

Biotechnology and the Idea of Human Nature

Modern medical biotechnology has captured the public imagination like few scientific developments since the splitting of the atom. Little wonder, for the issues it raises are vivid, dramatic and directly relevant to our lives and well-being. Here we have a powerful, new, some might even say revolutionary technology for detecting and treating disease. What ethical constraints, if any, should we place on its development and application? What impact will this technology have on our values, our institutions, and our general view of ourselves and the world?

There has been considerable public debate about the risks, costs, and benefits of recent developments in biotechnology. These issues, important as they are, are raised by any new technology. Perhaps the most interesting issues about biotechnology, however, are those peculiar to it, concerning the very idea of manipulating life and accelerating evolution. While these issues are less familiar and harder to articulate, they arguably lie behind much of the public concern and apprehensiveness regarding biotechnology, and often form the "subtext" for the public debate.

The Evolving Debate

When recombinant DNA techniques were first developed as tools for laboratory research, there was a great deal of concern about their safety and environmental risk. Critics described in lurid detail a "gruesome parade of horrors" that the new technologies might unleash — epidemics, ecological disasters, and "killer tomatoes." Some of the scenarios were plausible, but none of the disasters was unique to biotechnology: the roster is much the same for the discharge of industrial wastes or toxic chemicals, the introduction of exotic species into new environments, and the more mundane run of medical research. Nor does there appear to be anything novel in evaluating biotechnological risks; as several commentators argue, biotechnology requires no special techniques for assessing overall risk.

While some critics were demanding a temporary moratorium, others were raising broader concerns about intervention in the natural order. The phrase "playing God" was often invoked, and frequent allusions were made to Dr. Frankenstein and *Brave New World*. These critics saw biotechnology as not only risky but presumptuous: they warned of the terrible price we would pay for our hubris in defying the "wisdom of evolution." Defenders of biotechnology conceded that narrow concerns about risk were reasonable, if exaggerated, and could be addressed

by research and regulation. But they insisted that broader concerns about intervention were either a rearguard action against modern science and medicine, safely dismissed, or an expression of religious beliefs not widely shared in our society.

As biotechnology advanced and the worst fears of its critics failed to materialize, the tenor of the public debate changed somewhat. Ironically, as advances in biotechnology brought us closer to the ability to modify and create life, talk of playing God became less prominent. This may have been because such talk was associated with apocalyptic fears that proved unfounded, but it may also be that with greater exposure to biotechnology the public's concerns became more focused and specific.

In medical biotechnology, a standard agenda of issues has emerged during the past few years, debated in government-funded conferences and workshops, reviewed in scientific, legal, and policy journals, and reported in the popular media. This agenda focuses on the risks and social impact of biotechnology, especially issues of discrimination, privacy, and confidentiality in the use of genetic testing, screening and therapy. While concerns about the special difficulties of altering life and accelerating evolution have not been altogether ignored, they have received comparatively less attention in the last several years. I will suggest, however, that they are never far from the surface: they are raised, explicitly or implicitly, in any setting where the proper use of biotechnology depends on a baseline of "normal human functioning."

Not Just Doctors' Dilemmas

The most widely discussed applications of biotechnology are in medicine and health care, particularly in the area of genetic testing and screening. Biotechnology already enables us to detect many genetic disorders before their onset: not only asymptomatic stages of disease but also genetic susceptibility to disease. Who should authorize the tests for such disorders? Who should have access to their results? What choices (concerning, e.g., employment or insurance) should be influenced by this information? While some commentators note the potential for abuse in genetic testing — discrimination, breaches of confidentiality, and the like — there is no generally accepted view about what constitutes abuse.

Suppose an employer knows on the basis of a genetic test that one job candidate is more likely to suffer a debilitating disease than another, and so is a

poorer investment from the employer's standpoint. Is the employer guilty of unfair discrimination if she bases her hiring decision in part on such information? Are insurers unfairly discriminating if they supplement their actuarial tables with the results of genetic tests? In some respects, the employer and insurer would be conducting business as usual. But in other ways, they would be discriminating against the disabled.

How do we decide if genetically predisposed but asymptomatic individuals are handicapped, and so protected from discrimination? In determining what counts as a handicap, we appear to rely on a vague notion of normal human functioning as a baseline. But genetic testing raises questions about the meaning and coherence of that baseline, by revealing the extent to which all of us carry *potentially* lethal or debilitating genes. Are we ever healthy, or are we just asymptomatic?

Underlying this question are doubts about the very meaning of genetic susceptibility. Being genetically susceptible to a disease does not mean that one will contract that disease or even that one has a high probability of contracting it. Some philosophers argue that a claim of genetic susceptibility is really a subjunctive, or "counterfactual", conditional: if you were exposed to such-and-such environments (or maintained such-and-such a lifestyle), you would contract (within a range of probabilities) such-and-such diseases. However, the details of such a conditional are not at all clear. For example, most people who have the gene for the sickle cell trait on only one chromosome do not suffer from sickle cell anemia and have a certain immunity to malaria. But we wouldn't say that those who lack the sickle cell gene have a genetic susceptibility to malaria.

As in defining handicaps, we appear to rely on a notion of normal human functioning as a baseline for susceptibility — here, on normal human resistance to disease. Again, biotechnology raises doubts about the standard of normality invoked to regulate its use: if we can dramatically increase human resistance to disease, what level of resistance is "normal"? This question leads us to the most dramatic medical application of biotechnology: gene therapy.

Many diseases result from defects in specific genes. By repairing the defects or replacing the genes, doctors can treat such diseases at their source. This therapy can be performed on *somatic cells* or *germ cells*. In the former, only the appropriate cells of the affected individual are treated (e.g., bone marrow cells are treated for disorders in blood cells); in the latter, the reproductive cells are treated, thus preventing the defective gene from being transmitted to that individual's offspring. Somatic cell therapy is already being performed, provoking much interest but little opposition. The medical community had begun to assimilate it to more conventional forms of intervention, treating it as a kind of in-vivo drug delivery or micro-surgery.

While germ cell therapy is less advanced, it is far

more controversial. Because it alters the genetic code of the patient and his offspring, it is harder to regard it as a genetic version of conventional therapy. Germ cell therapy raises the specter of eugenics, albeit in a new way.

As traditionally understood, eugenics was an effort to improve the human race by applying the wisdom of animal breeders. The twist introduced by germ cell therapy is nicely described by Thomas Schelling: whereas the old eugenics consisted in selecting parents, the new eugenics consists in selecting children. Indeed, biotechnology seems to hold out the possibility that we will be able to design our children. Who is to decide these matters, and are there any moral constraints on these decisions?

The coercion and intrusion required by the old eugenics made its program morally objectionable. But no such coercion need be part of the new eugenics. Indeed, given the enormous authority we think parents should have in raising their children, why should we scruple over genetic manipulation? Eugenics, then, needs to be reexamined.

The philosophical discussion, however, has not yet risen to the challenge. Most writers rely on the traditional distinction between positive and negative eugenics, between therapy to produce enhancements and therapy to correct defects. The consensus is that only the latter is appropriate medical therapy. This distinction, though, will not stand up to close scrutiny: not only is the line between enhancements and corrections vague — when does correcting dwarfism become enhancing height? — but the concepts of health and disease on which the distinction rests are themselves threatened by biotechnology. Because "normal human functioning" is a vague and mutable standard, it is unclear how to define the abnormal or pathological state for which intervention is appropriate. We can no longer be comfortable with our conventional understandings of health and disease, any more than with our conventional understandings of handicap and susceptibility.

Underlying Concerns

When worries about manipulating life have been raised explicitly, they have taken the form of objections to "playing God." But the objection is at best obscure. In its religious formulation, the concern is that biotechnology gives us a God-like power whose exercise, if not an attempt to challenge God, is an attempt to interfere with His or Her plan. It is tempting to see secular objections to manipulating life as little more than Darwinian theology, with "God" replaced by "the wisdom of evolution." Much like God, Evolution works in mysterious, complex ways. We interfere with Its intricate workings at our peril; the price of our presumption may be the destruction of the human race, or the planet.

But this objection must make the controversial assumption that everything in nature is a result of adaptation, a careful balance of the myriad of ecological pressures and opportunities. Only if nature is

really in such delicate and precarious balance would our interference threaten monumental disaster. The reality of Darwinism is more reassuring. Evolution is chaotic, wasteful, and redundant; we do not confront a seamless web that our slightest blunder may rend. Moreover, neither the religious nor secular version of the objection can say what is so special — so specially fearsome — about biotechnology. Nearly every human activity from agriculture to sanitation can be seen as interfering with nature and evolution.

Nevertheless, it would be a mistake simply to dismiss such objections, which should be seen as poor articulations of important concerns. What are these concerns? I suggest that the worry about playing God is less a fear of apocalyptic failure than an anxiety about the implications of success. While there is no master plan in Nature or Evolution that our interventions may thwart, there are also no clear norms to guide our interventions. We may eventually be able to bring about radical changes in the physical and psychological capacities of human beings. What norms will guide us in deciding on these changes?

Until recently, our inability to make more than slight, incremental changes in human functioning spared us many difficult questions about how human beings should function. Our options were limited by such "basic facts" about humans as their vulnerability to a range of environmental toxins, their wide variation in natural talent and intelligence, and their three-score-and-ten year life-span. Biotechnology is fast removing these constraints, forcing us to consider the limits of genetic intervention: in conferring immunity to environmental toxins, in achieving "true" equality of opportunity, and in slowing or arresting the aging process.

Consider the environmental applications of biotechnology. Ordinarily, we understand by a polluted environment an environment that, as a result of our activities, is injurious to the health of the inhabitants. But this understanding of pollution turns on assumptions that cannot easily be sustained in the face of the possibilities of biotechnology. Instead of reducing the industrial discharge of dioxins and PCBs, why not modify humans so that they thrive on, or are indifferent to, these discharges? The decision about whether to alter the environment or its inhabitants would then be a purely economic one, a matter of efficiency. Of course, one might object that permitting unrestricted discharges would result in an aesthetically unpleasant environment, but that is not obvious — industrial sunsets may be more beautiful than pre-industrial ones — and it does not get to the heart of what we find objectionable.

Consider next the problem of distributive justice. We want to know how the various social goods (such as power and wealth) ought to be distributed in the face of obvious inequalities in the distribution of natural goods (intelligence, vigor, beauty and the like). Until recently, we have tried to move toward fuller equality of opportunity by redistributing social goods, e.g., by progressive taxation and remedial education.

Yet natural inequalities have stood as powerful obstacles to these efforts. While we could attempt to compensate for gross disparities in natural endowment, we could not directly or alter or control the "natural lottery".

How will our understanding of distributive justice change as we learn to control the distribution of natural goods? More than twenty years ago, Bernard Williams noted that a radical solution to inequality would present itself if "an individual's characteristics could be *pre-arranged* by interference with his genetic material," a possibility on whose "dizzying consequences" he declined to speculate. We may soon have to confront those consequences. As we acquire control over the natural goods of genetic endowment, do they become social goods, subject to the principles of distributive justice? Or should the distinction between natural and social goods be maintained, despite the advances of biotechnology? If so, how should that distinction be made?

Finally, consider the problem of aging. As Daniel Callahan has observed, we have long regarded seventy to eighty years as the natural life span, even when few people survived to adulthood. Most of the dramatic breakthroughs in modern health care and medicine, such as the development of antibiotics, allowed an increasing proportion of the world's people to reach their "allotted span of years" but did not push the chronological frontier much beyond what it had been in ancient times.

MEDICAL BOOK ILLUSTRATION

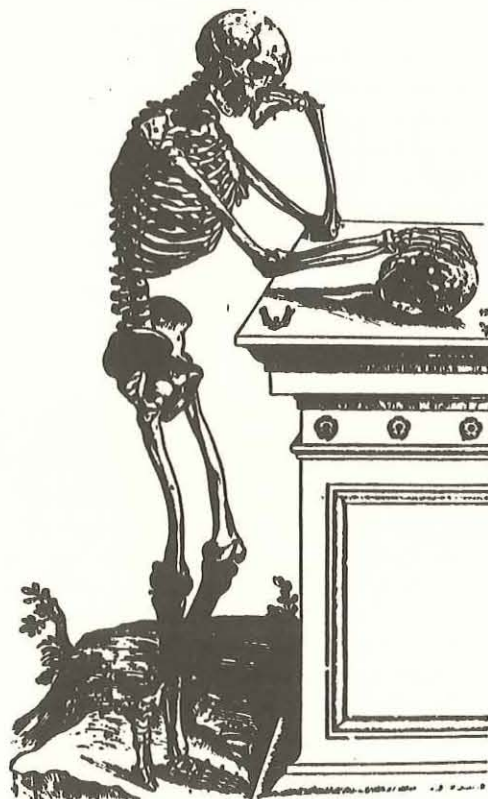


Plate 19. A skeleton from Andreas Vesalius: *De fabrica*, 1543.

More recently, modern hospital technology has indefinitely extended biological life through "extraordinary life-support." We have come to recognize that mere biological survival is not an unmixed blessing. Biotechnology confronts us with a far more radical specter: the indefinite prolongation of conscious, active life through the control of the aging process. If we can stop or slow the genetic program for cell senescence while controlling cell growth, we may be able to increase the human life-span dramatically. But if there are no longer natural limits, how many years should we allot ourselves? How much is enough? Do ever longer life-spans require a profound adjustment in our social institutions? Within a decade, these may well be pressing policy issues.

Biotechnology raises challenging new issues for public policy. In freeing us from the constraints of "normal human functioning," it may undermine the

assumptions that underlie much of the current policy debates. We will have to confront issues that were once left to philosophers and science fiction writers, and make decisions that were once thought to be God's alone.

—Robert Wachbroit

Among the sources discussed or cited in this article are J. Fiksel and V. Covello, "The Suitability and Applicability of Risk Assessment Methods for Environmental Applications of Biotechnology," in J. Fiksel and V. Covello, *Biotechnology Risk Assessment*, Pergamon (1986); Daniel Callahan, *Setting Limits: Medical Goals in An Aging Society*, Simon & Schuster, 1987; Bernard Williams, "The Idea of Equality" in Laslett and Runciman, *Philosophy, Politics and Society*, (Second Series) Blackwell, 1962; R. Wachbroit, "Making the Grade: Testing for Human Genetic Disorders," *Hofstra Law Review* 16 (Spring 1988): 583-99.

Nature Versus the Environment

Literature, history, and the arts take up the idea of nature as often as the ideas of humanity or love; indeed, a culture or an intellectual period can be identified by the symbolism it attaches to natural objects. No society has developed a culture that does not discover symbols in nature and attach special significance to them. But are these expressions of reverence for nature merely curious cultural artifacts, or do they have relevance for the contemporary debate on the environment?

Nature as Beauty and Power

"The two most obvious characteristics of Nature," the philosopher Alfred North Whitehead once said, "are loveliness and power." These were the principal characteristics artists and writers of the American Romantic tradition, including the transcendentalists, found in Nature — which they always spelled with a capital "N." Emerson, for example, discovered in the beautiful and the sublime aspects of Nature moral and religious lessons. "Man is fallen; nature is erect, and serves as a differential thermometer, detecting the presence or absence of the divine sentiment in man."

The transcendentalists inherited from the Puritan tradition the vision of Nature as a collection of images and shadows of divine things ("faint clues and indirections," Walt Whitman wrote) — although the buoyant Emerson thought these symbols were a lot easier to read than did the Puritan theologian Jonathan Edwards a century earlier. Similarly, the landscape of the American West impressed preservationists like

John Muir as a heritage direct from God's hand — a temple in which we should set foot only to worship.

What is striking today about the Romantic imagination of the nineteenth century is the insistence with which it portrayed Nature in moral, religious, and aesthetic terms — in terms of its beauty and power — and avoided mentioning its utility. The literature and art of the period — the paintings of Thomas Cole are an example — suggest that to use Nature is to transgress it, to put something foreign and artificial, i.e., Civilization, in its place. In one passage in which Emerson acknowledges the utility of Nature, he does so apologetically: we "draw our living as parasites from her roots and grains" he wrote, while we receive "the sublime moral of autumn and of noon."

The more Americans exploited the environment — the more they thrust civilization upon it — the more their literature and art celebrated the beauty and power of the Nature they destroyed. The historian Perry Miller observes:

The astonishing fact about this gigantic material thrust of the early nineteenth century is how few Americans would any longer venture, aside from their boasts, to explain, let alone to justify, the expansion of civilization in any language that could remotely be called that of utility. The more rapidly, the more voraciously the primordial forests were felled, the more desperately poets and painters — and also preachers — strove to identify the personality of this republic with the virtues of pristine and untarnished, or "romantic" Nature.