The Bellman, the Snark, and the Biohazard Debate

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I. The Problem: Scientific Freedom in an Activist State

Enormous hubbub — as evidenced by this symposium — has greeted the decision by Judge John Sirica, a good year ago now, in *Foundation on Economic Trends v. Heckler.* There the trial court issued a preliminary injunction prohibiting the release of recombinant DNA into the environment until the National Institutes of Health, under whose auspices the release was to take place, complied with the requirements of the National Environmental Policy Act. That, at least, is how a lawyer would describe the case. The scientific researcher's description of the case would probably be somewhat less complex: A court halted a scientific experiment. Government stood in the way of scientific progress, and that, in the view of the researcher, is simply outrageous. Perhaps the result in *Foundation on Economic Trends* is indeed outrageous, but outrageous or not, the court's action is at the very least a signal that times have changed.

At one time, the American public agreed with practitioners of the art that science was an "endless frontier," that scientific knowledge was itself a good thing, that there simply were no major problems not ultimately amenable to technological solutions. Yet it is important to understand how brief that era was. Scientists have been viewed with suspicion for about as long as there have been scientists, and government efforts to manipulate or suppress their work

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* Professor of Law, Yale University. I am grateful to Enola Aird and Roberta Romano for tossing some of these ideas back and forth with me. I also acknowledge my debt to Owen Fiss for struggling to set me straight on science and the First Amendment. Daniel Ewell and Dean Hashimoto have assisted me in tracking down a number of helpful references. This paper is dedicated to Leah Cristina Aird Carter, born June 26, 1985.

The Biohazard Debate

are nothing new. Only after the Second World War, which many saw as having been won in large measure by the superior technological expertise of the United States, did matters begin to change; the conquest of near space in the sixties fueled the optimism.

In the general disillusionment with authority and institutions that was wrought by (or perhaps reflected in) the Vietnam War abroad and civil strife at home, science was toppled from its pedestal. No longer were scientific researchers automatically trusted and left alone to improve society; no longer was all knowledge conceded to be good. Perhaps, some whispered, scientists had summoned spirits that would have been better left alone. True, the genie cannot be stuffed back into the bottle, but — so the question arose — shouldn’t we begin to be awfully careful about which bottles we open next? Scientific researchers would generally reply that trying to predict progress in order to control it is quite impossible; frightened lay people would argue that something had to be done “before it’s too late.” And thus the battle was joined.

In the old days when basic science was thought immune from moral censure, no judge would have pondered seriously an urgent request that some experiment be halted. Only after the first few decades of the twentieth century did American ideology begin to take seriously the idea that government is more than a formal mechanism for enforcing the essentially private ordering of resources and resolving private disputes. The modern American state intervenes in nearly every aspect of the lives of its constituents, all in the name of improving the lot of the society as a whole. Under an interventionist ideological regime, there may no longer be persuasive reasons for scientists to consider themselves possessed of a special immunity.

Thus an American scientist who today decides to perform an

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4. Often such attempts result from the efforts of various organized religions that formerly dominated secular politics in most of the world. For discussion of the ways in which religion has worked to restrain scientific progress, see, J. Draper, History of the Conflict Between Religion and Science (1889); B. Farrington, Science and Politics in the Ancient World (1939); A. D. White, A History of the Warfare of Science with Theology (2 vols. 1900). But more technologically advanced regimes have also attempted to interfere with free scientific inquiry. See, e.g., A. Beyerchen, Scientists Under Hitler: Politics and the Physics Community in the Third Reich 195-98 (1977) (Nazi Germany); L. Graham, The Soviet Academy of Sciences and the Communist Party, 1927-1932 (1967) (Soviet Union). Nor has the United States been immune from the temptation to interfere. See, e.g., Scopes v. State, 154 Tenn. 105, 289 S.W. 363 (1927) (state may forbid teaching of evolution); S. Gould, The Mismeasure of Man 30-72 (1981) (influence of racism and xenophobia on theories of intelligence).

5. See Ackerman, Foreword: Law in an Activist State, 92 Yale L.J. 1083 (1983).
open-air test of recombinant DNA must surely expect careful scrutiny before the experiment is permitted to proceed. The scrutiny may take the form of litigation, of affirmative legislation, of administrative regulation, or simply of public protest. Whatever the form, the scrutiny will lead inevitably to expense and delay — and may come in spite of the researcher's profoundly held conviction that the experiment is perfectly safe. The scrutiny may seem wasteful, it may seem inefficient, it may seem counter-productive, it may seem un-scientific — it may, in sum, seem to fit the definition of any one of the many terms we have developed to ridicule those not as clever as we are. But in the closing years of the twentieth century, this careful scrutiny is also something else: It is deeply American.

The debate never ends, and perhaps it never should. The current topic scarcely matters. The competitors are always the same. On one side are the scientists, well-educated, confident, curious about the natural world, anxious to test their hypotheses, impatient with those who would stop them. On the other side is the lay public, less educated, uncertain, frightened by what they view as unnatural experiments, distrustful of scientific hypotheses, determined to eliminate the sources of their concern. Somewhere in between, faced with demands from both sides, is the government — and government policy is ultimately the issue.

The debate sparking the instant symposium involves those public fears often collected under the term "biohazard" — particularly fears about the experimental release of recombinant DNA into the environment, but more generally, any experiments regarding what is often called The New Biology, the biology promising to reshape humankind rather than simply to cure its multifarious ills. The Foundation on Economic Trends case involved an effort by researchers at the University of California to release into the environment genetically altered bacteria intended to improve the frost tolerance of potato plants. Opposition was stirred only by the means, not by the end. The posture of the parties to the litigation illustrates the battle lines in the biohazard debate: The scientists want to test theories about the effect of their creations on the environment and the effect of the environment on their creations; their opponents are worried about precisely the same thing.

In debates of this kind, the scientists are typically labeled intolerant, their opponents typically dismissed as irrational. From the point

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6. Some scientists, of course, will join the lay public in its opposition, and the text should be read as including them among the opponents.
The Biohazard Debate

of view of the scientists, the matter is quite often a simple one: The scientists know what is going on, and members of the lay public do not. As a consequence, the scientists contend, their reasoned conclusions, not popular hysteria, ought to form the basis of policy. The public sees the matter in quite another way: An indifferent scientific community is eager to subject the public to risks that are ill-understood. Rather than permit this, the public insists, the political process should do its job of protecting citizens from harm. An enormous literature focuses on how best to design and implement policies that somehow lend comfort to both sides.7

My purpose in this essay is not to join that debate. Instead, I want to suggest why, unless scientific researchers shift their tactics, the Foundation on Economic Trends decision is likely to be just one of many successful efforts to restrain or regulate a scientific enterprise previously thought to be beyond the reach of the American political culture, a culture in which the fears of the public, whether rational or not, quite often form the basis for government decision. Scientific researchers seeking freedom to experiment might fight their absorption into this political culture, arguing that they know better than the lay public what the risks are. But unless the researchers can convince a court that some constitutional right is being violated or unless they can persuade political actors to ignore public pressure, the regulation will continue to expand. After explaining why these tactics are likely to fail, I will set out my alternative: That rather than seeking ways of circumventing public opposition to their work, researchers pursuing controversial experiments will best serve the long-run interests of the scientific endeavor and of the American democratic ideal by embarking on a campaign to win back the public trust that science once enjoyed.

II. Biohazard and The Bellman

The debate over biohazards resembles the debates that have arisen over hazards of many other kinds when experts and a concerned public have disagreed. When the name-calling is over, these

debates share a common theme: Should the experts play a special role, or should the uninformed public be permitted to rule? This theme is reminiscent of the view presented by Lewis Carroll in his satirical epic poem, *The Hunting of the Snark.* For the benefit of those unfortunates who have never read it, I should explain that the poem recounts the adventures of a ship with a most unusual crew (the name of each member, from the Beaver to the Boots to the Barrister, begins with the same letter) during the search for a creature known as the Snark. Most relevant to the instant debate is Carroll's description of one of the reasons the crew so admires its captain, the Bellman:

> He had bought a large map representing the sea,
> Without the least vestige of land:
> And the crew were much pleased when they found it to be
> A map they could all understand.
> "What's the good of Mercator's North Pole and Equators,
> Tropics, Zones, and Meridian Lines?"
> So the Bellman would cry: and the crew would reply
> "They are merely conventional signs!"
> "Other maps are such shapes, with their islands and capes!
> But we've got our brave Captain to thank"
> (So the crew would protest) "that he's bought us the best —
> A perfect and absolute blank!"

Carroll's story is obviously a lampoon, and the scientists would no doubt be quick to say that he is poking fun at the crew: They are know-nothings, who would rather have a simple answer than a right one. If the truth is too complex, then fiction will suffice. And perhaps the crew (and through them, the know-nothing mob) is indeed the object of Carroll's satire. Another point of view, however, is also plausible: He is poking fun at the readers.

After all, what is it that makes the excerpt so funny? It is, of course, that we all understand what the crew does not, that if the map does not use the "conventional signs" that the crew condemns, the ship will never get where it is going. Yes, construing the conventional signs might be difficult, but the difficulty is unavoidable if you want to get anywhere. And if you find reading the map too difficult, then find someone who knows how to read the map, tell her where you want to go, and let her figure out the best way to get there.

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9. *Id.* at 185-86.
The Biohazard Debate

So we understand that the crew is foolish. The members of the crew, however, may also understand that they may not get where they want to go without a more conventional map. Only our own prejudices translate their preferences into bad things. By laughing at the crew, we are insisting that they must want to get somewhere, and further, that they must follow the most expeditious path in getting there. No meandering, no stopping to admire the sunset or a daffodil, no frolicking for frolic’s sake. In laughing at them, in other words, our attitude is very much policy-analytic: Tell the experts what you want, and the experts will develop a plan for its achievement.

But what a presumption! Who are we to say to the crew members that they have no right to select their own end, or to choose to pursue no end at all, or to decide on an end and then decide to pursue it poorly, perhaps by selecting a seemingly irrational means for achieving it? So what if the crew’s map won’t take them any place but in a circle? Perhaps around and around in a circle is the only way they really wish to travel, or perhaps they want to travel in a circle and call it a straight line.\[10\] There is an enormous arrogance, indeed, an anti-democratic spirit, in laughing at the crew for its foolishness. More informed debate may be better than less informed debate, but the amount and nature of the information needed will vary according to the objectives of the discussion. If the crew must decide how most efficiently to reach a particular map point, then a debate without the aid of conventional signs is likely to be quite uninformed. But the crew may doubt—for moral reasons, say—that the map point in question should ever be reached. The crew might have other purposes as well: to decide what it would most enjoy doing, or to fool itself into believing that it knows what is going on. Unless the crew and the expert map-readers share a common objective, there is no basis for saying that the crew lacks adequate infor-

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10. This line of argument is inspired by Arthur Leff’s observations regarding efforts to use the tools of economics to analyze the efficiency with which institutions achieve their stated ends:

If one thoroughly accepts the idea that the results people actually achieve for themselves are the ones that, among the available alternatives, they wanted to achieve, then one trembles on the edge of a worrisome paradox. . . . One cannot say that though A achieved state X, he “really” wanted to achieve state Y (and certainly not that he ought to have wanted to achieve state Z), because the only test of the “rightness” of his choice, for him, given his circumstances, is what he did.

[N]othing can be considered inefficiently achieved until one discovers what the aim of the activity was.

mation. And if we insist that the crew has chosen the wrong objective, then perhaps we the readers are the real butts of Carroll’s joke.

From this perspective, the biohazard debate should look a bit different. If the issue is one of likely effects, the scientific experts surely have more information than do lay people. But this does not make the lay opponents wrong in their opposition, and it certainly does not render them Luddites or nihilists. “I’m just afraid, can’t say quite why” is not an argument that carries much force in expert debate, but it is far from clear why it should not carry substantial weight in the political arena. After all, whatever one’s view of the nature of American democracy, at least one of its functions is surely the enforcement of the popular will. Voters are not required to demonstrate policy expertise before they are permitted to vote.

In this sense, the scientists and their opponents may be talking past each other. The scientists argue as though the only issue is how the signs on the map should be interpreted; for the fearful public, however, there is the logically prior question of which map is the appropriate one to use — or whether using a map is even a good idea. The scientists, of course, put a good deal of faith in the ability of experts to construe the signs the public may find confusing or suspicious; the public may prefer to place its faith in a Bellman, in someone who will assure them that matters beyond their understanding need not be understood.

Thus the easy answer may be that the scientists have no case, that unless they are prepared for the rough and tumble of political argument, they ought not to qualify for special treatment. That easy answer, however, is a bit too quick. In the post-New Deal era, the public is not always given its free choice of maps. Even when a choice is made, the public does not always retain the option of overruling the expert map-readers. Since the Second World War, the political process (including, for this purpose, the judicial process) has chosen to take some issues aside and to try to place them more or less beyond the reach of partisan politics. To take but a single example, when the public decreed that the air and water must be cleaned, the Congress established an expert agency to figure out just how clean was clean enough — and how to determine when that

The Biohazard Debate

level of cleanliness had been reached. As the government has become more activist, more issues have been insulated from politics (at least in theory) and turned over to professionals for management. If an agency seems not to be doing its job, then the courts exist to enforce various procedural guarantees written into the enabling legislation. Everyone has a say and the decisions are (again in theory) based on the most complete information available. In short, the American constitutional democracy is not a dictatorship of the uninformed; accommodations can be made when expert opinion is thought to be important. Consequently, the demand by scientists that they not be subject to rules they consider ridiculous may not be as undemocratic as it seems.

But democratic or not, agency treatment may not be the answer. First, as I have argued elsewhere, such special treatment outside the easy reach of pluralist politics is not automatic; those who seek it must explain why what they do is so different from what others do. Second, administrative agencies are not necessarily as “independent” as their mandates imply. Every fresh election brings a new wave of policy reversals, and the expert agencies and their professional managers are as battered as anyone else by the political winds. Third, and most important, scientists who want the freedom to pursue their experiments without interference are not asking to be treated in the manner of air and water and working conditions, to be regulated by a quasi-independent expert agency subject to judicial review. They are asking instead to be left alone. They do not want to be regulated by experts; they prefer not to be regulated at all. They view their work as comparable to the decisions of the press on what to print and the decisions of private citizens on whether to marry and when to change jobs. They seek a restoration of the brief-lived scientific immunity mentioned in the introduction; they are asking, in short, that the practice of science be created a

13. The federal courts generally take a strongly deferential stance in reviewing scientific findings of Congress and of the expert agencies it has created to administer its regulatory schemes. See, e.g., Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519, 557-58 (1978) (courts may not impose procedural restrictions beyond those created by Congress); United Steelworkers v. Marshall, 647 F.2d 1189, 1259 (D.C. Cir. 1980) (conflicts in scientific evidence must be resolved in favor of the expert agency’s interpretation); Ethyl Corp. v. EPA, 541 F.2d 1, 36 (D.C. Cir. 1976), cert. denied, 426 U.S. 941 (1976) (court may not substitute its own scientific understanding for that of the expert agency).
15. For a somewhat depressing analysis of just how far from independence an agency can move, see B. Ackerman & W. Hassler, Clean Coal/Dirty Air (1981).
fundamental right. Thus redefined, the debate becomes more complex.

What scientists want, really, is to be left free to experiment, guided only by the demands of science and of their own consciences, restricted in their freedom for only the most pressing reasons of public safety. If they succeed in this push, they will have marked themselves as special and their endeavor as quite different from other tasks undertaken in a society in which nearly everyone is regulated. In the post-war era, those seeking to be marked as special in this way, to be left free of burdensome restrictions, have usually chosen one of three approaches. The most obvious strategy is one of lobbying, of pushing for legislative or perhaps administrative protection (or exemption) for the chosen activity. With a Washington bureaucracy involved so heavily in so many areas of life, this is a perfectly sensible and generally cost-effective strategy. It may not work, however, and when lobbying fails, two additional strategies are available to those seeking to mark their work as special: First, they may follow the advice of lawyers and litigate until a court decrees that the Constitution gives them the right to do what they want to do. Second, they may try to attract sufficient resources to obtain the freedom to continue their experiments through private agreements, and, if unable to do so, return to the legislature, this time pressing a claim for relief from a market failure. Other strategies are rarely tried, because if the legislative struggle results in defeat, and if neither the Constitution (as read by the courts) nor the market (as reflected in ability to attract resources) considers the activity special, then in a regulated society, perhaps it isn't.

The debate over scientific freedom does not arise unless the legislative battle is lost and scientists are threatened with unwanted regulation — regulation which either chooses a different map or construes the agreed map differently than scientific researchers would prefer. Thus, I will focus initially on these last two strategies, to try to determine the likelihood that scientists can succeed either in litigating for a fundamental right or buying out those in a position to halt or restrict their research. Subsequently, I will attempt to sketch the ways in which scientists seeking the freedom to experiment might instead pursue a more traditional but nowadays less popular strategy for gaining what they want. In none of this should

The Biohazard Debate

I be understood as urging that legislatures should reject the claims of researchers to autonomy; I mean only to evaluate the meaning of this rejection and to recommend courses the scientific community might consider in overcoming its likely defeat.

III. Two Strategies for Imposing the Map

A. The Allure of Constitutionalism

Plainly, legislative or administrative bodies will sometimes differ with scientists on the proper map to choose and will consequently adopt regulations limiting experimentation in some fashion or other. The literature on scientific policy-making has prepared for this eventuality with a common prescription: Scientists and their allies, when they lose in the political processes, should do what everyone else who loses in the political process seeks to do. They should cloak themselves and their activities in a claim of "right" tailored from constitutional cloth. Put simply, they should go to court.

As our constitutional democracy has matured, the courts have been the weapon of choice for many who want to impose their own putatively rational map in place of the presumptively blank map chosen by the mob. With the courts well-established in the business of "discovering" fundamental rights in various constitutional provisions, the probability of success must seem sufficiently high to make litigation an attractive option. So when the political process makes a bad decision — and almost every decision is bad by someone's standards — the remedy is quite frequently a lawsuit claiming that some constitutional right has been violated.

In this tradition, sympathetic legal scholars have come to the aid of the scientific community. Concerned by the contention in the scientific community that public fears will lead ultimately to suppression of research, these scholars have gone to considerable length to explain why some part of the Constitution — usually the First Amendment — extends protection to something that is called the "right to inquire" or the "right to experiment." Although the precise formulation of this right varies somewhat from one writer to the next, this exposition is characteristic:


[T]he first amendment does in fact protect the gathering of information, but . . . the information-gathering process may permissibly be regulated when such regulation is necessary to further an important state interest. . . .

. . . 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.19

Now, in the first place, this claim is not quite to the point. Rarely will the government seek to impose a restriction "based on the nature of the theory." Few would defend a government regulation stating "There shall be no research regarding Theory X because we hate Theory X."20 The regulation will always result from a perception of risk, and will be aimed at the experiments, not the theory. The only relevant right that scientific researchers would need or want is the right to pursue their experiments — their knowledge-gathering — without regard to any irrational or uninformed perceptions of risk, and perhaps without regard to any concerns over the morality of the research or knowledge to be gained. It is this form of the right which the literature has generally sought to defend. Thus for the purpose of this discussion, it is sensible to treat as one the right to inquire and the right to experiment, even though as a semantical proposition they are arguably distinct.21 Although the conclusion that the right "exists" has been reached via several different routes, most of them seem to flow from a central theory. The argument generally runs something like this:

(1) Scientific speech (as opposed to scientific experiment) is entitled to a heavy degree of First Amendment protection.

(2) If a form of speech is protected, then that which is a necessary prerequisite to it is protected.

(3) Scientific experiment is a necessary prerequisite to scientific speech, since without the testing of hypotheses, a scientist is engaging in no more than semi-informed speculation, which is not the same as scientific speech. In other words, without scientific experiment, scientific speech is not possible.


20. Perhaps the only exception involves religiously motivated hostility to the theory of evolution as a theory, but the Establishment Clause has proved quite adequate to support challenges to anti-evolution statutes, without the need to resort to a more complex argument on the right to do science. See, e.g., Epperson v. Arkansas, 393 U.S. 97 (1968); McLean v. Arkansas Bd. of Educ., 529 F. Supp. 1255 (E.D. Ark. 1982).

21. Were a logical distinction to be drawn, one might propose that the right to inquire would include the seeking of knowledge by means not involving interaction with the physical world, whereas the right to experiment would include those interactions. I emphasize that despite disclaimers, the literature clearly seeks to defend the second.
The Biohazard Debate

(4) Therefore, scientific experiment is protected.22 Some forms of the argument substitute other premises for those presented here, but in each case, the argument reduces to something similar to that set out above.23 Taking for the moment a legal-theoretic approach — conceding, in other words, that the Constitution is at least an appropriate battleground — I will consider each premise in its turn.

1. The First Premise

The initial premise, that scientific speech is entitled to a heavy degree of First Amendment protection, is usually supported either by historical exposition or through an appeal to the fundamental purposes of the Amendment. The preeminent work of historical exposition is probably the careful study of the views of the Framers presented by Steven Goldberg in support of his thesis that "the Constitution contains an implied science clause," to wit, "Congress may legislate the establishment of science, but shall not prohibit the free exercise of scientific speech."24 Professor Goldberg asserts that the history reveals an "intimate relation between science and civil liberty" in the minds of American political theorists of the late eighteenth century.25 Other writers move from the history to the assertion that freedom of scientific speech supports "individual self-fulfillment" and "attainment of truth"26 — goals that some would place near the heart of the First Amendment's purposes.27

These theoretical arguments may be met in the first place with the response that not everyone takes so expansive a view on the nature

22. See, e.g., Ferguson, supra note 18, at 644-54. None of the academic writers claims that this freedom is absolute or, in particular, that it can withstand compelling concerns over public safety.

23. Robertson, for example, considers basing a right to research on rights of privacy and association before settling on the First Amendment's protections of speech. Robertson, supra note 18, at 1212-15. Delgado and Millen spend several pages discussing ways of knowing and setting forth the constitutional protections for each, but their analysis still reduces to the proposition that inquiry, if protected at all, must be protected because of what it adds to the ability to engage in other protected activity. Delgado & Millen, supra note 18, at 372-88.


25. Id. at 6-7. See also Delgado & Millen, supra note 18, at 354-61. One of the problems for the historical argument, even assuming its formal validity, is that outside of the Patent Clause (and perhaps the Establishment Clause), there is little if anything in the Constitution or in the debates over its ratification to suggest that scientific freedom was a significant concern. Thus both Goldberg and Delgado and Millen rely heavily on the private views of the Framers and the published views of various non-American political philosophers.


of the First Amendment’s protections. The leading exponent of what might be called the “narrow scope” school is Robert Bork, who has expressed the following view:

I agree that there is an analogy between criticism of official behavior and the publication of a novel like *Ulysses*, for the latter may form attitudes that ultimately affect politics. But it is an analogy, not an identity. Other human activities and experiences also form personality, teach and create attitudes just as much as does the novel, but no one would on that account, I take it, suggest that the first amendment strikes down regulations of economic activity, control of entry into a trade, laws about sexual behavior, marriage, and the like. Yet these activities, in their capacity to create attitudes that ultimately impinge upon the political process, are more like literature and science than literature and science are like political speech. If the dialectical progression is not to become an analogical stampede, the protection of the first amendment must be cut off when it reaches the outer limits of political speech.\(^28\)

The existence of a contrary opinion — especially one which, like this one, states a decidedly minority position — hardly makes the proponents of the right to inquiry wrong. But it is not easy to see how logic alone will dictate the choice among competing formulations of First Amendment right. One may earnestly believe that the First Amendment protects whatever is necessary for individual self-fulfillment or attainment of truth, but the belief does not make it so, and the Supreme Court has avoided adopting so broad a definition. On the other hand, while one may claim that any attempt to extend First Amendment protection beyond political speech invites slippery slope problems, the difficulty of drawing lines only illuminates the practical problems of implementing a proposal. That difficulty does not necessarily show the proposal to be unwise, and hardly shows it to be wrong. The great majority of First Amendment scholars would protect much more than the political speech that some see as the Amendment’s core.\(^29\) The courts, moreover, have certainly pressed the limits of First Amendment protection well beyond Judge Bork’s relatively narrow conception of free speech.\(^30\)

Because proponents of free scientific inquiry frame their essentially normative proposals as though already supported in positive law, it is useful to look at the cases. But a problem arises immedi-


The Biohazard Debate

ately: There are no decisions holding that scientific speech is covered by the First Amendment. Some have so suggested in dicta, but no court has ever been explicit. The strongest support might come from those cases involving statutes restricting the teaching of evolution, but the courts have always been careful to decide them on the alternative ground of improper religious motivation. In fact, in *United States v. Progressive, Inc.*, the one case in which the question was squarely presented, the trial court approved a prior restraint on publication of scientific information. The significance of the decision lies in the fact that in virtually every other case involving a prior restraint on a protected form of expression, the restraint was ultimately struck down. The entire flavor of the trial court's opinion in the *Progressive* case evinces a concern that scientific information (at least some scientific information) may be qualitatively different from information of other types because of the greater danger it potentially poses. Certainly the reasoning of the court's opinion may be challenged, and the decision does not explicitly refute the contention that scientific speech enjoys full First Amendment protection, but the decision surely does raise questions for the advocates of that view.

Advocates of freedom for scientific speech should remember that the courts have identified many forms of communication which are not entitled to the full protections of the First Amendment. Thus obscenity, commercial speech, and libel, to take but a handfull of examples, are all speech in some sense but are not — so the courts

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32. For example, both Epperson v. Arkansas, 393 U.S. 97 (1968), and McLean v. Arkansas Bd. of Educ., 529 F. Supp. 1255 (E.D. Ark. 1982), were decided on the ground that the law in question violated the Establishment Clause.


34. Direct comparison is probably unfair, because the *Progressive* case was dismissed as moot before final appeal of the injunction was possible. It is conceivable — indeed, it seems fairly probable — that the government would have lost in the Court of Appeals or the Supreme Court. But speculation of this kind is less impressive than is the fact that a federal district judge, faced with the wealth of precedent disdaining prior restraints (see, e.g., New York Times Co. v. United States, 403 U.S. 713 (1971) (per curiam); Near v. Minnesota, 283 U.S. 697 (1931)), was nevertheless convinced that on the facts before him, he was justified in restraining publication of an article purporting to explain how a hydrogen bomb might be constructed.

35. For example, the court's first opinion stated: "[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." 467 F. Supp. at 994. Earlier prior restraint cases did not seek to analyze the relative contribution of the information in question to public debate, and indeed, substantive analysis of content flies in the face of traditional First Amendment review.
say — speech of the kind that the First Amendment most centrally protects. And as long as a thing can be speech and yet not be the subject of full First Amendment protection, it falls to the advocate to explain why speech of the sort under discussion is possessed of those qualities the First Amendment most values — or is not possessed of those qualities it disdains. "Treat science like obscenity" may yet become the rallying cry of those who seek to limit the freedom to experiment, and the defenders of unfettered research must be prepared with counter-arguments.

This should not be taken as an anti-free-speech polemic. It is intended to show that even the first premise is not without controversy, that waving the twin banners of "speech" and "First Amendment" is not enough to resolve even this preliminary matter. Perhaps those who propose a freedom to exchange scientific information would do better to follow Steven Goldberg's argument and look at the understanding of the Framers. True, there are some problems with his analysis; in particular, the fact that many of the Framers considered scientific thought important does not mean that any protection for it was written into the Constitution. Further, and perhaps more important, a growing number of modern constitutional theorists challenge the interpretive approach giving dispositive weight to the views of the Framers — even assuming that those views can be ascertained, which, consensus holds, they quite often cannot. But there is a sense in which this scholarly consensus scarcely matters. Even if scholars reject too great a reliance on the Constitution's legislative history, the courts continue to wallow in the murky waters of the Framers' intentions. And after all, when one writes an essay contending that the First Amendment "does" protect scientific speech, it is the courts one is trying to convince.

It may be that proponents of freedom of scientific speech would do best to abandon a claim that scientific speech is a special category and to argue instead that the general speech of all sorts that is pro-

37. This slogan is a jocular suggestion of my colleague Owen Fiss.
38. Although few scholars are likely to agree with every point made therein, perhaps the most articulate summary of the weaknesses in the "original intention" approach is Brest, The Misconceived Quest for the Original Understanding, 60 B.U. L. REV. 204 (1980).
39. I myself doubt whether the relatively indeterminate constitutional language protecting individual rights — the language, for example, of the First Amendment — can fairly be said to possess any "inherent" meaning. See Carter, Constitutional Adjudication and the Indeterminate Text: A Preliminary Defense of an Imperfect Muddle, 94 YALE L.J. 821 (1985).
The Biohazard Debate

tected by the First Amendment does not lose that protection merely because it happens to include some scientific data or argument. The proponents of the right would thus face the potentially insurmountable obstacle which they have sought to avoid: The traditional First Amendment distinction between speech and conduct.\(^4\) The entire point of the advocates of a special right to do science is to protect more than the flow of data. So this softer form of the right, while probably easier to defend, is not one that could possibly satisfy many of those who contend that the Constitution should be read to protect a right to inquire.

2. The Second Premise

A teacher of mine once asserted that every constitutional argument in part involves a leap of faith, and the argument for protection of scientific inquiry only confirms his insight. The leap here is in the premise that when a form of speech is protected, then that which is its necessary prerequisite is also protected. One of the judges on the District of Columbia Circuit is fond of inquiring innocently at oral argument: “What is your single best case for that proposition, Counselor?” Were the proponents of the constitutional right to experiment pressed to answer that question with respect to this second premise, they would likely hem and haw and finally mention \textit{Houchins v. KQED}\(^4\) and its close relatives,\(^4\) or \textit{Buckley v. Valeo}.\(^4\)

The purpose of the citation to \textit{Houchins} would be to show that there exists a “newsgathering privilege” by necessary implication from the First Amendment’s protection for freedom of the press.\(^4\) That is hardly a novel proposition and is possibly an appealing one.\(^4\) The only problem is that \textit{Houchins} was decided the other way — against the claims of the press — and the references there and in other cases to a possible privilege to gather news exist only as dicta. As a consequence, even if one believes that the Supreme Court is

\(^{40}\) See, e.g., United States v. O’Brien, 391 U.S. 367 (1968) (burning a draft card is conduct, not speech); Tinker v. Des Moines School District, 393 U.S. 503 (1969) (wearing an armband in school is speech, not conduct).

\(^{41}\) 438 U.S. 1 (1978). \textit{Houchins} rejected the claim of special journalistic right of access different from the access of the general public, but suggested that there might exist a special right to gather news. See id. at 14-15.

\(^{42}\) Among the cases containing relevant dicta are Branzburg v. Hayes, 408 U.S. 665 (1972), and Pell v. Procunier, 417 U.S. 817 (1974). Both cases were decided on independent grounds.

\(^{43}\) 424 U.S. 1 (1976) (per curiam).

\(^{44}\) See, e.g., Ferguson, \textit{supra} note 18, at 652-53; Robertson, \textit{supra} note 18, at 1226-40.

\(^{45}\) For early efforts at formalizing this privilege, see, e.g., Note, \textit{The Rights of the Public and the Press to Gather Information}, 87 \textit{HARV. L. REV.} 1505 (1974); Note, \textit{The Right of the Press to Gather Information}, 71 \textit{COLUM. L. REV.} 838 (1971).
inclined to grant such a privilege, there is no way to tell in advance anything about its scope or its depth.

Yet matters of definition are important: It is necessary to know to what the scientific freedom analogy is drawn. Certainly not everything a reporter might do as a prerequisite to protected speech is protected. For example, the First Amendment undoubtedly protects the right of a newspaper to publish the minutes of a secret White House meeting at which sabotage of political opponents is discussed. But would the Amendment save from prosecution a reporter who was arrested breaking into the Oval Office to look for those minutes? Quite clearly it would not.

More to the point, anyone can define a form of speech, argue for its full protection, and then set forth its prerequisites. That does not mean the prerequisites are protected. To take just one more example, I might define something called “The Right to Shout Political Slogans.” I could point to many situations in which this right has been protected, including any number of protest demonstrations and political rallies. Having thereby established that the Right to Shout Political Slogans is entitled to constitutional protection, I would then contend that one cannot really Shout Political Slogans without the aid of amplifying equipment. (Here someone might argue that I could use my own unaided lung power, but that is a typical lay person’s error. All professional Shouters understand that real Shouting of Political Slogans is done with amplifying equipment — otherwise it is mere shouting.) The conclusion to be drawn, naturally, is that the Right to Shout Political Slogans includes the right to use amplifying equipment, and that as a consequence, the First Amendment protects my right to use it. The only trouble is that this claim has already been rejected by the Supreme Court: There may be a Right to Shout Political Slogans, but there is no fundamental right to use amplifying equipment.46

In other words, it is not altogether a sensible argument that newsgathering is protected merely because news reporting is. I do not mean to suggest, however, that the press enjoys no rights different from those of the public at large. Yet such special and distinctive rights as the press may possess surely flow from whatever qualities the free press clause adds to the free speech clause.47

46. See Kovacs v. Cooper, 336 U.S. 77 (1949). Advocates of the right to experiment might simply reply that Kovacs was wrongly decided, but surely an analyst claiming to set forth what the law “is” cannot be permitted so easy an out.

The Biohazard Debate

right to do some things in furtherance of the gathering of news is not a right to do all things in furtherance of the gathering of news.

The same principle applies a fortiori to the conduct of scientific experiments, which is not even supported by any special constitutional clause of its own. If the newsgathering right is so tenuous, and definition of a form of protected speech and its underlying necessity so easy, those calling for a right to do scientific experiments must offer more than the syllogistic argument they advance in support of their claim that necessary prerequisites to constitutional speech are also protected.

Buckley v. Valeo also stands for an altogether different proposition than the one the second premise asserts. There the Court (among other things) struck down on First Amendment grounds a congressional restriction on the amount an individual could spend, independent of direct contributions, in behalf of a "clearly identified" candidate for public office. As described by advocates of a constitutional right to inquire, Buckley rested on the premise that the spending of money was a prerequisite to political speech. The Justices certainly used that language, but calling the phrase an important premise does not seem to be the most sensible reading of the Court's opinion. The main point cannot be that expenditure of money is absolutely protected when it leads to protected speech, or all contribution limits would be unconstitutional. The distinction must be between Anna giving a dollar to Bob for Bob to purchase advertising and Anna purchasing the advertising herself. When Anna herself purchases the time, she is exercising creative control of some sort; in other words, she herself is speaking. When Anna speaks, she has the right to decide the form her expression will take, and the expenditure of money is thus a part of, rather than a prerequisite to, her speech. But when Anna instead contributes money to Bob, he will make the ultimate choice about how it is spent. Anna herself is making no choice about the form of her expression; she is not expressing herself at all, and thus is not speaking.

If this is the proper distinction — and I confess that explaining Buckley is not an easy task — then Judge J. Skelly Wright, who later wrote an article on the decision, correctly understood it when he argued that the Justices were holding that the expenditure of money is itself speech. This rule may be a good one or a bad one — I

49. See Ferguson, supra note 18, at 652.
50. 424 U.S. at 19.
51. Most of the limits in question were sustained. See id. at 23-38.
have argued elsewhere that it is a bad one\textsuperscript{53} — but it is at bottom the only explanation that makes sense. Viewed from this perspective, Buckley has nothing to do with protecting what is required in order to engage in some constitutionally protected activity. Its rule instead covers an activity — the purchase of advertising for independent support of a candidate — that is itself protected. The expenditure is not protected because it will lead to speech; it is protected because, in the judgment of the Court, the expenditure is speech.

Thus to rely on Buckley — even granting the proposition that the case is rightly decided — the supporter of free scientific inquiry is forced to make by far the more difficult argument, that scientific research is speech. This contention would naturally run up against the speech/conduct distinction I have mentioned before; it is in any event a position that seems counter-intuitive, and, perhaps as a consequence, is difficult to support.

My purpose here is not to assert that no prerequisites to protected speech can themselves be entitled to constitutional protection; rather, I am arguing that an independent rationale for protection must be offered. The simple existence of a connection between a protected activity and a second one the status of which is unclear is not enough to show that the second is also protected.

3. The Third Premise

The argument for constitutional protection for scientific inquiry proceeds from its scientific speech premise to the assertion that scientific inquiry is a "prerequisite" to scientific speech. Although it is tempting to accept this contention as relatively non-controversial, this may not be so easy. In the first place, it is wrong to assume that there is one set of procedures (hypothesis-experiment-observation-hypothesis) that is "the" scientific method and that therefore embodies science. This is not the place to consider in detail competing philosophies of science.\textsuperscript{54} Suffice it to say that one may observe and speculate on the nature of the physical universe without also performing experiments to determine whether one's views are correct. "But wait," the alert reader might say, "you are describing not science, but mere guesswork." If the alert reader is correct, then most of today's cosmologists and many of yesterday's physicists and bi-

\textsuperscript{53} See Carter, Technology and Democracy, supra note 11, at 590, 605.

\textsuperscript{54} In a forthcoming work, I do consider whether these competing philosophies might carry differing implications for constitutional adjudication. See Carter, Some Constitutional Implications of Scientific Irrationality 42-45 (unpublished work-in-progress) [hereinafter cited as Carter, Constitutional Implications].
The Biohazard Debate

ologists cannot properly be called scientists. If that seems an acceptable result, one ought also to consider that if humanity survives the next few centuries, the scientists of that future era will no doubt look back on our puny efforts and scoff, "That was not really science that they were doing, because they lacked our modern methods for experiment" — and in another five or six hundred years, their inheritors will look back and say much the same thing.

This point is not as picky as it may seem. What qualifies as science and what constitutes a scientific experiment are often in the eye of the beholder, and condemning a self-proclaimed scientist for not doing what others define as "science" is in the end a hopeless effort.55 Thus to say that scientific experiment is a prerequisite to scientific speech is to say little or nothing unless the expositor and the auditor of the argument can first agree on what they are talking about. If the expositor says that this is the way things are because most scientists agree that this is the way things are, and also reserves the right to define which people are "scientists" and thus entitled to a vote, then the argument is growing circular, and further pursuit of the issue is probably pointless.

4. The Status of the Right

This argument has been an effort to meet the theorists on their own ground, to explain why the existence of a right of scientific inquiry is not so clear as the literature sometimes makes it appear. This does not mean that judicial creation of a right of this sort would be a bad thing; on the contrary, a properly delimited right to scientific inquiry, for all the normative reasons advanced by its proponents, might well prove a boon to our development as a just and healthy society.

But the right to inquire freely should be approached as cautiously as any other proposal to place some decisions affecting large numbers of people beyond the reach of traditional political processes. In this sense, the proposition that scientists should be left alone is what I have described elsewhere as a "Separatist" idea, because the scientists and their allies are trying to make an end-run around public opinion, which is often cheaper than trying to change people's minds.56 Over the years, a good number of these end-runs, espe-

55. For a discussion of some of the intricacies in attempting definitions of this kind, see J. Ziman, Public Knowledge: An Essay Concerning the Social Dimension of Science 1-29 (1968).

cially many of those proclaiming constitutional rights, have made positive contributions to the society. Not all of them, however, can be said to do so.

The federal courts, it has often been emphasized, play an educational role. In their continuing dialogue with the public, the courts force the nation to face the decisions that it has made, sometimes through action, sometimes through inaction.\(^{57}\) This most recent decision of yours, the courts may say, is contrary to the moral precepts embodied in the Constitution by which you have chosen to claim that you run your society. So make your choice: Change your decision or eliminate the precept.\(^{58}\) But don't continue your pretense. Even the Court’s most controversial decisions, such cases as *Lochner v. New York*\(^{59}\) and *Roe v. Wade,*\(^{60}\) may be said to serve a function of this kind.

The difficulty with the proposed right to scientific inquiry (as with so many other contemporary claims of right) is that it is not easily twisted to fit this framework. For most Americans, science is something beyond understanding and often quite intimidating — occasionally even frightening. Assume for the moment that the federal courts ultimately hold that the Constitution indeed protects some right to inquire. This right may not fit well with the notion that courts perform an educational function. The public would likely resist the suggestion that there exist moral precepts, long accepted by the society, that have to do with freedom to inquire. Should a court nevertheless insist on a fundamental right to perform scientific experiments, those who heap abuse on the courts for losing touch with the country will heap more abuse.

There are those who will respond, “So what? When the courts do justice, somebody is always upset.” But that objection, while true, is also not quite to the point: The fact that someone is upset is no proof that justice has been done. What matters is not whether the losers are upset, but what the winners choose to do about it. It seems a bit tacky, not to say reactionary, to assert in these enlightened times that not all things that are good must be enshrined in the Constitution. But a judicial decision announcing a new right is less a victory in a war than a triumph in a single battle. What happens


\(^{58}\) For those who find the text a bit obscure, let me say that by “eliminate the precept” I mean only “amend the Constitution.”

\(^{59}\) 198 U.S. 45 (1905).

\(^{60}\) 410 U.S. 113 (1973).
The Biohazard Debate

later also matters. If the winners — here, the supporters of the right to inquiry — dismiss the losers as so many disgruntled and uneducated fanatics, then they will in effect be saying, “We have the votes on the Court, so leave us alone.” If that is the best justification that the winners can offer the public, then in the long run, there is an excellent chance that the hard-won victory will be overturned in the first of many defeats. A successful end-run around public opposition should be only the start, not the end, of the campaign, and this principle applies whether the issue is desegregation, the death penalty, or scientific inquiry. This point I will consider in somewhat greater detail after a brief detour along another course that scientific researchers might elect if the judicial strategy, like the legislative one, proves a failure.

B. The Potential Failure of the Market

Despite their defeat in constitutional argument, supporters of unfettered scientific inquiry might have another approach to recommend: Structure any regulations in the form of entitlements running in favor of identifiable individuals or institutions. Then, if the scientific research is in fact socially useful, the scientists might buy their way to freedom to experiment by purchasing whatever contrary entitlements the legislature might create. This strategy could not circumvent an outright ban on the research. If, however, the restriction were in the form of an entitlement of someone to be free of the research, or if the opposition could be bribed to end its pressure prior to any legislative action, then a series of private transactions might permit the work to go forward. In other words, following Coase, the result of any regulation ought to depend on the cost of transacting around it.61 If left to bargain among themselves, the parties should reach an efficient result; if the law imposes a different rule, they will try to work around it. Thus in the case of objectionable research, as long as the transaction costs are low, any rule short of outright ban ought not to matter.62

For example, the entitlement not to have research performed (or

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61. See Coase, The Problem of Social Cost, 3 J. Law & Econ. 1 (1960). This proposition, sometimes called the Coase Theorem, is richer than my inadequate textual statement implies. It may be worth noting, however, that the Coase Theorem does make certain empirical assumptions about human behavior — assumptions that may test out only because of popular inculcation with a market ideology. See Kelman, Spitzer and Hoffman on Coase: A Brief Rejoinder, 53 S. Cal. L. Rev. 1215, 1215 (1980); Kelman, Consumption Theory, Production Theory, and Ideology in the Coase Theorem, 52 S. Cal. L. Rev. 669, 678 (1979).

62. A ban could not practically be circumvented because there would be no entitlements to purchase. In Coasean terms, an entitlement is a freely alienable privilege to do something or to remain free of it. The privilege is initially assigned to an individual or
to have it performed only in a particular way) might be protected by a property rule running in favor of a museum fearing that its business will be affected by the research program that a neighboring university plans to undertake. If transaction costs are low, then the university can pay its neighbor, which perceives itself as being at risk, to waive its rights. The calculus would be trivial: If proceeding with the research is worth $50,000 to the university, then a risk-neutral museum with one chance in 100 of suffering $100,000 worth of harm, would get something between $10,000 and $50,000 to shut up and go away. If the university researchers could not afford the purchase price, that might say something about the social utility of their work, at least if one believes, as neoclassical economists do, that resources will generally find their way into the hands of those able to give them their most socially useful application. If the researchers could afford the $10,000 to $50,000, then the experiment would be able to proceed.

That would be fun if it worked, but it probably would not work anywhere except on paper. In the first place, the example may be

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63. One may imagine instead that the museum is protected by a liability rule requiring the university to pay any damages. If the museum is perfectly risk neutral, it would not then care whether the research took place. The museum is not likely to be risk neutral, however, and in any event might choose to disbelieve official assurances that it would be compensated for all damages, especially if the damages it expects in the event of accident would be catastrophic. Cf. Duke Power Co. v. Carolina Environmental Study Group, Inc., 438 U.S. 59 (1979) (sustaining constitutionality of Price-Anderson Act, which limits nuclear power industry's liability in the event of a nuclear accident).

One student of these problems has argued that private negligence actions should play a much larger role than they currently do in the regulation of scientific research. See Furrow, Governing Science: Public Risks and Private Remedies, 131 U. Pa. L. Rev. 1403, 1403 (1983). For a statement of quite the opposite view, see Murray, Law and Research Supported by Government, in Law and the Social Role of Science 16, 24 (H. Jones ed. 1966) (government should indemnify government-sponsored scientific researchers "against the risk of liability for catastrophic accidents").

64. This analysis is not quite accurate when basic scientific research is viewed as producing a public good — knowledge — which once made available may be appropriated by the next user at a marginal cost close to zero. See D. Greenberg, The Politics of Pure Science 26-27 (1967) (contrasting costs and benefits of basic and applied science). In Foundation on Economic Trends v. Heckler, however, as is the case with much controversial research, the research was applied, not basic — the question was whether the recombinant DNA bacteria could make potato plants more frost-tolerant — and thus might have attracted private investment. See 587 F. Supp. at 755-56. The private investment would of course be attracted only because the government has already intervened through the creation of a patent system.

65. Bear in mind that in the example I am assuming a legislature which, under public pressure, has declined to impose an efficient solution, and am further assuming that because of the legislative intervention, judicial selection of an efficient rule is impossible unless the rule can be dressed as a constitutional right. I will momentarily consider whether the legislature ought after all to impose an efficient solution.
The Biohazard Debate

unreasonable in its assumption that some of the usual causes of high transaction costs are not present — that the scientific researchers can join together at low cost for the bargaining, and that the same is true of those who might object. Even if the relevant parties can indeed join together at low cost to bargain, there is a second, more important problem likely to lead to market failure: The public's uncertainty, its mistrust of scientists, and its fear of the experiments may be so great that the public's "asking price" for the waiver would be astronomical. The museum might in all sincerity demand $1 million, and no amount of argument by the scientists might convince the museum of its analytical error. The museum might demand that its property be purchased entirely and that the scientists resettle its collection elsewhere. It might demand that the experiments be performed on a remote desert island, and that the museum still be compensated in advance for its risk.

If the museum's directors had access to (and were prepared to believe) all relevant information, their decision on rational self-interest might of course be quite different. But much of the relevant information is inaccessible because it is too technical; in this sense, the information cost is too high. The scientists might be able to explain it, except that the museum's directors may prefer what seems to them a less costly alternative, such as trusting the explanations they glean from the pages of popular magazines. They may prefer to trust their own instincts and fears, whether rational or not. They may prefer to trust ill-informed politicians or journalists. They may prefer to trust dissenters from the scientific consensus.

Lack of trust may not be the only cause of high information costs. In many situations, particularly those raising the biohazard fears, not all the information needed to make reasonably accurate predictions is available even to scientists, so the risks may not be fully quantifiable. If everything were known, experimentation would be unnecessary. Perhaps more to the point, the public may assess risks and (particularly) benefits differently than the scientific community

66. For reasons that are obscure, some critics have wrongly accused Professor Coase of ignoring the problem of transaction costs. Not only did he not ignore the problem in his original article (indeed, they were the point of the original article), but he has recently emphasized that the time has passed when scholarly debate should concentrate on examples in which transaction costs are relatively low. Coase, The Coase Theorem and the Empty Core: A Comment, 24 J. Law & Econ. 183 (1981).

67. I am assuming that the counter-demand is based on the museum's actual, if perhaps erroneous, cost-benefit determination, and is not strategic in nature.

would. Most controversial experiments or processes will involve some degree of risk, albeit a minuscule one. The public may not perceive as benefits the results the scientists predict. So while the public’s fears may often be disproportionate to the likelihood of harm, it can rarely be said that they are wholly irrational. To take a single ubiquitous example, while it is true that the disaster at Three Mile Island never presented a danger of nuclear explosion (a commonly mentioned public fear about nuclear power), the containment did come close to a conventional explosion that would have scattered radioactive material over a considerable distance, and the core temperature was nearly high enough to cause meltdown. Like other aspects of the accident, these problems apparently were not assigned a very high probability when the experts modeled the risks of nuclear power generation. Although generalizing from a single example is hardly fair, it does seem safe to say that not even the scientists who want to perform the experiments will always fully appreciate the risks.

This example points up an additional problem: Many of the experiments to which the public most objects are on or near the frontiers of knowledge and thus, implicitly, the frontiers of ethics and morality. The moral judgment of the public may differ drastically from the scientific credo that there is no bad knowledge, only bad use of knowledge. The President’s Commission may conclude that it is far too soon to begin considering questions regarding transferring genetic material between animals and humans, but science twists along funny paths (an argument scientists generally use against regulation) and the technology may arrive tomorrow. Public fears are generated by concern over what could happen — and science is unable as a formal matter to assign a zero probability to any event. Nor would it be sensible to do so with respect to the public’s greatest fears: If every aspect of the recombinant DNA organism that a researcher wishes to release into the atmosphere were understood, there would be no need for the experiment. In the public’s view, the fact that the experiment is thought necessary may itself become cause for alarm.

69. See 1 STAFF REPORT TO THE PRESIDENT’S COMMISSION ON THE ACCIDENT AT THREE MILE ISLAND 61-78 (1979).
70. See N.Y. Times, Nov. 8, 1984, at A13, col. 1.
71. See Yellin, High Technology, supra note 7, at 516-28, 528 n. 235 (suggesting that TMI accident casts doubts on all weights assigned in NRC’s risk assessment model).
72. See PRESIDENT’S COMMISSION FOR THE STUDY OF ETHICAL PROBLEMS IN MEDICINE AND BIOMEDICAL AND BEHAVIORAL RESEARCH, SPICING LIFE 79-83 (1982).
The Biohazard Debate

These twin problems of inaccessible and unknown information would likely combine to cause a market failure so severe that effective private bargaining would not be possible. When high costs prevent bargaining, reform may take one of two courses: Altering the substantive rule or altering those conditions of the parties themselves which lead to the market failure. Altering the substantive rule might involve imposition of an efficient solution (the solution the parties would reach if transactions were costless) or it may involve substituting a rule that can be altered by the parties at lower cost. If the problem is a lack of adequate information, altering the conditions of the parties would mean working to make additional information available to the party at an informational disadvantage.

Discussion of the second approach, the spreading of information, I will postpone for the moment. Thus far I have assumed that the legislature is unwilling to grant the researchers any relief. But there is also a normative argument available to show why, even if persuaded that the would-be experimenters have their facts right and the objectors have their facts wrong, the government ought to hesitate before imposing a solution approved by the experts and allowing controversial research to go forward in the face of public protest. Ignoring the public outcry on the ground that superior expertise points the other way is likely, in the long run, to damage the very scientific enterprise that researchers seek to protect.

This point is best pursued by first considering a somewhat different question: Does the University v. Museum example seem unreasonable? Even without empirical testing, it should not: Popular perception of risk, even among those who are well-educated, is remarkably out of line with expert risk assessment. Consider this question: “On average, by how many years would your life be shortened if all electrical power in the United States were generated by nuclear power plants?” Based on currently available information, an actuary would conclude that the alteration is infinitesimal — the difference would be something between one half-hour (best case) and two days (worst case) over a lifetime. But it seems a safe bet that lay people and even many experts would offer answers that fall all over the map — or rather, the number line. Even when experts

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75. Admittedly, efforts to compare the hazards of different risks are not entirely fair.
disclose the "correct" answers, public opinion may not shift much, because, as I have explained above, the experts may not be trusted.

And so the public may once again prefer to follow the Bellman in searching for the Snark, because he promises an easier (and cheaper) journey — and they believe him. Trusting the experts, as far as the public is concerned, is simply too risky. To be sure, if the research continues and new scientific knowledge becomes part of our cultural background — if recombinant DNA experiments become as common and noncontroversial as, say, cross-breeding of livestock — the cost of buying off the neighbors would fall, not because the neighbors would come to trust the scientists, but because the neighbors would in effect share the knowledge. But if the neighbors cannot be bought off, the research might not continue, at least not where the scientists want to do it, and if the research does not continue, then the new scientific knowledge will not accrue, and thus will not be available to convince the neighbors to change their minds.

Once upon a time, members of the public assumed that scientific progress was inherently a good thing. The metaphor of the open door was common: Open a door in a dark room and you bring in more than a narrow shaft of light; you bring in light enough to brighten the entire room. Nowadays, one might add that even after the door is opened, some of the corners and the spaces behind the furniture are still shrouded in shadow. The things that are thought to dwell in those shadows — dark, ugly creatures, cackling and cavorting just out of sight, obviously bent on evil — frighten people, and the public increasingly worries that scientists, particularly those involved in biotechnology, are starting to poke around in those dark places.

That is the principal worry that drives transaction costs sky-high; the worry would be exacerbated, not alleviated, imposing a "more efficient" solution. Part of the worry involves simple fear, and part of it involves doubts about morality. Scientists are not helped by the fact that so few of them seem particularly skillful at making their case to the public.76 Only recently have scientists as a group started

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76. In particular, the same scientists who will "frankly confess ignorance" when speaking with their colleagues generally adopt a less equivocal attitude when addressing lay persons. See The Science Court Proposal and Alternatives, 1978 A.B.A. SEC. BULL. L. SCI. & TECH. No. 17, at 1 (quoting Arthur Kantrowitz). As Dorothy Nelkin has pointed out, "the way in which . . . information is communicated may partly explain why public
to evidence understanding of the nature of the political system and of the fact that they must live in it. Even now, many researchers seem to regard public debate as vulgar and unprofessional. Given that view, there is little to counter popular speculation on flying saucers, telekinesis, and the emotional responses of plants to Debussy — to say nothing of the dangers of nuclear fission or recombinant DNA research. If public debate is beneath one's dignity, then so is public respect.

This point is increasingly overlooked in a scholarly debate that has become overwhelmingly policy-analytic. The government is repeatedly urged to impose various rules, rules that are efficient, rules that are rational, rules with benefits outweighing their costs, all because the experts have deemed them best; convincing the suspicious lay public that the rule thereby imposed is the proper one always seems to be somebody else's job. In the biohazard debate, a strategy that responds to a perceived market failure by awarding victory (as it would be seen by the public) to those who are disrespected is a strategy that in the long run will itself be disrespected. Earlier I made brief reference to the problem of public perception, and the public's desire that its views not be totally ignored — in particular, that its views not be ignored in a way that makes its members seem stupid. When this happens frequently — which is possible if the public's lack of understanding leads to imposition of expert-approved rules to govern research — there are serious demoralization costs, and the public's sense of its own marginality is increased. The long-run consequences of this demoralization could be catastrophic for those forms of scientific research which would not be able to continue in the face of massive public opposition.77

Nor should scientific researchers desire to continue their work as though the public and its fears did not exist. Wishful thinking has yet to solve a single human problem. Even an uninformed public wants to feel that someone cares, and if nobody seems to, someone must pay. Given the nature of democracy, the voters might always rise up against their tormentors and announce that they are tired of governance by experts and prefer to elect the Bellman. "But he'll reach the wrong answers!" opponents might cry, to which members of the public could well respond: "Sure, but at least he pays attention to what we think." And of course, in any society, if the people

77. Public demoralization might have other more important costs as well, but I am concerned here only with the likely consequences for the scientific enterprise.

are sufficiently angered, there are cathartic remedies beyond simple democratic change.

C. A Preliminary Conclusion

I do not mean any of this to be taken as a diatribe against science or against government institutions in general, and I certainly do not mean to suggest that a contrary decision in Foundation on Economic Trends v. Heckler would have sown the seeds of popular revolt. I use the stark images in the preceding sections for another, more limited purpose: I want to make plain that there may be substantial costs to strategies that seek to bypass public opinion in the name of following expert opinion. As long as those costs are present, scientific researchers will sometimes find themselves fettered by rules of the sort that I have been discussing. Only when viewed through the glass of scientific rationality, however, do the rules seem ridiculous. In the final section of the paper, I hope to show why the rules may not be as irrational as they appear, and to advocate what I consider the most sensible strategy for scientists to follow: Work not to get around the public's irrationality, but instead to regain the public's trust.

III. One Solution: Regaining the Public's Trust

The hypothetical situation, then, is this: The constitutional challenge to restrictions on scientific research has been rebuffed, and soundly. The government has refused to impose a solution more in line with expert thinking than those available through the market. The scientists, in short, find themselves facing the same situation that has confronted other groups of the powerless and oppressed over the centuries: A conviction that their ideas are right and a refusal of anyone else to believe them. I put the matter this way because I want to emphasize a commonality of interest between scientific researchers and others who want to do things that the society is not ready to approve. In earlier ages, these ranks have included individuals of different races wanting to marry, women wanting to work in "male" professions, and the devout wishing to pursue unorthodox religious beliefs. And like those who have struggled before them, the scientists must come to accept that when constitutional and market failure deny them rights they consider basic, their most important task is the education of the public that stands in their way.

The previous discussion should have laid bare my biases. I am
not a fan of strategies for making public policy by leaving the public in the cold. That is not to say that I am particularly fond of the imposition of irrational rules generated by public hysteria. I tend to be a passionate technophile, and have the deepest admiration for scientific researchers. I am concerned, however, about the effect on scientific enterprise if all opposition is dismissed as uninformed and irrational. Finding a middle ground is not easy, but I would suggest this one: If the public wants to trust a Bellman, then convince the public to trust the right one. Convince the public that scientists can be trusted.

In a sense, when scientists ask for removal of restrictions that they believe short-sighted and wrong, restrictions that the larger society has imposed in a belief that what the scientists are doing is dangerous, immoral, or both, the scientists are asking the public to trust them. After all, every experiment may be said to involve nonconsenting subjects. If the ecosystem is viewed as dynamic, all its components constantly interacting, then everything that changes any part will in the long run affect the whole. It is unnecessary to press that point too strongly: the easier argument is that many of the most controversial experiments have undeniable effects on the rest of the world. Some respond that if the experiment is itself safe and if people are worried that the knowledge gained will be misused, then they should try to control use, not discovery. That argument, however, is beside the point. If people do not trust the system that will exploit the knowledge, they have no choice but to strike at the knowledge itself. That choice may in its turn seem irrational, immoral, or unconstitutional, but it flows from an impulse that is per-

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78. One of the most elegant formulations of the "no moral responsibility" argument is this one by a Nobel Laureate:

Science has two aims: to increase knowledge by penetrating into the secrets of Nature and to elevate human life. We scientists cannot be made responsible if the fruits of our work have reached only a minority of our kind. As to the murderous weapons which threaten our existence, I must also decline responsibility. Science creates new knowledge and new knowledge creates new tools, and any tool can be used, both for construction and destruction [sic]. It is regrettable that moral progress has lagged behind scientific progress and that the new tools created by science are made into instruments of murder and destruction. We cannot be blamed if groups of people snatch the discoveries from our hands, run away with them and use them contrary to our intentions.


ffectlv understandable: Fear. The fear may be of physical danger, it may be of drastic societal change, it may be of an alteration in the way we view ourselves and our world, or it may be of something else altogether, but it is fear nevertheless that motivates the desire to rein in scientific experimentation.

The most controversial experiments—especially those involving recombinant DNA—are of course the ones with respect to which the cost of obtaining information is most likely to be so high that few members of the lay public will be capable of making truly rational analyses of their self-interest. These experiments, which the lay public does not understand and therefore fears, are the most likely targets of government regulation. Something very much like this has contributed to the near-destruction of the nuclear power industry in the United States: The public’s fears have led to increased regulation, thus driving up the cost of nuclear power generation, even though other industries, sharing many of the same problems regulated in the nuclear industry, are left relatively untouched. True, some public fears about nuclear energy—long-term effects on the gene pool of increased background radiation, for example, and the problems of storage of nuclear waste—are unique to the industry, but regulation of those aspects is only a small part of what is making nuclear energy generation so expensive. A fearful public, however, seems to believe that any additional regulation of nuclear energy is worthwhile, and as long as that is the public mood, the regulatory cost will continue to mount.

The same may happen ultimately to biotechnology, and for much the same reason: The public is concerned and the scientists are unable to make a convincing and public case that the concerns are irrational. There are some who fear that any experiments with recombinant DNA constitute a threat to the public health and safety, that the processes involved in the modification of life carry the unavoidable risk that (quite by accident) a dangerous, perhaps uncontrolable microorganism will be created. Most researchers discount these fears, but the reality of such concerns, not their rationality, is their politically relevant characteristic. Other members of the public

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80. An individual’s self-interest may include moral as well as physical fears, but no matter what is included, the rationality of the calculation will almost always be enhanced when based on more information.

81. See, e.g., 10 C.F.R. §§ 73.1(a)(1)(i) (1985) (protection required against terrorist attack); id. § 73.55 (same); id. § 100.10(c) and App. A (practical invulnerability to earthquake required).

82. See generally Cook, Nuclear Follies, FORBES, Feb. 11, 1985, at 82.
— and even a few experts — seek controls not because of the biological dangers, but because of what might be called the political or moral dangers should technology be developed to permit significant alterations in human genetic inheritance: “If it doesn’t escape from the laboratory and kill us, somebody will take it from the laboratory and use it to change us.” To dismiss such concerns as uninformed quite misses the point: The fears may exist because the public is uninformed, but they may also exist because an adequately informed public differs with the scientific community either in moral judgment or in prediction about the future. In either event, the policy question surely is not whether the fears are sensible or not, but what to do about them.

Of course scientific research does produce some dangers, often indirectly as the fruits of the research are put to use. Some of them we see or breathe every day. Others are more insidious. Relatively few moral philosophers deny to organized society the right to protect itself, and in an activist state, the right is exercised more frequently, sometimes even when nobody but concerned members of the public perceives any risk at all. Some protections from the fruits of science, when those fruits threaten health, have gained widespread public acceptance and support. The Environmental Protection Agency and the many statutes establishing its mandate come immediately to mind. Some communities have tried to ban the shipment of nuclear materials through their streets. Cambridge, Massachusetts, has placed some restrictions on recombinant DNA research. Berkeley, California, made a short-lived effort to ban electroshock therapy.

Scientists have responded to all of this in various ways, but they have generally focused their resources on the lobbying strategy I mentioned above, trying to convince legislators and administrators that if restrictions on inquiry, at least, are carried too far, the “end-

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83. I do not mean to suggest that the Environmental Protection Agency and its enabling statutes really do work consistently for the cause of better public health, but I do believe that the perception that they do so explains the overwhelming support they enjoy among members of the lay public.


86. See N.Y. Times, Jan. 15, 1983, at 12, col. 4 (local judge stuck down the ordinance as unconstitutional).
less frontier” will be so tightly constrained that scientific creativity will cease to flourish. That may be true (although I doubt that restrictions will soon move so far), but it has nothing to do with the right of society to protect itself. There is no societal obligation to encourage scientific innovation, although it may be in the interest of society to do so. The constitutional argument, as I explained above, seems distinctly unpromising. In short, scientists who rely on moral suasion alone are unlikely to win their case for unrestricted inquiry.

There are, however, any number of normative arguments in favor of relatively unfettered scientific progress, and many of these are quite convincing. Sometimes the opened door does illuminate the entire room; certainly the advance of technology has improved the quality of life for most Americans. Indeed, there is something at once amusing and distressing in the image of college students listening to electronic music on their stereo headphones, taking antibiotics for their infections, flying around the country for vacations or job interviews, playing video games, using word processing equipment, making long-distance telephone calls, and watching documentary films about how horrible an animal is scientific progress. This kind of neo-romanticism is, I think, a close cousin to some of the driving forces behind Moral Majority and similar organizations: It reflects the twin desires to bring order to what cannot be understood and to put moral brakes on a swiftly changing society. These forces play an important role in the formation of policy, but they have no unique claim to intellectual or moral respect. Scientific progress brings dangers, but it brings more good things than bad. Not every assertion that something is dangerous renders it so. Indeed, claims by bad scientists (or by nonscientists) that such-and-such a process constitutes a threat to life or health or safety need not even raise suspicion.

A society must protect itself, but not every bit of regulation that might be described as “protecting life and health” deserves that description. Much of it will constitute legislation enacted for quite different motives. Much of it will be quite irrational. In a majoritarian democracy, however, most of it will be valid. Legislation may be

87. In saying that the driving force is similar, I do not mean any comparison of motivation or goals. Both, however, are part of what is sometimes called the “romantic” or “neo-romantic” resistance to science. See, e.g., Nelkin, supra note 76, at 39; Marx, Reflections on the Neo-Romantic Critique of Science, in LIMITS OF SCIENTIFIC INQUIRY, supra note 16, at 61.

88. For my generally negative assessment of the idea that scientific irrationality should play a role in constitutional adjudication, see Carter, Constitutional Implications, supra note 54.
valid and still be a bad idea. Precisely because the majority so often rules, our political system presents a special danger that utterly irrational ideas may become the law of the land. When that happens, scientists often only bemoan or ignore altogether this facet of our political culture. They may be tempted to seek end-runs around the weight of public opinion; their true responsibility, however, is to do the often dirty work of seeking to change the public's mind to eliminate the fears that give rise to the legislation. The immense cost of obtaining information will still make it impossible for the public to share the understanding of scientists; consequently, if the public's fears are to be calmed and its opinion changed, the education I suggest must be of a particular sort: Scientists must make their case not on an experiment-by-experiment basis, but on a far broader one. They must educate the public to believe in their morality and in their work; they must explain why members of the public should trust what the experts say. This task of working to regain the public trust is also a means for resolving a market failure problem or a denial of a claim of right, and it does so without insult or injury. It is thus an ideal task for the scientific community now to undertake.

When scientific researchers ask to be free of restrictions, they are really asking members of the public to trust them. The public may be unimpressed, asking "Why should we trust you with our safety?" Many scientists would give answers that boil down to: "Because we're smarter than you are." While that might sometimes be true, it is not calculated to elicit a positive response. It may in fact be the elitism of much of the scientific establishment and the disdain in

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89. See supra note 76. Members of the public may take this perceived contempt quite personally. A particularly evocative exposition of this theme is sociologist Thomas J. Cottle's dialogue with a poor black woman who is disturbed by her young son's interest in pursuing a career in science. See Cottle, "Show Me A Scientist Who's Helped Poor Folks and I'll Kiss Her Hand," in SCIENCE AND SOCIETY: PAST, PRESENT, AND FUTURE 216 (N. Steneck ed. 1975). Two samples of the mother's lament:

"I blame the scientists," she said, seeing I wasn't about to speak. "I blame them all. They're specially educated, everyone of them. Every single one of them has degrees, like a doctor or whatever. Just like you have." I said nothing. "They know what's happening in America. They know the children here are dying from the lead they eat in that paint. . . . Scientists, doctors let that happen. Scientists don't make cheap medicine for us. . . ."

Id. at 225.

"We're always the dogs. You mess around on us, and then you leave us to die. But not a word comes from you, not a 'I'm sorry.' " She walked toward me and pushed her finger at the newspaper I still held in my lap. "Three hundred black folks gave their babies to those scientists. That means all over the country they're experimenting. We never get to say a word about it. Or if we ask, we can't be sure they're telling us everything that's going on. We're just your dogs waiting for you to play your rich games. But you never show your white faces around here. You never even say 'I'm sorry. I'm sorry for what's happening. I'm sorry that we got our
which some of its members seem to hold the public that lie near the heart of the profession's current problems. To the extent that opposition to scientific research stems from the quite different problem that the public questions the morality of the work, elitism and disdain will do nothing to solve the problem and will likely make matters worse.

Scientists will regain the public's trust only when they can manage an answer on the order of: "We should have your trust because we have earned it." Setting out to accomplish that task will not be easy, but nothing short of it may do. If scientists instead seek end-runs to increase their access to decision-making without appreciably altering public perceptions of risk — I have in mind not only what I have discussed in this paper, but such proposals as the "Science Court" as well — they are surely doomed to failure in the long term. Cheap though these strategies may seem, they will eventually give rise to a bill that must be paid.

And how are scientists to go about earning the trust of the public? The question is not one to which the legal process can offer much answer. The twin strategies I would recommend are public education and scientific self-restraint.

By public education I do not mean improving the teaching of science in the schools, although that is important as well. I mean instead that scientists must take the time to explain and even justify the more controversial things that they do. These explanations cannot be limited to the narrow circles of the well-educated; scientists
must select forums that will get their messages to those most in need of them — the relatively uneducated who may be afraid or the many citizens who may doubt the morality of their work. At the same time, the scientific community should undertake a massive public relations offensive, trying to convince a questioning public that the scientific way of knowing is essential to progress and, as a corollary, to let people know just what benefits have been brought forth by unimpeded scientific inquiry.

By self-restraint I mean something quite different, and my suggestion will be a bitter pill for researchers to swallow. Much as I admire the wonderful creed of knowledge for its own sake, the time may have come to discard it — or at least to place it in mothballs for a while. Perhaps I am suggesting a kind of disingenuousness, but my intent is to recommend a more thoughtful response to the question, "Why are you doing this research?" Scientists seeking to regain the public trust must portray themselves as seeking knowledge for the sake of society or of humanity. Almost any investigation can, if the researcher tries, be justified in terms of its benefits to the world. But applying such a standard would at least require researchers to think through the benefits and risks of their experiments. And should the public question the benefits, especially if public doubts arise because of a moral judgment differing from scientific consensus, the researcher would have to try to explain in patient detail. Should the explanation fail to convince, should public suspicion and opposition continue to grow, the researcher might have to do what most would consider a form of blasphemy: give up the research. To be sure, it might eventually be resumed. But in the short term, for a scientific community trying to convince the public that it can be trusted, stopping the work voluntarily — as was done for a time in the field of recombinant DNA — might shore up an image of a science responsive to public concern, and should in any event be infinitely preferable to later government intervention.

These, then, are some of the ways in which scientists might try to regain the public's trust, and no doubt there are many others that will occur to the sensitive reader. But until these or other means are pursued, it may well be that when the public demands of the scientists, "Why should we trust you with our safety?,” scientists will have no response other than:

"Perhaps you shouldn’t."
IV. A Final Word

I opened my analysis with a discussion of the hunt for the Snark, and I would like to close with it as well. Most of my cautions have been aimed at the scientific community, but my concluding caution points in quite a different direction. Following the Bellman and his perfectly blank map, the crew finally discovered the hiding place of the creature. At least, they thought they had discovered it: Thingum-a-jig, the crew member who found it, did not survive his triumph; after announcing his discovery, he realized that he had perhaps discovered not a Snark after all, but the far more dangerous Boojum. And like everyone who ever found a Boojum, the wretched Thingum-a-jig softly and suddenly vanished away and never was met with again. Nor was the Snark—or was it a Boojum?—actually seen by any other member of the crew. Here, then, Carroll may have been sending his readers another message: Following its own blank map, without the guidance of experts, the crew ended up losing one of its members, and could never say for sure whether it had reached its goal.

In that, too, is a lesson for someone.