits by conferring the power of informed intervention in the vital areas of biomedicine, agriculture, transportation and energy. Indeed, the applications of scientific knowledge have become so crucial to the quality of modern life that the research endeavor of natural science has acquired a new sense of mission, becoming not so much an effort to comprehend natural behavior as an effort to uncover new ways of directing, altering or controlling nature for human ends.¹⁰

But if scientific discoveries have often led to important material benefits for the public-at-large, so too have they posed an array of potential hazards, for the powers conferred by new information carry risks of misapplication. To begin with, the very intervention in nature that is made possible by an advance in scientific knowledge may itself hold unrecognized hazards for the larger society. Thus, as scientists probe more deeply into the most fundamental of physical and biological phenomena, the possibility mounts that a well-meaning effort to alter the behavior of nature will frustrate a major strategy of evolution or destroy a vital ecological balance.¹¹

Apart from the risk of inadvertent misuse, there is also the danger that the power conferred by new information will be used for malevolent ends. Some critics have argued, for instance, that further advances in techniques of genetic recombination could enable a terrorist group to create an extraordinarily virulent pathogen and hold the world hostage with the threat of a latter day plague.¹² In a similar vein, others have claimed that research

¹⁰ Jonas, supra note 8, at 15.

^{11 [}It is] troubling to recognize that our scientific endeavor truly does rest upon unspoken, even unrecognized, faith—a faith in the resilience, even the benevolence, of nature as we have probed it, dissected it, rearranged its components in novel configurations, bent its forms and diverted its forces to human purpose. Scientific endeavor rests upon the faith that our scientific probing and our technological ventures will not displace some key element of our protective environment and thereby collapse our ecological niche. It is a faith that nature does not set booby traps for unwary species.

Sinsheimer, The Presumptions of Science, DAEDALUS, Spring 1978, at 23, 24. Such concerns have surfaced in the recombinant DNA debate. In particular, some critics have argued that recombinant research may hold "incalculable evolutionary dangers," since the transfer of new genetic properties to one-celled organisms might make them "more effective, both as competitors and as parasites." Grobstein, The Recombinant DNA Debate, Scientific Am., July 1977, at 22, 28.

¹² What gives cause for special concern in this connection is that recombinant techniques "do not require large installations or highly sophisticated instrumentation." Grobstein, *supra* note 11, at 31.

on so-called "isotope separation" could disclose a cheap and abundant energy source for nuclear weapons and thus breach "one of the last defenses against nuclear terror." ¹³

Nor are the dangers of misapplication confined to physical and biological hazards. It is also conceivable that a major social dislocation could result from the ill-considered use of newly acquired knowledge. One intriguing, if highly speculative example of such a dislocation is offered by critics of the current research on aging. In particular, it has been suggested that if the investigation of aging were to make possible a major extension of human life—to the age, say, of 130 years—the application of such knowledge would produce a wide range of profoundly disruptive social, political and psychological changes by 1) radically altering the life cycle, 2) increasing the general population, and 3) shifting the median age to what is now the retirement years. Furthermore, according to these same observers, the effects would be even more disruptive if life could be extended indefinitely and society was forced to determine who would be the last to be born.¹⁴

There is, finally, a sense in which potential applications of scientific information can intrude on deeply held moral or ethical sensibilities. This is most clearly evident in fields of human biology, where the theoretical possibilities posed by scientific advances are sometimes at odds with prevailing notions of what it means to be fully human.¹⁵ The popular objections to genetic engineering or human cloning, for example, seem to rest on the belief that such practices would represent an "unnatural" or "forbidden" encroachment on the human spirit. Thus, it is now said that in these areas of scientific investigation and others man is acquiring powers that he ought not rightfully have.¹⁶

¹³ Sinsheimer, supra note 11, at 29.

¹⁴ See Morison, Misgivings about Life-Extending Technologies, DAEDALUS, Spring 1978, at 211; Sinsheimer, supra note 11; Sinsheimer, Inquiring into Inquiry, HASTINGS CENTER REP., Aug. 1976, at 18.

¹⁵ In recent months, such concerns have been evident in the public response to the birth of a child fertilized *in vitro* (see N.Y. Times, July 27, 1978, at 1, col. 3), and the widely reported claim that a human being had been cloned. See N.Y. Times, Mar. 8, 1978, at 19, col. 1; N.Y. Times, Mar. 4, 1978, at 19, col. 3.

Although the moral issues facing modern science arise most frequently from potential applications of scientific knowledge, there are also contemporary examples of ethical objections to scientific theory qua theory. Most notable, perhaps, is the egalitarian critique of the emerging discipline of human behavioral genetics, or "sociobiology." See Wilson, The Attempt to Suppress Human Behavioral Genetics, J. GEN. EDUC., Winter 1978, at 277.

¹⁶ See, e.g., J. Goodfield, Playing God: Genetic Engineering and the Manipulation of Life 71-73 (1977).

In such ways, then, do the applications of scientific knowledge carry serious implications for the public-at-large. And to recognize this—that new scientific information may confer powers that can alter in unwanted ways the conditions of everyday life—is to recognize, too, that the "ancient alibi of pure theory" no longer holds for the scientific endeavor.¹⁷ It is to suggest that the "highest wisdom" may lie in prohibiting the acquisition of information on matters that, for the moment at least, are best left unknown.¹⁸

The notion of "dangerous knowledge" has acquired new and more urgent meanings in the twentieth century, meanings that may justify governmental efforts to regulate the research activities of scientists. But if scientific freedom is a constitutional value, there are limits to the power of the state to restrict the scientific endeavor. In what sense, then, can it be said that scientific inquiry is protected by the free speech clause of the first amendment? To this question we may now turn.

Π

Simply stated, the constitutional claim of scientific inquiry holds that the research enterprise of scientists has a first amendment importance because it is essential to the ability of individuals to engage in scientific expression. The argument thus proceeds on the assumption that scientific expression is itself protected by the free speech clause of the first amendment. This initial premise entails no sharp break from accepted first amendment principles; indeed the Supreme Court has strongly hinted on several occasions that scientific speech is a protected form of expression.¹⁹ Yet there are good reasons for undertaking an inquiry into the constitutional status of scientific communication. For one thing, the matter has not yet been adjudicated, so there may be some value in simply sketching the broad lines of the constitutional argument. More important, however, it now appears that the Su-

¹⁷ Jonas, supra note 8, at 16.

¹⁸ Sinsheimer, supra note 14.

¹⁹ See, e.g., FCC v. Pacifica Foundation, 438 U.S. 726, 746 (1978) (words which lack literary, political, or scientific value are not entirely outside first amendment protection); Miller v. California, 413 U.S. 15, 34 (1973) ("The First Amendment protects works which, taken as a whole, have ... scientific value, regardless of whether the government or a majority of the people approve of the ideas these works represent."); Roth v. United States, 354 U.S. 476, 484 (1957) (quoting letter of Continental Congress citing scientific advancement as a reason for protecting freedom of the press).

preme Court is moving toward a hierarchical view of the first amendment, a view that assigns different levels of constitutional protection to different kinds of expression. The Court has recently held, for instance, that commercial speech deserves only a "limited measure of protection, commensurate with its subordinate position in the scale of First Amendment values." Similarly, a plurality of the Court has indicated that "indecent language" and "sexually explicit" films warrant less protection than political, philosophical or literary expression. Accordingly, it is necessary to show not only that scientific communication is a protected form of speech, but also that it does not occupy a "subordinate position" in the emerging hierarchy of first amendment values.

To this end, a useful analytical framework is furnished by Virginia State Board of Pharmacy v. Virginia Citizens Consumer Council, Inc., 22 a 1976 decision in which the Supreme Court held that commercial speech is not "subject to complete suppression by the State." 23 More precisely, the Court determined that commercial information has first amendment "value" by identifying the ways in which such information promotes three major interests that lie at the heart of the free speech guarantee: 1) an individual interest in self-expression; 2) a general social interest in the free flow of information; and 3) a more specific social interest in enlightened public decisionmaking. 24

²⁰ Ohralik v. Ohio State Bar Ass'n, 436 U.S. 447, 456 (1978). The Court first suggested that commercial speech would not receive a full measure of constitutional protection in Virginia State Bd. of Pharmacy v. Virginia Citizens Consumer Council, Inc., 425 U.S. 748, 771 n.24 (1976), and it has held to that view since. Friedman v. Rogers, 99 S. Ct. 887, 894 & n.9 (1979); Bates v. State Bar, 433 U.S. 350, 379-81 (1977). See generally Note, Yes, FTC, There Is a Virginia: The Impact of Virginia State Board of Pharmacy v. Virginia Citizens Consumer Council, Inc. on the Federal Trade Commission's Regulation of Misleading Advertising, 57 B.U. L. Rev. 833, 838-48 (1977); Comment, First Amendment Protection for Commercial Advertising: The New Constitutional Doctrine, 44 U. Chi. L. Rev. 205 (1976).

²¹ See FCC v. Pacifica Foundation, 438 U.S. 726, 746-47 (1978); Young v. American Mini Theatres, Inc., 427 U.S. 50, 70-71 (1976).

²² 425 U.S. 748 (1976).

²³ Id. at 771 n.24. The Virginia Pharmacy decision is particularly appropriate for our purposes since commercial information, like scientific expression, consists largely of "hard" data. Although it is true that the free speech guarantee is usually identified with the expression of individual opinion in open discussions of public affairs, there is no reason to thus limit the scope of the first amendment. Indeed, the Supreme Court has attached great importance to the "informational purpose of the First Amendment," declaring that the "First Amendment goes beyond protection of the press and the self-expression of individuals to prohibit government from limiting the stock of information from which members of the public may draw." First Nat'l Bank v. Bellotti, 435 U.S. 765, 782 n.18, 783 (1978).

The Court's analysis began with the recognition that both the advertiser and the consumer have a substantial individual interest—admittedly economic but legitimate nevertheless—in the communication of commercial data. The advertiser seeks to convey price and product information to the widest possible range of potential customers and the consumer seeks to learn of the availability of goods at reasonable prices.²⁵ The Court then noted that commercial information has an important social value because the efficient allocation of economic resources depends on "intelligent and well informed" private economic decisions.²⁶ Finally, in a nod to the influential theory of Professor Alexander Meiklejohn,²⁷ the Court carried its analysis a step further, declaring that if commercial information

is indispensable to the proper allocation of resources in a free enterprise system, it is also indispensable to the formation of intelligent opinions as to how that system ought to be regulated or altered. Therefore, even if the First Amendment were thought to be primarily an instrument to enlighten public decisionmaking in a democracy, we could not say that the free flow of information does not serve that goal.²⁸

What emerges from the *Virginia Pharmacy* decision, then, is a three pronged test that will determine the "value", and hence the constitutional status, of a given form of expression.²⁹ When this

²⁵ Id. at 762-64.

²⁶ Id. at 765.

²⁷ Id. at 765 n.19. As described by the Court, Professor Meiklejohn's theory emphasizes "the role of the First Amendment in guaranteeing our capacity for democratic self-government." Id. This view is most fully developed in A. Meiklejohn, Free Speech and Its Relation to Self-Government (1948).

²⁸ 425 U.S. at 765 (footnotes omitted).

²⁹ In recent decisions, the Supreme Court has clearly indicated that the relative "value" of commercial speech is largely responsible for its subordinate position in the hierarchy of first amendment protection. *See* Ohralik v. Ohio State Bar Ass'n, 436 U.S. 447, 456 (1978). *Accord*, FCC v. Pacifica Foundation, 438 U.S. 726, 761 & n.3 (1978) (concurring opinion, Powell, J.).

Similarly, a plurality of the Court has concluded that the "value" of "indecent language" and "sexually explicit" films justifies a lower level of judicial scrntiny. In Young v. American Mini Theatres, Inc., 427 U.S. 50 (1976), Mr. Justice Stevens wrote for a four-justice plurality that

society's interest in protecting this type of [erotic] expression is of a wholly different, and lesser, magnitude than the interest in untrammeled political debate that inspired Voltaire's immortal comment. Whether political oratory or philosophical discussion moves us to applaud or to despise what is said, every schoolchild can understand why our duty to defend the right to speak remains the same. But few of us would march our sons and daughters off to war to

test is applied to scientific communication, it provides the basis for a compelling constitutional claim—more compelling than that of commercial speech. To begin with, scientists clearly have strong individual interests in the free exchange of scientific data and ideas. These interests, moreover, are largely intellectual in nature, and thus—unlike the economic concerns that underlie commercial advertising—they are fully consistent with prevailing views of free expression as a mode of self-realization.³⁰

The public-at-large also has strong interests in the free flow of scientific information. A system of unregulated scientific expression not only enables scientists to draw on the work of colleagues, but also tests the validity of hypotheses against current data and opposing views. In these ways, it promotes the discovery of scientific truth, ³¹ and thus fosters the technological and intellectual advances that contribute to the quality of modern life and the collective wisdom of the culture.³²

Finally, scientific expression is essential to enlightened public decisionmaking, for many of the major policy issues of our time

preserve the citizen's right to see "Specified Sexual Activities" exhibited in the theaters of our choice.

Id. at 70.

30 Thomas Emerson writes:

[F]reedom of expression is essential as a means of assuring individual self-fulfillment. The proper end of man is the realization of his character and potentialities as a human being. For the achievement of this self-realization the mind must be free. Hence suppression of belief, opinion, or other expression is an affront to the dignity of man, a negation of man's essential nature. Moreover, man in his capacity as a member of society has a right to share in the common decisions that affect him. To cut off his search for truth, or his expression of it, is to elevate society and the state to a despotic command over him and to place him under the arbitrary control of others.

T. EMERSON, THE SYSTEM OF FREEDOM OF EXPRESSION 6 (1970).

31 The notion that a "free market" of ideas promotes the discovery of political and philosophical truth has been called into question in recent years. See DuVal, Free Communication of Ideas and the Quest for Truth: Toward a Teleological Approach to First Amendment Adjudication, 41 Geo. Wash. L. Rev. 161, 188-94 (1972). However, the evidence of history offers strong support for the claim that selective suppression of scientific information and ideas can impede the discovery of scientific truth. Most notable in this regard is the so-called Lysenko episode, in which the Soviet state embraced a set of seriously flawed genetic hypotheses to the exclusion of all alternatives. The resulting policy of state suppression cost the Soviets a generation of progress in the science of genetics. See generally Z. Medvedev, The Rise and Fall of T. D. Lysenko (1969).

On the cultural importance of moderu science, Lewis Thomas writes: We need science, more and better science, not for its technology, not for leisure, not even for health and longevity, but for the hope of wisdom which our kind of culture must acquire for its survival.

L. THOMAS, THE MEDUSA AND THE SNAIL: MORE NOTES OF A BIOLOGY WATCHER 175 (1979).

are rooted in a technological base. Indeed, while commercial information is relevant only to questions of economic policy, scientific information has a direct bearing on questions of national security, the environment, energy, health care, education and agriculture. In these areas and others, therefore, the dissemination of scientific opinion and data is indispensable to informed public participation in the decisionmaking process.³³

This is not to suggest that all forms of scientific expression are indistinguishable from traditional varieties of speech. On the contrary, as was shown earlier, there are important differences between certain kinds of scientific communication and more conventional forms of expression.³⁴ And, as will be shown, these differences may furnish the state with an adequate justification for either restricting the dissemination of specific scientific information or preventing its very acquisition. It does seem clear, however, that scientific expression is so crucial to the individual concerns of scientists, so vital to the material and cultural concerns of the public-at-large, and so important to the policy concerns of a democratic state that it warrants more than the "limited measure of protection" that the Court has extended to commercial speech.³⁵ If this much is granted, the initial groundwork is laid for the constitutional claim of free inquiry.

³³ It is noteworthy that Alexander Meiklejohn, in whose view the first amendment protects only speech necessary to the process of governing (see notes 27-28 and accompanying text supra), listed "[t]he achievements of ... the sciences in creating knowledge and understanding of men and their world," as a class of thought and expression deserving protection. Meiklejohn, The First Amendment Is an Absolute, 1961 Sup. Ct. Rev. 245, 257.

³⁴ See text accompanying notes 10-18 supra.

³⁵ See Ohralik v. Ohio State Bar Ass'n, 436 U.S. 447, 456 (1978). It would be difficult to draw any general distinction of constitutional significance between scientific expression and other highly valued forms of speech. To be sure, certain kinds of scientific knowledge have practical applications that can be put to dangerous or unwanted uses. But this does not hold true for all forms of scientific speech. Some types of scientific knowledge are subject only to beneficial applications, while others have no practical use at all, but contribute to the general understanding of natural phenomena. It should also be noted that a considerable amount of scientific communication consists not of factual data, but of ideas—theories, hypotheses, or informed speculation that reflect the creative intellectual activity of individual scientists.

It would be equally difficult to justify different levels of constitutional protection for different kinds of scientific speech. To be sure, some types of scientific data may have only limited applications that are so obviously detrimental to the public welfare as to justify a lower standard of review. The "restricted data" defined by The Atomic Energy Act of 1954, 42 U.S.C. §§ 2011, 2014 (1954), may be a case in point. See United States v. The Progressive, Inc., 467 F. Supp. 990, 994 (W.D. Wis. 1979) ("[T]his Court can find no plausible reason why the public needs to know the technical details about hydrogen bomb construction to carry on an informed debate on this issue."). More commonly, however, a body

III

If the logic of the first amendment claim of scientific speech is immediately apparent, the same cannot be said for scientific inquiry. On the contrary, there is something vaguely unsettling about the notion that scientific research is protected by the free speech clause of the first amendment. What is most troubling, of course, is that such research is not "speech" at all. Rather—and this is a crucial distinction in traditional first amendment theory—it is more in the nature of "conduct." ³⁶

The speech-conduct dichotomy does not always provide a useful analytical framework, however, for some forms of conduct are so tightly bound up with protected speech as to warrant a measure of constitutional protection themselves.³⁷ Indeed, the Supreme Court has found at least three distinct patterns of activity to merit first amendment protection. First, the Court has long held that certain modes of communication—picketing, marching, distributing handbills—fall within the scope of the first amendment even though such activity is, to some extent, nonverbal conduct.³⁸ Second, the Court has acknowledged that "symbolic acts" such as the wearing of armbands are "closely akin to 'pure speech'" and thus worthy of protection.³⁹ Finally, the Court has recently recognized a third form of conduct with first amendment

of knowledge that is subject to deleterious or unwanted uses will also have a wide range of beneficial applications, and some of these may not be fully recognized for years. Furthermore, newly acquired data may inspire other lines of investigation that yield additional knowledge of great value. See note 42 infra.

All this is only to suggest that in dealing with restrictions on scientific speech, the Court should adopt a case-by-case approach in which it starts with the assumption that scientific expression warrants a full measure of constitutional protection, and then determines whether the particular state interests implicated by the information at issue are sufficient to justify an abridgment of fully protected speech. Under this approach, the Court could best serve the values of free expression while, at the same time, recognizing that certain types of scientific information pose significantly greater dangers than more conventional forms of expression.

³⁶ The leading exponent of the expression-action distinction is Professor Emerson. See T. Emerson, supra note 30, at 8, 17.

³⁷ For critiques of the speech-conduct dichotomy, see L. TRIBE, AMERICAN CONSTITUTIONAL LAW 598-601 (1978); Ely, Flag Desecration: A Case Study in the Roles of Categorization and Balancing in First Amendment Analysis, 88 HARV. L. REV. 1482, 1494-96 (1975); Henkin, The Supreme Court 1967 Term—Foreword: On Drawing Lines, 82 HARV. L. REV. 63, 79 (1968).

³⁸ See, e.g., Carlson v. California, 310 U.S. 106 (1940); Thornhill v. Alabama, 310 U.S. 88 (1940); Schneider v. State, 308 U.S. 147 (1939); Lovell v. City of Griffin, 303 U.S. 444 (1938)

³⁹ Tinker v. Des Moines Independent Community School Dist., 393 U.S. 503, 505-06 (1969).

significance—what might be broadly described as noncommunicative conduct essential to the ability of individuals to engage in free expression.⁴⁰ This third category of first amendment activity bears closer examination, for herein lies the basis for the constitutional argument of scientific inquiry.⁴¹

A brief outline of the argument itself will provide a useful point of departure. The analysis begins with the recognition that scientific information is wholly derived from, or verified by, experimental investigation. The research endeavor is therefore essential to scientific expression. Once this is granted, it follows that restraints on scientific inquiry are also restraints on scientific

[t]o impose any strait jacket upon the intellectual leaders in our colleges and universities would imperil the future of our Nation. No field of education is so thoroughly comprehended by man that new discoveries cannot yet be made.... 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.

Similarly, in Keyishian v. Board of Regents, 385 U.S. 589, 603 (1967), the Court declared that academic freedom is "a special concern of the First Amendment, which does not tolerate laws that cast a pall of orthodoxy over the classroom." See also Regents of the Univ. of Cal. v. Bakke, 438 U.S. 265, 312-13 (1978) (Powell, J.); Emerson, Colonial Intentions and Current Realities of the First Amendment, 125 U. Pa. L. Rev. 737, 746 (1977).

However, there are several limitations on the availability of the concept of academic freedom to scientific research. First, the concept is by no means firmly entrenched as a central first amendment value; it has never served as the sole grounds for a Supreme Court decision. On the contrary, the Supreme Court cases that refer to the concept "all involve an issue of obvious speech infringement either by a loyalty oath requirement or an investigation into subversion." Note, supra note 6, 126 U. Pa. L. Rev. at 1430. More importantly, a considerable body of scientific research is conducted outside the academic community. Much of the current work with recombinant DNA, for example, has been undertaken by private research centers and commercial concerns. Grobstein, supra note 11, at 28. Moreover, there is a strong argument to be made that scientific freedom and academic freedom are two very different ideas:

The key differentia lies in this: academic freedom is the ideology of a profession-across-the-disciplines, the profession created out of the common circumstance of an academic appointment in a college or university and of the common duties and anxieties this entails; scientific freedom is the ideology of the divers professions-in-the-discipline, the professions based on the regularized advance of knowledge in distinctive fields. Each affects a different, though overlapping, constituency.

Metzger, Academic Freedom and Scientific Freedom, DAEDALUS, Spring 1978, at 93, 107 (footnote omitted).

For further discussion of the possibility of applying the concept of academic freedom to scientific inquiry, see Delgado & Miller, *supra* note 6, at 386-88; Note, *supra* note 6, 126 U. Pa. L. Rev. at 1429-31; Note, *supra* note 6, 19 ARIZ. L. Rev. at 908-12.

⁴⁰ Buckley v. Valeo, 424 U.S. 1 (1976); Branzburg v. Hayes, 408 U.S. 665 (1972).

⁴¹ In addition to the argument that follows, there is at least one other first amendment claim that is available to some types of scientific research, a claim that rests on the notion of academic freedom. In Sweezy v. New Hampshire, 354 U.S. 234, 250 (1957), Chief Justice Warren, speaking for a plurality of the Court, declared that

speech. Indeed, any restriction on areas of scientific research will effectively suppress the data and ideas that would otherwise result if the research proceeded without legal constraint.⁴² Accordingly, if scientists are precluded from pursuing lines of investigation, they are restrained in their ability to engage in free expression.

The logic of this argument draws support from two major decisions of the Supreme Court dealing with forms of noncommunicative conduct that are vital to the meaningful exercise of first amendment rights. In Buckley v. Valeo, 43 the Court addressed a first amendment challenge to the Federal Election Campaign Act amendments of 1974. As part of a congressional effort to eliminate sources of political corruption, the amendments restricted the political spending of citizens in two ways: first, they imposed limits on the amount an individual could spend in direct contributions to political campaigns; 44 second, they imposed limits on the amount an individual could spend in independent expressions of support for a "clearly identified" candidate. 45 This latter restriction became a principal target of the free speech claim presented in Buckley, as the plaintiffs argued that a limit on the amount one could spend on political speech interfered with the exercise of a first amendment right.

The Supreme Court agreed. As a first step, the Court declared that "virtually every means of communicating ideas in today's mass society requires the expenditure of money" 46—or, to put it another way, the ability to communicate is fundamentally dependent on the ability to spend. As a result, the Court's analysis continued, restrictions on spending necessarily operate as restric-

⁴² It would be difficult, if not impossible to determine the extent to which a ban on a specific line of inquiry restricts the flow of scientific information and ideas, since experimental data often inspire new lines of investigation that yield additional knowledge. It follows that any effort to assess the social value of the unacquired data would be equally uncertain. To take one example, it has been recently shown that when certain deadly cancer cells are inserted in mice embryos, they give rise to healthy tissue in normal mice. This investigation strongly suggests that the abnormality producing the cancer is found in the cellular environment rather than in the cells themselves. Accordingly, this research has generated a broad range of additional experiments that may prove vital to an understanding of the causes of cancer and the ways in which the disease can be controlled. N.Y. Times, Feb. 13, 1979, §C, at I, col. I.

⁴³ 424 U.S. 1 (1976). For a useful analysis of *Buckley* and its significance, see Polsby, *Buckley v. Valeo: The Special Nature of Political Speech*, 1976 Sup. Ct. Rev. 1.

^{44 18} U.S.C. §§ 608(b)(1) & (3) (Supp. IV 1970) (repealed 1976; reenacted as part of 2 U.S.C. § 441a (1976)).

⁴⁵ Id. § 608(e)(1).

^{46 424} U.S. at 19.

tions on speech.⁴⁷ To illustrate the point, the Court noted that the provisions of the Act would prevent citizens from making "any significant use" of radio, television or metropolitan papers to express their views through purchased political announcements.⁴⁸ With these propositions firmly in hand, the Court moved quickly to its conclusion: since limitations on spending restrict the exercise of the free speech right, the expenditure of money for political speech must itself be protected as a first amendment freedom.⁴⁹

While Buckley dealt with restraints on the ability of citizens to disseminate information, the Court has also acknowledged that state-imposed restraints on the acquisition of information may violate the first amendment.⁵⁰ In Branzburg v. Hayes,⁵¹ the Court considered a challenge to a grand jury's power to compel reporters to disclose the identities of their confidential sources. The newsmen argued that compulsory disclosure, by deterring sources from supplying information, would impermissibly intrude on a newsgathering privilege said to arise from the first amendment's

⁴⁷ Id. at 19-20, 39.

⁴⁸ Id. at 19-20.

⁴⁹ Id. at 45-51. Judge J. Skelly Wright has suggested that the Buckley Court treated the expenditure of money as equivalent to pure speech. Wright, Politics and the Constitution: Is Money Speech?, 85 Yale L.J. 1001, 1005-10 (1976). Wright bases this interpretation largely on the Court's refusal to characterize campaign expenditures as "conduct" similar to the draft card burning that was at issue in United States v. O'Brien, 391 U.S. 367 (1968). See Buckley v. Valeo, 424 U.S. at 16-17. However, as Judge Wright appears to recognize, the major premise of the Buckley opinion was that (in Judge Wright's phrase) "the use of money is essential for 'effective political speech'"—and not that the expenditure of money is itself a pure form of expression. Wright, supra, at 1011 (emphasis supplied). It is for this reason that the Court characterized the expenditure limitations as a "substantial restraint on the ability of persons to engage in protected First Amendment expression." 424 U.S. at 52.

⁵⁰ The state could effectively suppress a body of information by imposing restraints on either its acquisition or its dissemination. As a general matter, therefore, the distinction between these two necessary steps in the communicative process should not he significant from the standpoint of the first amendment. Indeed, the distinction should become constitutionally significant only in the special case of information that is originally in the possession of the government or a private party. Compare Houchins v. KQED, Inc., 438 U.S. 1, 10 (1978) (no "special privilege of access to information as distinguished from a right to publish information which has been obtained") (emphasis in original) with Landmark Communications, Inc. v. Virginia, 435 U.S. 829 (1978) (publication of truthful information withheld by law from public domain held protected by first amendment).

For general discussions of the first amendment right to acquire information, see Emerson, Legal Foundations of the Right to Know, 1976 WASH. U.L.Q. 1; Note, The Right of the Press to Gather Information, 71 COLUM. L. REV. 838 (1971); Note, The Rights of the Public and the Press to Gather Information, 87 HARV. L. REV. 1505 (1974).

^{51 408} U.S. 665 (1972).

guarantee of a free press.⁵² In rejecting the claim, the majority opinion of Justice White emphasized both the state's interest in uncovering criminal activity and the largely "speculative" effect of the compelled disclosures on the ability of reporters to gather information.⁵³ The Court did acknowledge, however, that newsgathering "is not without its First Amendment protections." 54 The logic that led to this conclusion applies as well to claims arising from the guarantee of free speech.⁵⁵ The major premise holds that the ability to engage in certain noncommunicative activity (the gathering of newsworthy information) is essential to the exercise of the first amendment right (the right to publish news); from this it follows that restrictions on the first are also restrictions on the second ("without some protection for seeking out the news, freedom of the press could be eviscerated").⁵⁶ Therefore, as the Court recognized, the first amendment right to publish must have as its correlate the right to gather newsworthy information without unwarranted state interference.

Thus, in the Buckley and Branzburg decisions, the Court acknowledged that certain forms of noncommunicative conduct are essential to the ability to communicate—so essential, in fact, that they cannot be restricted without also abridging first amendment rights. It is this general principle that underlies the constitutional claim of scientific inquiry. For, in like manner, scientific research is so essential to the ability of individuals to engage in scientific expression that limitations on the former must surely result in abridgment of the latter. Thus, as with the expenditure of

⁵² Id. at 679-80.

⁵³ Id. at 694-95.

⁵⁴ Id. at 707. Although this statement is dictum, the Court has cited it with approval in subsequent cases. See Houchins v. KQED, Inc., 438 U.S. 1, 10 (1978); Pell v. Procunier, 417 U.S. 817, 833 (1974). The Court has refused to extend Branzburg to grant the press access to information within the government's control. Houchins v. KQED, Inc., 438 U.S. at 8-12. However, the protection of scientific research does not require that Branzburg be so extended. See note 50, supra.

⁵⁵ The Supreme Court has consistently refused to draw any distinction between the first amendment rights of the press and those of the general public. In *Branzburg*, for instance, the Court declared that, "the First Amendment does not guarantee the press a constitutional right of special access to information not available to the public generally." 408 U.S. at 684. Accord, Houchins v. KQED, Inc., 438 U.S. 1, 11 (1978); Pell v. Procunier, 417 U.S. 817, 833-34 (1974). For discussions of the meaning of the "free press" clause, see First Nat'l Bank v. Bellotti, 435 U.S. 765, 795-802 (1978) (concurring opinion, Burger, C.J.); Lange, The Speech and Press Clauses, 23 U.C.L.A. L. Rev. 77 (1975); Nimmer, Introduction—Is Freedom of the Press A Redundancy: What Does It Add To Freedom of Speech?, 26 HASTINGS L.J. 639 (1975); Stewart, "Or of the Press," 26 HASTINGS L.J. 631 (1975).

money for political speech and the newsgathering activities of the press, so too with the research enterprise of scientists: to restrict this form of conduct is to impose (in the Court's phrase) "a substantial restraint on the ability of persons to engage in protected First Amendment expression." ⁵⁷

IV

If the analysis thus far is correct, then scientific inquiry merits at least some degree of constitutional protection under the free speech clause. But how much protection is due? In what circumstances may the government permissibly regulate the research activities of scientists? 58

The case law on so-called "unconstitutional conditions" has taken two distinct and apparently contradictory directions. On the one hand, the Supreme Court has acknowledged that the "liberties of religion and expression may be infringed by the denial of or placing of conditions upon a benefit or privilege." Sherbert v. Verner, 374 U.S. 398, 404 (1963). See also Frost & Frost Trucking Co. v. Railroad Comm'n, 271 U.S. 583, 594 (1926). But another line of decisions has followed the logic of Justice Holmes' well-known opinion holding that a policeman can be compelled to surrender free speech rights as a condition of public employment. McAuliffe v. Mayor of New Bedford, 155 Mass. 216, 29 N.E. 517 (1892). Thus, in Buckley, for example, the Court declared that the "acceptance of public financing entails voluntary acceptance" of what would otherwise be unconstitutional restrictions on first amendment activities. 424 U.S. at 95.

In a recent effort to make sense of these cases, Professor Polsby has suggested that "no conditioned surrender of a constitutional right is acceptable unless there is some substantial relation between the governmental interest sought to be vindicated and the actual forfeiture of the individual interest that is required to be forgone." Polsby, supra note 43, at 29. Under this approach the conditioned surrender of a first amendment right must bear some rational relationship to the purpose of the benefit or grant in question. This standard would afford the state considerable latitude in imposing restrictions on research as a condition to the receipt of funds that the state had specifically allocated for the support of scientific research. The government could insist, for example, that private institutions receiving federal monies for biomedical research refrain from fetal experimentation. Such a condition would reflect a legitimate interest the state was seeking to vindicate through the spending program in question, namely, the financial support of fields of biomedical research that are consistent with prevailing social mores.

A very different situation would be presented, however, if the government threatened a university with the withdrawal of funds that had been allocated for a humanities program because faculty members in the biology department were conducting controversial lines of research. In such a case, the surrender of the constitutional right would not be substantially related to the purpose of the funding grant. Accordingly, the state's effort to impose the condition should be viewed as unreasonable and therefore unconstitutional.

⁵⁷ Buckley v. Valeo, 424 U.S. at 52.

⁵⁸ The balance of this Article deals with direct governmental restraints on the conduct of basic research. The state, however, may also impose restrictions on scientific research as a condition of public funding. The question thus arises: to what extent may the government condition the receipt of a public benefit on the surrender of first amendment freedoms?

In *United States v. O'Brien*, ⁵⁹ the Supreme Court established guidelines for determining permissible regulations of first amendment activity. Under the *O'Brien* test, the critical inquiry centers on the nature of the government's interest in restricting the conduct. If the government's interest in regulation stems from concerns unrelated to the conduct's communicative qualities rather than "[arising] in some measure because the communication [that is] integral to the conduct is itself thought to be harmful," ⁶⁰ the government need not demonstrate a "compelling" interest in restricting the activity.

Two examples may illustrate the point. Suppose that the government's child labor laws prohibit children from distributing handbills. This, of course, would curtail expressive activity. But the government's reasons for doing so are in no way connected with the message that is being conveyed. Rather, what has prompted the state to prohibit the act is simply the fact that the children are working; this concern would arise if the labor entailed no communicative importance at all. On the other hand, suppose that the state were to prohibit any march or parade that displayed the sign of the swastika. Several concerns might lead the state to enact such a law, but they all arise in some measure from the message the symbol conveys. In this case, then, the government's interest in regulation is bound up with the "communication [that is] integral to the conduct."

Under the O'Brien decision, an inquiry of this kind will determine the justification the state must advance to save the regula-

^{59 391} U.S. 367 (1968).

Id. at 382. Professor John Hart Ely has emphasized that the reference of this criterion is not to the ultimate interest to which the state is able to point, for that will always be unrelated to expression, but rather to the causal connection the state asserts. If, for example, the state asserts an interest in discouraging riots, the Court will ask why that interest is implicated in the case at bar. If the answer is ... that the danger was created by what the defendant was saying, the state's interest is not unrelated to the suppression of free expression within the meaning of O'Brien's criterion [2].... The critical question would therefore seem to be whether the harm that the state is seeking to avert is one that grows out of the fact that the defendant is communicating, and more particularly out of the way people can be expected to react to his message, or rather would arise even if the defendant's conduct had no communicative significance whatever.

Ely, supra note 37, at 1497 (emphasis added). As Professor Ely notes, one of the great virtues of this approach is that it does not require "question begging judgments" on whether a given course of conduct is predominantly "expression" or "action." Id. at 1494-95.

⁶¹ This example, based on Prince v. Massachusetts, 321 U.S. 158 (1944), is furnished by Professor John Hart Ely. Ely, *supra* note 37, at 1499.

tion from a first amendment challenge. Thus, if the interest in regulation is "unrelated to the suppression of free expression," the government need only show that the interest is "important or substantial" to justify the challenged restraints.⁶² If, however, the interest arises from the "communication [that is] integral to the conduct," the government's task is more difficult. Indeed, it now seems clear that the Court will uphold the regulation only if the government can demonstrate a "compelling" interest in restricting the activity.⁶³

Furthermore, according to the *O'Brien* opinion, even if the state's interest in regulation is sufficient to justify a restriction on first amendment freedoms, the government must still show that the restriction is "no greater than is essential to the furtherance of that interest." Therefore, if the state can achieve its ends through a "less restrictive alternative," the broader regulation must be declared invalid.

v

With these general principles in hand, we may now turn to specific problems involving the first amendment and restrictions on scientific inquiry. The discussion thus far has suggested that the nature of the government's interest in regulating a first amendment activity is central to a resolution of the constitutional question. We may therefore adopt as a framework for analysis the four major concerns that might prompt the state to restrict or

⁶² 391 U.S. at 377. Professor Tribe has suggested that the Court will actually apply what amounts to an ad hoc balancing test in dealing with regulations aimed at the non-communicative impact of an act. Under this approach, the central question is whether the government's regulatory interests in the case at hand are sufficient to outweigh the "values of freedom of expression." L. Tribe, *supra* note 37, at 581-82.

If this kind of balancing test is applied to restrictions on scientific research, it seems likely that the Court will consider both the extent to which the regulation restricts the flow of scientific information and the apparent social value of the unacquired data to determine the first amendment interests that are set against the government's competing justifications. However, it must again be emphasized that these two factors cannot be determined with any certainty in the case of unacquired scientific data. See note 42 supra. Indeed, it would seem that in dealing with most restrictions on scientific inquiry the Court could legitimately consider these factors only to the extent that they strengthened the first amendment claim.

⁶³ See, e.g., First Nat'l Bank v. Bellotti, 435 U.S. 765, 786 & n.23 (1978); Elrod v. Burns, 427 U.S. 347, 362-63 (1976); L. Tribe, supra note 37, at 602. Presumably, the "compelling" state interest standard would not apply if the Court held that scientific expression itself warranted only a limited measure of constitutional protection. But cf. notes 29-35 and accompanying text supra (scientific expression unlikely to receive reduced protection).

^{64 391} U.S. at 377.

prohibit a specific avenue of inquiry: 1) the research procedure imperils the public health and safety; 2) the knowledge to be gained is in some sense "dangerous" or "inopportune"; 3) the knowledge to be gained conflicts with a central social value; and 4) the research procedure conflicts with a central social value.

The most significant aspect of the first rationale for regulation is that it stems from concerns that are unrelated to the communicative significance of the research. This is true, for example, of the recent congressional proposals for restricting recombinant-DNA research. The expressed concern is that the experimental technique—a procedure in which genetic material from different species is pieced together in novel combinations—might inadvertently produce a new epidemic pathogen or other hazardous life form. The interest in regulation thus arises not from the expected data or ideas, but from the research procedure itself. Therefore, if the concerns of the state are "important"—and the preservation of the public health is surely "important"—there is an adequate justification for the restriction of research activity.

The state could not rely, however, on mere assertions that a research procedure imperils the public health, for the Supreme Court will not accept at face value legislative justifications for an abridgment of first amendment rights:⁶⁷ On the contrary, the Court will

make its own inquiry into the imminence and magnitude of the danger said to flow from the particular utterance and then ... balance the character of the evil, as well as its likelihood, against the need for free and unfettered expression.⁶⁸

Thus, in weighing the state's interest in regulation, the Court will consider both the nature of the asserted evil and the likelihood of

⁶⁵ See H.R. Rep. No. 95-1005, 95th Cong., 2d Sess., part 1, at 2 (1978); Riesenberg, Recombinant DNA-The Containment Debate, CHEMISTRY, Dec. 1977, at 13.

⁶⁶ Similarly, the state's concern in restricting the use of human subjects in certain areas of biomedical research is unrelated to the expected data or ideas, and is quite obviously "important."

⁶⁷ "Deference to a legislative finding cannot limit judicial inquiry when First Amendment rights are at stake." Landmark Communications, Inc. v. Virginia, 435 U.S. 829, 843 (1978). Free scientific inquiry should be seen as a first amendment right. See notes 36-57 supra.

⁶⁸ Landmark Communications, Inc. v. Virginia, 435 U.S. 829, 843 (1978). While the Court was dealing with "pure speech" in this case, it seems clear that the same considerations should apply in evaluating the legitimacy of the state's rationale for restricting any first amendment activity. See note 67 supra.

its occurrence. If the risk of occurrence is small, the danger must be correspondingly grave to give the state a sufficiently "important"—or, as the case may be, "compelling"—interest in regulation.⁶⁹

However, in dealing with new scientific technologies, the Court will not always be able to determine the "imminence" of danger. Scientific opinion may be deeply divided on the risk of an untoward event—as is the case with recombinant-DNA technology⁷⁰—and the Court is peculiarly ill-equipped to resolve competing scientific arguments.⁷¹ In such a case, the nature of the evil that the state seeks to avert would become especially significant, for if the potential danger is sufficiently grave, an indeterminate risk of occurrence could provide an adequate interest in regulation.

By this logic, the Court will uphold restrictions on recombinant-DNA research so long as the state can show that such research poses an indeterminate risk of physical harm to the general population⁷²—unless, of course, the restrictions are unnecessarily broad. If, for example, the state were to ban *all* recombinant research in the name of the public health, there would be a serious "less restrictive alternatives" problem, as much of the work in this field entails no risk at all.⁷³

⁶⁹ Suppose, for example, that a particular research procedure results in the death of the experimental subject in one percent of the cases. This risk of occurrence would clearly provide the state with a sufficiently "important" interest in prohibiting the research on human subjects. It is doubtful, however, that the same risk could justify a ban on the use of the procedure on laboratory animals. It should perhaps be noted that the welfare of laboratory animals is by no means a fanciful possibility as a rationale for restrictions on scientific research. See Curtis, New Debate over Experimenting with Animals, N.Y. Times, Dec. 31, 1978, § 6 (Magazine), at 18.

⁷⁰ See, e.g., Recombinant DNA Research Guidelines, 4I Fed. Reg. 27902, 27904 (1976); Grobstein, supra note II, at 26-31.

⁷¹ On this point, Judge Bazelon writes:

The problem is not just that these scientific issues are complicated; courts have long grappled with complicated issues in reviewing actions by the FCC, SEC, ICC, CAB, and scores of other governmental regulatory agencies. These more traditional administrative matters, however, involve issues with which all judges have at least a speaking familiarity; but I daresay that almost none have the knowledge and training to assess the merits of competing scientific arguments. And this is hardly a task for on-the-job training.

Bazelon, Coping with Technology Through the Legal Process, 62 Cornell L. Rev. 817, 822 (1977).

⁷² Indeed, the magnitude of the potential harm in this case is so enormous that the Court would probably find a sufficiently "important" interest in regulation even if the consensus of scientific opinion held that the risk of occurrence was minimal.

⁷³ See, e.g., N.Y. Times, Mar. 2, 1979, at A-13, col. 1.

On the evidence of recent bills,⁷⁴ however, it is more likely that congressional regulation will simply incorporate the guidelines for federally funded recombinant research that have been issued by the National Institutes of Health. These guidelines are narrowly tailored to further the government's interest in protecting the health of the public without unnecessarily abridging the scientists' freedom of inquiry.⁷⁵ This is achieved through a hierarchy of experimental controls that corresponds to the possible risk created by given procedures. Thus, while some procedures are wholly forbidden (for example, those involving organisms known to be high risk pathogens), others are virtually unrestricted (for example, those involving nonpathogenic organisms that exchange genes in nature). Between these extremes, various experiments are categorized according to estimated risk and made subject to matching "containment" requirements.

It is possible, of course, that restrictions of this sort might become overbroad with subsequent developments in the art. For instance, further refinements in techniques of biological containment (that is, the use of genetically deficient bacterium that can survive only in controlled laboratory conditions) ⁷⁶ might render some prohibitions unnecessary. But until that happens, we may safely assume that congressional legislation patterned on the NIH guidelines will be adjudged constitutional.

What, then, of the second possible rationale for regulation? What if the state restrained a specific line of inquiry because the anticipated fruits of the research—the knowledge to be gained—might be used in ways that threaten the welfare of the general population? This concern has not yet led to proposals for state intervention,⁷⁷ but it soon will, predictably in a national se-

⁷⁴ H.R. 11192, 95th Cong., 2d Sess. (1978), for example, seeks to extend for two years the scope of the containment requirements and the requirements of the experimental guidelines of the National Institutes of Health respecting recombinant DNA research to include all public and private recombinant DNA activities and to provide for a study respecting research and technology involving genetic manipulation.

^{75 41} Fed. Reg. 27902 (1976).

⁷⁶ See Hearings on Regulation of Recombinant DNA Research Before the Subcomm. on Science, Technology and Space of the Senate Comm. on Commerce, Science and Transportation, 95th Cong., 1st Sess. 54-60 (1978) (statement of Roy Curtiss).

⁷⁷ The government has, however, attempted to prevent the dissemination of scientific information. The Justice Department recently obtained an injunction against the publication of an article entitled "The H-Bomb Secret: How We Got It, Why We're Telling It." United States v. The Progressive, Inc., 467 F. Supp. 990 (W.D. Wis. 1979). The government alleged that "the publication or disclosure of this information would increase the

curity context. Indeed, several computer scientists have already charged that the National Security Agency is "harassing" their efforts to develop an indecipherable computer communication code, apparently because such a code "could enable foreign powers to develop virtually impenetrable command-and-control military communications systems." ⁷⁸ By the same token, one can easily imagine the state seeking to enjoin other kinds of research that touch on sensitive national security concerns—the development, for example, of new biochemical or nuclear technologies that have obvious military applications as well as beneficial uses.

From the standpoint of first amendment analysis, this second, "dangerous knowledge" rationale differs in one crucial respect from the first: the government's interest in regulation would arise not from the research procedure, but from the knowledge that it would yield. Accordingly, the state would have to provide a "compelling" justification for any restraint it sought to impose on the investigation at issue.

In weighing the government's regulatory interest, the Court would again look to the gravity of the asserted evil and the likelihood of its occurrence. In this case, however, the state would carry a much heavier burden of proof. Indeed, if the state were to seek an *injunction* against the acquisition of specific scientific information,⁷⁹ the Court might view the prohibition as a form of prior restraint⁸⁰—"the most serious and least tolerable infringe-

proliferation of nuclear weapons, and thereby severely undercut the arms control and disarmament policies of the United States." Plaintiff's Application for a Temporary Restraining Order at 2, United States v. The Progressive, Inc., 467 F. Supp. 990 (W.D. Wis. 1979).

⁷⁸ N.Y. Times, Oct. 19, 1977, at A-26, col. 1. It was apparently this concern that lay behind the effort of the Commerce Department to impose a "secrecy order" on a computer study at the University of Wisconsin. The order was lifted only after the University threatened to challenge it as an impermissible encroachment on academic freedom. N.Y. Times, June 13, 1978, at A-16, col. I. See note 41 supra.

⁷⁹ In the case of information that allegedly implicates national security interests, it seems likely that the state would not rest content with threats of subsequent punishment.

⁸⁰ An injunction against the acquisition of specific scientific data would necessarily prevent the publication of the data. This, indeed, would be the very purpose of the order. Arguably, therefore, such an injunction could be viewed as a prior restraint on expression—that is, an order that "prohibit[s] the publication or broadcast of particular information or commentary." Nebraska Press Ass'n v. Stuart, 427 U.S. 539, 556 (1976).

The recent cryptography controversy (see note 78 and accompanying text supra) may illustrate the point. The government could prevent the dissemination of computer communication codes by preventing either the acquisition of the information or its publication. The Justice Department, however, has concluded that restrictions on the publication of such codes would be "unconstitutional insofar as they establish prior restraint on disclosure of cryptographic ideas and information." N.Y. Times, Feb. 1, 1979, at A-21, col. 2. If this

ment on First Amendment rights."⁸¹ The state could then justify the prohibition only by showing to a high degree of certainty that the potential danger is both grave and probable.⁸²

Importantly, however, the danger posed by the misuse of certain types of scientific information could be so grave as to warrant a lesser showing on the likelihood of occurrence.⁸³ For example, if the information at issue could be used in ways that exposed entire populations to an immediate threat of physical harm, the state could persuasively argue that even a reasonable possibility of misuse would provide an adequate cause for intervention.⁸⁴ The government could thus justify restrictions on either the acquisition or dissemination of a specific body of scientific information by showing that such information would provide a hostile nation or terrorist group with the means of developing new and more effective military capabilities.⁸⁵

is correct, then logic suggests that the government should not be permitted to avoid the burden of justifying a prior restraint simply because it seeks to prevent the dissemination of the data by enjoining the research.

⁸¹ Nebraska Press Ass'n v. Stuart, 427 U.S. 539, 559 (1976). The Court has declared that a prior restraint on expression bears a "heavy presumption" against its constitutional validity. Organization for a Better Austin v. Keefe, 402 U.S. 415, 419, (1971). *Accord*, New York Times Co. v. United States, 403 U.S. 713, 714 (1971).

The government's burden may be lessened, however, if there is an "express and appropriately limited congressional authorization" for the restraint at issue. *Id.* at 731 (concurring opinion, White, J.) and 743, n.3 (concurring opinion, Marshall, J.). *See also* United States v. The Progressive, Inc., 467 F. Supp. 990, 994 (W.D Wis. 1979).

⁸² In the Nebraska Press decision, for instance, the Court struck down a prior restraint on the publication of information that admittedly threatened a criminal defendant's right to a fair trial because the state had failed to establish with the "requisite degree of certainty" a probability that the substantive evil would occur. 427 U.S. at 569-70. Accord, New York Times Co. v. United States, 403 U.S. 713, 726-27 (1971) (concurring opinion, Brennan, J.); id. at 730 (concurring opinion, Stewart, J.).

⁸³ This should hold true even if the Court were to view the challenged prohibition as a form of prior restraint. In the *Nebraska Press* decision, the Court quoted Learned Hand in defining the appropriate inquiry as whether the "gravity of the 'evil,' discounted by its improbability" provides the state with an adequate justification for a prior restraint on expression. 427 U.S. at 562. This statement represents the Court's first acknowledgment that the seriousness of the threatened evil can reduce the requisite likelihood of occurrence in determining whether a prior restraint is constitutionally permissible. Such an approach has a considerable appeal to common sense in view of the qualitative difference between, for example, a threat to the lives of thousands of people and a threat to a criminal defendant's right to a fair trial. *See* L. Tribe, *supra* note 37, at 731 n.24.

84 Even here, however, it seems clear that the government would have to establish to a high degree of certainty that the information at issue could be used in ways that pose an immediate threat to the physical well-being of great numbers of people.

⁸⁵ Thus, in United States v. The Progressive, Inc., 467 F. Supp. 990, 993 (W.D. Wis. 1979), the district court enjoined the publication of an article that "could *possibly* provide sufficient information to allow a medium size nation to move faster in developing a hydrogen weapon." (emphasis supplied).

On the other hand, if the expected knowledge were viewed as dangerous because its application might result in a major social dislocation—as would be the case, for instance, in a prohibition on the acquisition of life-extending technologies ⁸⁶—the state would have a more difficult task in showing that the magnitude and likelihood of danger justified restraints on the acquisition of knowledge. Moreover, this particular variation of the "dangerous knowledge" rationale would be subject to a "less restrictive alternatives" challenge if the state could achieve its ends by simply regulating the ways in which the knowledge is used.⁸⁷

We arrive now at the third, and no doubt the most controversial of the four possible rationales for restricting scientific inquiry: the knowledge to be gained (or its possible uses) conflicts with a central social value. More so than the first two, this rationale calls for the regulation of scientific research on public policy grounds, for it proceeds in the belief that the pursuit of knowledge is secondary to other, more fundamental values.

But what values, precisely? Most important, perhaps, are the moral concerns that underlie critical public reactions to certain advances in human biology. The often unarticulated notion here is that, in tampering with the most fundamental processes of life, research scientists are venturing into "forbidden" regions of knowledge, intruding on the sanctity of human nature, the essence of human individuality. While such values may at times be ill-defined in the public consciousness, they are nevertheless deeply felt. It would be a serious mistake, therefore, to dismiss out of hand the possibility of a public imagination so inflamed by the prospect of human cloning or man-animal hybrids, for instance, as to result in restraints on the acquisition of knowledge.

And there are other possibilities as well. For example, the investigation of possible racial differences in the genetic contribution to intelligence has been the subject of a spirited debate in recent years, 88 as some critics have argued that the acquisition of

⁸⁶ See note 14 and accompanying text supra.

⁸⁷ The difficulties that would confront the government in attempting to restrict the use of scientific information once it became available in a free society should not be underestimated, particularly in view of the "pervasive experience that the pragmatic implications of scientific discoveries prove irresistable to the marketplace." Jonas, *supra* note 8, at 16. Indeed, in the case of life-extending technology, the government might well argue that it could not realistically hope to restrict the use of such a capability once it was developed and freely disseminated.

⁸⁸ See generally, The I. Q. Controversy, Critical Readings (N. Block & G. Dworkin eds. 1976).

such knowledge would undermine the social commitment to democratic and egalitarian values.⁸⁹ A similar argument has been advanced in connection with research on the so-called "criminal" XYY genotype; ⁹⁰ and one can imagine like-minded views on other investigations pointing to a biological basis for "undesirable" forms of social behavior.

But if such concerns were to serve as the grounds for a ban on fields of research, it is doubtful that the regulation could withstand a first amendment challenge. Once again, the government would have to provide a "compelling" justification for the challenged restraints, since its interest in regulation would be quite obviously tied to the communicative aspect of the research.⁹¹ this case, however, the state's justification would invoke not the health and safety of the public, but the "collective conscience" of the community, and, more particularly, the value protected by the regulation at issue. The result, then, would be a classic confrontation between the free speech interests of a minority, on one hand, and certain majoritarian norms and traditions on the other—a clash of values that, under prevailing interpretations of the first amendment, must be resolved in favor of minority freedoms. It is thus unlikely that the Court would hold majoritarian moral sensibilities to be a sufficiently compelling justification for restraints on the acquisition of knowledge.

Moreover, in many cases, this third rationale could be served by measures that did not intrude on first amendment rights. It seems clear, for example, that the central ethical objections to human cloning are concerned with the uses to which such knowledge might be put. Accordingly, the state could effectively answer these moral concerns by restricting the *practice* of human cloning once the knowledge is gained.

There is, finally, a fourth possible rationale for state intervention in the conduct of basic research, namely, the experimental procedure is itself at odds with a central social value. Consider, for example, the current restrictions that several states have placed on research involving the aborted or soon-to-be aborted

⁸⁹ See, e.g., Chomsky, The Fallacy of Richard Herrnstein's IQ, in The IQ Controversy, Critical Readings 285 (N. Block & G. Dworkin eds. 1976).

⁹⁰ See, e.g., Beckwith & Miller, The XYY Male: The Making of a Myth, HARV. MAGAZINE, Oct. 1976, at 30.

⁹¹ If the state were to seek an injunction against the research, the doctrine of prior restraint may apply. See notes 79-82 and accompanying text supra.

fetus.⁹² It is quite apparent that the rationale for these prohibitions is an ethical one—specifically, considerations of respect for the dignity of the fetus ⁹³—and one that arises, not from the biomedical data that would result from the research, but from the experimental procedure itself.⁹⁴ Therefore, if such legislation were challenged on first amendment grounds, the major question would be whether the ethical concerns of the state, standing alone, are sufficiently "important" to justify an abridgment of first amendment freedoms.

This would be a difficult question to answer. In attempting to resolve the issue, the Court might be influenced by the apparent social value of the "suppressed" knowledge.⁹⁵ In the case of fetal experimentation, for instance, recent reports have indicated that a ban on fetal research would arrest the development of biomedical knowledge in three critical areas: prenatal diagnosis of genetic defects through amniocentesis; prevention, diagnosis and treatment of Rh isoimmunization disease; and management of infant respiratory distress syndrome.⁹⁶ Given facts such as these, the Court might be persuaded to find restrictions on some controversial research procedures to be unconstitutional.

Conclusion

In such ways, then, would firmly established principles of first amendment law accommodate the claims of scientific freedom with those of public accountability. Although the first amendment would not afford an absolute protection to scientific investigation, the state would not have a free hand in restricting lines of inquiry. On the contrary, the government would have to have an adequate justification for any restraint it sought to impose on the conduct of basic research. Moreover, even when the state did have

⁹² See note 5 supra.

⁹³ NATIONAL COMMISSION FOR THE PROTECTION OF HUMAN SUBJECTS OF BIOMEDICAL AND BEHAVIORAL RESEARCH, RESEARCH ON THE FETUS 68 (1975), reprinted in part at 40 Fed. Reg. 33,530, 33,546 (1975) [hereinafter cited as COMMISSION REPORT]. It is this rationale that lies at the heart of the current restrictions on federally funded fetal research that have been implemented by the National Institutes of Health. 40 Fed. Reg. 33,528 (1975).

⁹⁴ Presumably, similar ethical concerns would underlie state restrictions on animal experimentation. *See* Curtis, *supra* note 69.

⁹⁵ See note 62 supra.

⁹⁶ Batelle-Columbus Laboratories, An Assessment of the Role of Research Involving Living Human Fetuses in Advances in Medical Science and Technology, reprinted in COMMISSION REPORT, supra note 93, at 15-1 app.

sufficient cause for intervention, it would have to employ means that are narrowly drawn to avoid an unnecessary abridgment of the first amendment right.

Thus, if the thesis of this Article is correct—if scientific freedom is indeed a first amendment value—there are fixed limits to the power of the state to impose restrictions on the scientific endeavor. With this knowledge in hand, the American scientific community may perhaps find its new public accountability an easier responsibility to accept.