

Forbidding Science: Some Beginning Reflections¹

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Are there things we should *not* know? Can anyone or any institution, in this culture of unfettered enterprise and growth, seriously propose limits on knowledge? Have we lost the capacity to perceive and honor the moral dimensions of such questions?

Roger Shattuck, Foreword to *Forbidden Knowledge*, 1996

With these three simple questions, the late Roger Shattuck opens his magisterial exploration of “forbidden knowledge,” courageously and thoughtfully making respectable an increasingly important discussion about the moral significance of our limitless pursuit of new knowledge. To Shattuck’s three questions, I would for myself answer “yes,” “probably yes,” and “probably no”: yes, there are things we should *not* know; yes, we probably should seriously entertain proposals for setting at least *some* limits on *certain* forms of dangerous knowledge; but no, I doubt whether our society has the will or the capacity for this challenge, either (a) to sustain, with adequate thoughtfulness and sobriety, the necessarily difficult conversations that such questions require, or (b) to act wisely and prudently as a consequence of such deliberations. Happily, some encouraging evidence to the contrary is the convening of this meeting, with its willingness to publicly think the unthinkable, and I applaud the sponsors for their boldness and openness in creating such a conversation, and under its right name. I very much regret that I am not able to participate in person.

¹ A slightly shorter and less edited version of this essay was presented (by Prof. Jane Maienschein, on my behalf) at the conference on “Forbidding Science: Balancing Freedom, Innovation, Security & Precaution,” Arizona State University, January 12, 2006. The opinions expressed are my own.

My remarks aim (1) to explore some important distinctions, (2) to establish what I hope might be some points of common agreement, and (3) to offer some general observations and specific suggestions about setting limits—provisional limits—on certain areas of biomedical research and practice. I begin with some comments on the title of our meeting, and its welcome, and no doubt deliberate, ambiguities.

We do well to keep in mind the twin meanings of “forbidding”: “Forbidding,” an adjective, meaning “disagreeable or repellent” (“a forbidding chore”) or “grim, menacing, or ominous” (“a forbidding sky”); “forbidding,” a transitive verb, the activity of proscribing or refusing to allow, done with actual or implied authority thus to forbid. Our other term, “science,” is no less richly ambiguous. It denotes both the organized and methodical *human activity of research and experimentation*, as well as the *knowledge* sought and obtained through such research and experimentation. Further, because knowledge of how things work often brings sought-for powers to alter their workings, we are meant here to consider also forbidding *applications* of scientific knowledge and the *technologies* to which it leads.

Now I trust that it goes without saying that there are worthwhile scientific and technical activities that nonetheless involve disagreeable or repulsive practices—for example, the practice of vivisection or of growing fetuses and perfusing cadavers for body parts. More important, there are surely menacing forms of knowledge and technology—for example, nuclear fission or the devising of drug-resistant pathogens. With these dangerous forms of forbidding knowledge, the threats to peace, security, safety, and health are obvious, though what to do about them is anything but. For most of my career, I have been interested rather in certain more subtle but (I believe) equally ominous forms of knowledge and know-how, whose menacing aspects we are slow to recognize precisely because they come from the

humanitarian and benevolent hands of biomedical science—for example, knowledge that yields power to initiate and grow human life in the laboratory, to select and manipulate its genetic composition, to erase memory or desire, to simulate feelings of intense pleasure or falling in love, to blur the boundaries between man and machine or man and animal, or to extend greatly the maximum natural human lifespan. If these forms of knowledge are forbidding, it is not because they threaten bodily health and safety—human cloning or performance-enhancing drugs are not worrisome mainly because they are unsafe—or even because they might augment existing social inequalities. They are worrisome rather because of their threat to human freedom and dignity, because they appear to challenge fundamental aspects of being human: the boundaries of our lives, the relation of soul and body, the meaning of begetting and belonging, the ways in which we are actively at work in the world.

Now I expect that we may disagree about whether specific “knowledge X” or “power Y” is forbidding, but I trust that we do not disagree about the awesomeness of acquiring en masse knowledge and power to intervene deeply into the human body and mind, with capacities that enable us not merely to heal disease and restore wholeness, but to serve novel purposes and to alter our underlying nature.

Ominous in all this are not only the technical powers, available for use without clear ethical standards and wisdom to guide us, and not only the myriad potential problems connected to their use: the mischievous and malevolent uses, the unintended and unanticipated side effects of legitimate uses, and especially the unavoidable and undesirable consequences of even their most desired and desirable uses. Worrisome also are menacing aspects of the knowledge itself, insofar as it challenges our human self-understanding and our existing standards for guiding conduct. Such concerns bother not only religious

fundamentalists; they were once well understood even by philosophically minded scientists. In *Chance and Necessity*, for example, Jacques Monod talked about how new biological discoveries were forcing man to “make a heart-rending revision in his concept of himself, a concept which had become rooted in him through tens of thousands of years,” a process of change Monod called “a *deep-seated evil*, one which besets the spirit . . . *ever increasing that bitter distress of the soul*” (emphasis added). Whereas the technologies (merely) present troublesome ethical dilemmas, the underlying scientific notions call into question the very foundations of our ethics.

The challenge goes much further than the notorious case of evolution versus Biblical religion. Is there *any* elevated view of human life and goodness that is proof against the belief that man is just a collection of molecules, an accident on the stage of evolution, a freakish speck of mind in the mindless universe, fundamentally no different from other living—or even non-living—things? What chance have the ideas of freedom and dignity, under even any high-minded *humanistic* dispensation, against the teachings of strict determinism in behavior and survival as the only natural concern of life?

Now I may be wrong in regarding these forms and aspects of biological knowledge as ominous, or grim, or menacing. But to show that I am wrong, or for me to show that I am right, means engaging not in the scientific activity that gives rise to the difficulties but in a different kind of inquiry: the search for the truth about the human and moral significance of these new advances in biomedical science and technology. (Such an inquiry is in fact President Bush’s first charge to the President’s Council on Bioethics.) It is an inquiry of philosophical anthropology, of ethics, and of a morally sensitive political science. And although scientific findings are relevant to the inquiry, they are hardly dispositive. To be sure,

the canons of evidence and the degree of certainty possible in such an inquiry are not the same as those in neuroscience or genetics. But expertise in the latter is no guarantee of competence or wisdom in the former. For the knowledge of whether some knowledge is forbidding, and why, is knowledge of a wholly different sort. This fact—and I trust that we can agree that this is a fact—has important implications for questions about *who* should decide *whether, why, how* and *by whom* science and technology should be restricted.

Turning from forbidding aspects of science to the forbidding of science, it in no way follows a priori that all—or indeed *any*—forbidding knowledge deserves to be forbidden—proscribed or disallowed. Other things being equal, truth and understanding are genuine goods, and although there are no guarantees that the truth will be edifying or comforting, censorship of inquiry is also forbidding—ominous and menacing. More important, many of the fearsome aspects of science and technology—especially in the biomedical sciences—are intimately linked to their attractive and beneficial aspects. The retarding of biological senescence is being pursued, not in search of immortality or expanded longevity, but to prevent frailty and decay in the elderly. Drugs to blunt or erase the emotional contents of memory are being sought not to ease the conscience of the guilty, but to prevent post-traumatic stress disorder. A superior euphoriant (without risk of cirrhosis or addiction) is wanted not as Huxley's soma, but as a treatment for major depression. Because the potential benefits and harms are so intertwined, we should be disinclined to try to curtail the research or even the development of the techniques and powers they might yield. Except for the crucial area of designing deadly pathogens and toxins, in most of the biomedical sciences there is at least a *prima facie* case against proscription and severe restriction, especially with respect to basic research. Much more attractive is the idea of trying to distinguish later on between the

better and worse *uses* of the perfected technologies, and to try to regulate against the latter without interfering with the former. Whether this makes sense depends, of course, on whether the conventional distinction between science and technology is intellectually sound and whether the gap between basic and applied science is wide enough to offer a practically useful point of leverage—points to which I shall return.

In any discussion of restraining science, we need to distinguish questions of desirability, questions of feasibility, and questions of the wisdom of forbidding any given scientific or technological activity. Conversations regarding “the desirability question,” of the sort we are having here, are often short-circuited by people who argue that it is either impossible (unfeasible) or foolish (unwise) to try to restrict science in any way. I have never been in a public discussion about limiting science or technology in which someone does not assert, sooner rather than latter, one or another of these commonplaces about science, human nature, and politics: “You cannot stop science.” “If *we* don’t do it, *someone else* will.” “Curiosity will out.” “Forbidden fruit is so delicious.” More thoughtful critics of the discussion argue less the impossibility, more the un-wisdom of trying to restrict science: often using the much maligned slippery-slope argument, they insist that it will be politically impossible to set limits selectively and prudently, or without doing great harm to scientific freedom. If these critics are right, it would be of less than academic interest to argue whether such impossible and foolish efforts would be desirable.

Although there is force to these challenges, I would argue that, as usually asserted, they are in fact unexamined assumptions and often a form of intellectual laziness, offered as a substitute for careful and hard thinking. In any case, they should not be accepted without critical review. First, it is not true that science and technology cannot take direction and

flourish. They receive positive direction in the form of selective government funding and through the intellectual fashions that set budgetary priorities and shape even the peer review of proposals. They receive modest negative limitation in the form of canons of ethics governing human experimentation or the humane treatment of animals, self-imposed restrictions on human germ-line genetic modification, legal prohibition of the buying and selling of human organs, safety regulation by the Food and Drug Administration, and (in other countries) political bans and restrictions on certain limited forms of human embryo research. These restrictions and limitations are observed without great harm to the scientific enterprise or technological innovation. Indeed, some scientists (especially in other countries) understand that it is in their long-term self-interest to help craft the moral boundaries within which they will operate, boundaries in keeping with the moral sensibilities and norms of their communities. They prudently recognize that a genetic Chernobyl will bring down restrictions upon science well beyond anything sensible. Our own National Academies have called for a legislative ban on human reproductive cloning, albeit only because it is for now unsafe.² More important, given the high stakes for the human future, it would be foolish to declare in advance that we human beings simply cannot govern where biotechnology might be taking us, or that the direction and rate of progress are utterly immune to human control. Rational sanity in the devising of the technological means, but utter irrationality and chance in deciding about their use is anything but the mastery of nature for which modern science has been gathering

² Some of us even remember that the NAS in the 1970s convened a blue ribbon panel to in effect censor as “unhelpful to any public purpose” Nobel Laureate William Shockley’s request that the Academy commission a study on race and intelligence. At about the same time, the Report Review Committee of the Academy censored for three years a report of its own National Research Council, *Assessing Biomedical Technologies*, on the (preposterous) grounds that its publication would endanger science and lead to a curtailment of all federal support for biomedical science. I was the executive secretary of the committee that produced the report, which was finally printed without publicity only after the financial sponsor, the National Science Foundation, threatened to publish the report on its own. Even scientists officially believe in censoring some forms of inquiry.

its powers. The effort at some form of regulation and control must be attempted, notwithstanding the genuine difficulties and the risks.

Who should do it? At what stage? And how well are we now doing it? I leave to others the especially vexing questions of knowledge and technologies affecting national security, where full public disclosure is out of the question. What about the human biotechnologies that raise what one can call the “Brave New World” questions, or more generally, concerns that go beyond health, safety, and efficacy? Time permits only a few comments and beginning suggestions.

Oversight on these questions in our society belongs in principle to the democratic polity at large, not only because we are all affected by the development of these technologies, but because the decisive issues for debate are matters of morals and politics, not of scientific or technical expertise. Francis Bacon, in his *New Atlantis*, could charge his elite scientists in Salomon’s House with practicing self-censorship to avoid publicizing dangerous knowledge,³ but his utopian community was illiberal in its customs and neither publicly enlightened nor democratically ruled. We, by contrast, have an open society where the people are sovereign; besides, our scientists have no special expertise in matters ethical and political, indeed, by explicit design, the knowledge and power they provide is morally neutral. Moreover, many of our fellow citizens do not share the blind faith in the simple beneficence of all technological innovation. And because they do not share the corporealist, morally neutral, and in some cases

³ Here is how the Father of Salomon’s House describes their practice: “We have consultations, which of the inventions and experiences which we have discovered shall be published, and which not: and take all a oath of secrecy for the concealing of those which we think fit to keep secret: though some of those we do reveal sometime to the State, and some not.” Bacon, the first prophet of the new relation between science and society and of the “conquest of nature for the relief of man’s estate,” knew better than we that knowledge is dangerous, that publication is a public and politically relevant act, and that self-censorship on the part of scientists is necessary and desirable. The passage is also remarkable for its wonderful ambiguity regarding whether scientists or the State has ultimate authority over dangerous knowledge.

atheistic world-view that they attribute (fairly or not) to science and scientists, they are reluctant to surrender the power of decision to *the very people who they think are creating the problem*. And although it may not be polite to speak of such matters, they become doubly reluctant when they discover that the scientific boosters of this practice or that innovation have financial interests at stake or are deeply in bed with industry.

A cautionary word about bioethics and bioethicists. For moral advice in dealing with sticky ethical issues, in recent years biologists and the larger society have turned to bioethicists to help negotiate the difficult straits between biomedical science and society. Hospitals and biotech companies have hired them. Scientific societies retain them and the Human Genome Project has brought them handsomely under the tent of big funding. And many bioethicists, eager for an honored seat at scientific conference tables and a share of the federal budget, have been only too glad to oblige. But it is far from clear that either science or society have been *adequately* served by this safe compromise that has been adopted. For the process has employed only mainstream academic bioethicists whose ethical views and institutional attachments are not representative of society as a whole. They largely share the scientists' moral outlook, their progressivist and enlightenment view of the world, and their corporealistic metaphysic. And most important, they share a belief in the importance and sufficiency of expertise: both the scientists and the ethicists believe that the best way forward lies with a combination of their respective expertise.

Until our current President's Council on Bioethics, previous public bioethics deliberation was set up to produce a mixture of academic experts, scientific and ethical, with a feeble smattering of "public members." The goal, quite explicitly, was to shield these vexing and delicate subjects from the unwelcome intrusions of the noisy and contentious political

process. These bodies have been very helpful, especially in devising regulations for or refining practices of research using human subjects. But because the bioethicists who have served on these bodies largely approve of whatever scientists propose to do, they will—after a suitable amount of hand wringing—pronounce their moral blessings upon it. The price of this congenial relationship is that official public bioethics has been insulated from the larger political culture where real and serious differences exist and where academic arguments of ethicists hold little sway. (An example: The previous bioethics council, President Clinton’s National Bioethics Advisory Commission, had no pro-life members.) Scientists encounter no serious and thoughtful ethical challenges to their unexamined faith that all their innovations are good for humanity. Worse, this attempt at government by experts has isolated the larger society from the opportunities and responsibilities of public decision-making. Where biotechnology may be taking us is everyone’s business. It is therefore fitting that the public should be involved and that its multiple views and values should all be taken into account.

The people who have accused our Council of politicizing science and bioethics have been right, but not in the way they meant it. We are a Council on bioethics, not a Council of expert bioethicists. We were constituted to reflect the large differences of opinion in the community at large—and so we have done. We have helped to bring important bioethical issues into the public arena, beyond the private domain of a small group of experts. We are proud of the fact that we eschew academic jargon, consider sensibilities as well as arguments, and welcome all perspectives—not just secular and liberal ones—into the public conversation. To be sure, in public discussion the experts have their role to play. But our ultimate arbiters of the proper relations between science and society are the people and their representatives. For

it is they—we—who are charged to think and act and govern in ways that will do full justice to our humanity in this age of biotechnology.

Where should regulation or restriction be attempted? It would be nice if we could find and govern always at the level of application, never at the level of basic science. That way we could have the pleasure of discovery itself, as well as the genuine practical benefits promised in virtually every new major scientific finding about the human body or mind. In some cases, where the technologies are hard to master, requiring high levels of precise manipulation and skill—for example, deep brain stimulation or gene therapy—it makes sense to try to regulate application and practice—ideally, and in most cases, not by proscriptive legislation but by professional self-control. And ethically far-sighted professional societies can and do establish guidelines for legitimate and illegitimate uses; but being live-and-let live types and fearful of lawsuits from reprimanded members, they often do not enforce their own rules against violating members. But in other areas, especially involving drugs—easy to synthesize, impossible to keep under strict professional control, and hard to monitor let alone police—it will be extremely difficult to govern once someone has published, say, the chemical synthesis and hallucinogenic properties of LSD. Indeed, the story of LSD presents a classic example of the danger of mere publication. During the 1960s, the United States Patent and Trademark Office was unwittingly but unavoidably complicit in the spread of LSD and the lives wrecked through its use. Although the patent had been previously granted for other uses, once LSD's power to produce hallucinations became known, potential users and dealers sought the method of synthesis from the USPTO, which was legally obliged to supply this public information to anyone who requested it. The USPTO did so until its supply of printed materials was exhausted.

The well-meaning and sensible desire to regulate or restrict science only at the level of practical application faces a more formidable challenge: the problematic status of the distinction between science and technology. Though it is fashionable to distinguish *applied* from *pure* science—and it makes some sense to do so—it is important to grasp the essentially practical, social, and technical character of modern science as such. Ancient science had sought knowledge of *what things are*, to be contemplated as an end in itself satisfying to the knower. In contrast, modern science seeks knowledge of *how things work*, to be used as a means for the relief and comfort of *all humanity*, knowers and non-knowers alike. Though the benefits were at first slow in coming, this practical intention has been at the heart of modern science right from the start.⁴

But modern science is practical and artful not only in its end. Its very notions and ways manifest a conception of the interrelation of knowledge and power. Nature herself is conceived energetically and mechanistically, and explanation of change is given in terms of (at most) efficient or moving causes; in modern science, to be *responsible* means to *produce* an *effect*. Knowledge itself is obtained productively: Hidden truths are gained by *acting* on nature, through experiment, twisting her arm to make her cough up her secrets.⁵ The so-called

⁴ Here, for example, is the celebrated announcement by Descartes of the good news of knowledge that is “very useful in life”:

So soon as I had acquired some general notions concerning Physics . . . they caused me to see that it is possible to attain knowledge which is very useful in life, and that, instead of that speculative philosophy which is found in the Schools, we may find a *practical philosophy* by means of which, knowing the *force* and the *action* of fire, water, air, the stars, heaven, and all the other bodies that environ us, as distinctly as we know the different crafts of our artisans, we can in the same way *employ them* in all those uses *to which they are adapted*, and *thus render ourselves as the masters and possessors of nature*. (*Discourse on Method, Part VI*. Emphasis added)

In the immediate sequel, Descartes makes clear that the goals of mastery of nature are humanitarian: the conquest of external necessity; the promotion of bodily health and longevity; the provision of psychic peace or a new kind of practical wisdom; and perhaps also the overcoming of mortality itself.

⁵ Because nearly all of biomedical science is experimental, scientific research is more than intellectual inquiry. It is almost always also a form of action, knowledge being gained only through experimental deeds. This fact lies behind the need for ethical guidelines to restrain the actions involved in research

empirical science of nature is, as actually experienced, the highly contrived encounter with apparatus, measuring devices, pointer readings, and numbers; people decipher the DNA sequence of sea urchins without ever having seen a sea urchin. Indeed, nature in its ordinary course is virtually never directly encountered, save by ecologists and organismal biologists.

Inquiry is made “methodical,” through the imposition of order and schemes of measurement “made” by the intellect. Knowledge, embodied in *laws* rather than theorems, becomes “systematic” under rules of a new mathematics expressly *invented* for this purpose. This mathematics orders an “unnatural” world that has been intellectually “objectified,” re-presented or projected before the knowing subject as pure homogenous extension, ripe for the mind’s grasping—just as the world itself will be grasped by the techniques that science will later provide. Why, even the modern word, “concept,” means “a grasping-together,” implying that the mind itself, in its act of knowing, functions like the intervening hand (in contrast to its ancient counterpart, “idea,” “that which can be beheld,” which implies that the mind functions like the receiving eye). And modern science rejects, as meaningless or useless, questions that cannot be answered by the application of method. Science becomes not the representation and demonstration of truth, but an *art*: the art of *finding* the truth—or, rather, that portion of truth that lends itself to be artfully found.

Finally, the truths modern science finds—even about human beings—are value-neutral, in no way restraining, and indeed perfectly adapted for, technical application. In short, as Hans Jonas has put it, modern science contains manipulability at its theoretical

using human subjects (and, to a degree, also some non-human animals.) This fact also embarrasses any attempt to treat experimental science as (merely) a form of speech, fully immunized against Congressional interference by the First Amendment to the Constitution, even broadly construed. Scientists have no right of free speech and free inquiry to do more than talk and ask questions. It is not clear that even the act of making public clearly dangerous knowledge would be—or should be—a protected deed implicit in constitutionally protected speech.

core—and this remains true even for those great scientists who are themselves motivated by the desire for truth and who have no interest in that mastery over nature to which their discoveries nonetheless contribute and for which science is largely esteemed by the rest of us and mightily supported by the modern state.

For this reason, we must think of modern science and modern technology as a single, integrated phenomenon. It is the latter's fusion with the former that both makes it so successful and makes it often also a problem for society—including for any attempt to think about at what stage and how a particularly forbidding technological prospect might be proscribed or regulated.

How well are we now regulating worrisome new biotechnologies, beyond the scrutiny given them for safety and efficacy by the FDA? The President's Council on Bioethics has been very interested in the regulation of new biotechnologies, and in *Reproduction and Responsibility*, we reported our comprehensive diagnostic survey of how new technologies at the intersection of assisted reproduction, genomic knowledge, and embryo research are currently regulated. To make a long story short, we found that this area was largely unregulated, with no one charged even with monitoring the effects of these practices, not even on the health and well-being of children born with their aid. We also discovered why we are unlikely to get any federal regulatory activity in this area: the major players are opposed to any and all governmental intrusion. The IVF practitioners and biotech industry fear draconian measures imposed by the pro-life forces, and in any case, they want to be left completely alone; the pro-life forces, who would welcome some restrictions, oppose governmental involvement because official regulation would involve complicity in and sanction of activities to which they are morally opposed. Other countries—especially Canada—have in recent years

worked out a highly principled and sober set of governmental policies and restrictions; alone of the major nations active in these fields, the United States has no national oversight at all, and we are unlikely to develop any soon.

Frustrated by this political impasse in the path toward regulation but unwilling to concede defeat, the Council put forward some modest practical proposals for the field, including some legislative suggestions for restrictions on a few well-defined and morally troubling scientific and technical practices. These proposals were developed in the spirit of reasoned collaboration across the political and ideological spectrum. In order to show a possible way forward and to demonstrate by example how people who disagree on the moral status of the human embryo can nevertheless find common ground in defense of other goods at risk in the domain of reproductive technologies, the Council identified a number of limited proscriptions that we all could unanimously support, whether we are politically left or right, pro-life or pro-choice. None of these proposed moratoria are earthshaking, but their enactment by Congress would represent a major breakthrough for the public governance of morally charged and boundary-crossing practices. They would place the burden of persuasion on the innovators who would transgress existing moral boundaries, rather than on the defenders of those boundaries—in protecting the reproductive line between human and animal, in assuring that women’s uteruses are not used as experimental laboratories or organ farms, in guaranteeing to each child a normal biological link to one genetic father and one genetic mother (both of them adults), and in preventing the patenting or commodification of the living human organism, at all stages of development.⁶ It remains to be seen whether Congress can

⁶ The precise Council proposals were as follows:

- (1) Prohibit the transfer, for any purpose, of any human embryo into the body of any member of a non-human species.
- (2) Prohibit the production of a hybrid human-animal embryo by fertilization of human egg by animal

rise to the occasion and seriously consider setting some limits—these or any others—while limits can still be set. It also remains to be seen whether we as a nation are willing and able to recognize and meet the challenge of forbidding biotechnologies or whether all we can do is stand on the sidelines and chatter.

sperm or of animal egg by human sperm.

(3) Prohibit the transfer of a human embryo (produced ex vivo) to a woman's uterus for any purpose other than to attempt to produce a live-born child.

(4) Prohibit attempts to conceive a child by any means other than the union of egg and sperm.

(5) Prohibit attempts to conceive a child by using gametes obtained from a human fetus or derived from human embryonic stem cells.

(6) Prohibit attempts to conceive a child by fusing blastomeres from two or more embryos.

(7) Prohibit the use of human embryos in research beyond a designated stage in their development (between 10 and 14 days after fertilization).

(8) Prohibit the buying and selling of human embryos.

(9) Instruct the United States Patent and Trademark Office not to issue patents on claims directed to or encompassing human embryos or fetuses at any stage of development; and amend Title 35, United States Code, section 271(g) (which extends patent protections to products resulting from a patented process) to exclude these items from patentability.

(From *Reproduction and Responsibility: The Regulation of New Biotechnologies*, 2004, available online at www.bioethics.gov)