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The Problems and Possibilities of Modern Genetics: A Paradigm for Social, Ethical, and Political Analysis

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INTRODUCTION

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Imagine a future in which any person, man or woman, could engineer a child as a genetic replica of himself or herself. Or a future in which a child could be the biological fusion of the genes of two men or two women. Or a future in which every individual could know, with reasonable certainty, which diseases they would suffer in the months, years, or even decades ahead. Would this new genetic age constitute a better world, or a deformed one? The triumph of modern civilization, or the realization of modernity's dark side?

With a subject as large and as profound as modern genetics, we face a major question from the start about how to approach it. We could take a scientific approach, examining the use of information technology in genomic research, or the latest advances in identifying certain genetic mutations, or the use of genetic knowledge in the development of medical technologies. We can take a social scientific approach, seeking to understand the economic incentives that drive the genetic research agenda, or surveying public attitudes toward genetic testing, or documenting the use of reproductive genetic technology according to socioeconomic class. We could take a public safety approach, reviewing different genetic tests and therapies for safety and efficacy with a view to identifying regulatory procedures to protect and inform vulnerable patients undergoing gene therapy trials. As we think about the genetic future, all of these approaches are valuable. Yet there are even more fundamental questions that need to be addressed. These concern the human meaning of our growing powers over the human genome.

The reason modern genetics worries, excites, and fascinates the imagination is that we sense that this area of science will affect or even transform the core experiences of being human—such as how we have children, how we experience freedom, and how we face sickness and death. Like no other area of modern science and technology, genetics inspires both dreams and nightmares about the human future with equal passion: the dream of perfect babies, the nightmare of genetic tyranny. But the dream and the nightmare are not the best guides to understanding how genetics will challenge our moral self-understanding and our social fabric. We need a more sober approach—one that confronts the real ethical and social dilemmas that we face, without constructing such a monstrous image of the future that our gravest warnings are ignored like the bioethics boy who cried wolf.

What is the role of constitutional adjudication in confronting these dilemmas? In a word, that role should be limited. To be sure, American constitutional principles and institutions provide the frameworks and forums for democratic deliberation regarding bioethical and other important moral questions, but in most cases it will not be possible to resolve them by reference to norms that can fairly be said to be discoverable in the text, logic, structure, or historical understanding of the Constitution. Reasonable people of goodwill who disagree on these matters may be equally committed to constitutional principles of due process, equal

protection, and the like; and it would be deeply wrong—profoundly anti-constitutional—for people on either side of a disputed question left unsettled by the Constitution to manipulate constitutional concepts or language in the hope of inducing judges, under the guise of interpreting the Constitution, to hand them victories that they have not been able to achieve in the forums of democratic deliberation established by the Constitution itself. It would be a tragedy for our polity if bioethics became the next domain in which over-reaching judges, charged with protecting the rule of law, undermine the constitutional division of powers by usurping the authority vested under the Constitution in the people acting on their own initiative (as is authorized under the laws of some states) or through their elected representatives.

Possibility and Prediction

In thinking about the new genetics, it is all-too-easy to commit two errors at once: worrying too much too early and worrying too little too late. For decades, scientists and science-fiction writers have predicted the coming of genetic engineering: some with fear and loathing, some with anticipatory glee. But when the gradual pace of technological change does not seem as wonderful as the dream or as terrible as the nightmare, we get used to our new powers all too readily. Profound change quickly seems prosaic, because we measure it against the world we imagined instead of the world we truly have. Our technological advances—including those that require transgressing existing moral boundaries—quickly seem insufficient, because the human desire for perfect control and perfect happiness is insatiable.

Of course, sometimes we face the opposite problem: Scientists assure us that today's breakthrough will not lead to tomorrow's nightmare. They tell us that what we want (like cures for disease) is just over the horizon, but that what we fear (like human cloning) is technologically impossible. The case of human cloning is indeed instructive, revealing the dangers of both over-prediction and under-prediction. So permit us a brief historical digression, but a digression with a point.

In the 1970s, as the first human embryos were being produced outside the human body, many critics treated in vitro fertilization and human cloning as equally pregnant developments, with genetic engineering lurking not far behind. James Watson testified before the United States Congress in 1971, declaring that we must pass laws about cloning now before it is too late. In one sense, perhaps, the oracles were right: Even if human cloning did not come as fast as they expected, it is coming and probably coming soon. But because we worried so much more about human cloning even then, test-tube babies came to seem prosaic very quickly, in part because they were not clones and in part because the babies themselves were such a blessing. We barely paused to consider the strangeness of originating human life in the laboratory; of beholding, with human eyes, our own human origins; of suspending nascent human life in the freezer; of further separating procreation from sex or of treating procreation as a species of manufacture and a child as the operational objective of an application of technique. Of course, babies

who are produced by IVF are loved by their parents and are, in themselves, great blessings. Whatever one's views of the ethics of IVF (and the authors of this paper are not entirely of one mind on the question) no one would deny that it has fulfilled time and again the longing most couples possess to have a child of their own, flesh of their own flesh. But, by the same token, no one should deny that it has also created strange new prospects, including the novel possibility of giving birth to another couple's child—flesh not of my flesh, you might say—and the possibility of picking-and-choosing human embryos for life or death based on their genetic characteristics. It has also left us the tragic question of deciding what we owe the thousands of embryos now left-over in freezers—a dilemma with no satisfying moral answer.

But this is only the first part of the cloning story. Fast-forward now to the 1990s. By then, IVF had become normal, while many leading scientists assured the world that mammals could never be cloned. Ian Wilmut and his team in Scotland proved them all wrong with the birth of Dolly in 1996, and something similar seems to be happening now with primate and human cloning. In 2002, Gerald Schatten, a cloning researcher at the University of Pittsburgh, said "primate cloning, including human cloning, will not be in our lifetimes." By 2003, he was saying that "given enough time and materials, we may discover how to make it work." In 2007, researchers at Oregon Health Sciences University announced the successful cloning of primates, which has since been repeated by scientists across the globe. And today, leading laboratories around the world are eagerly—and confidently—at work trying to produce the first cloned human embryos for research. If they succeed, the age of human "reproductive cloning" is probably not far behind.

The case of human cloning should teach us a double lesson: beware the dangers of both over-prediction and under-prediction. Over-prediction risks blinding us to the significance of present realities, by focusing our attention on the utopia and dystopia that do not come as prophesied. Under-prediction risks blinding us to where today's technological breakthroughs may lead, both for better and for worse. Prediction requires the right kind of caution—caution about letting our imaginations run wild, and caution about letting science proceed without limits, because we falsely assume that it is always innocent and always will be. To think clearly, therefore, we must put aside the grand dreams and great nightmares of the genetic future to consider the moral meaning of the genetic present. And we need to explore what these new genetic possibilities might mean for how we live, what we value, and how we treat one another.

Humanly speaking, the new genetics seems to have five dimensions or meanings: (1) genetics as a route to self-understanding, a way of knowing ourselves; (2) genetics as a route to new medical therapies, a way of curing ourselves; (3) genetics as a potential tool for genetic engineering, a way of re-designing ourselves and our offspring; (4) genetics as a means of knowing something about our biological destiny, about our health and sickness in the future; and (5) genetics as a tool for screening the traits of the next generation, for

choosing some lives and rejecting others. We want to explore each of these five dimensions in turn—beginning with the hunger for self-understanding.

Genetic Self-Understanding

The first reason for pursuing knowledge of genetics is simply man's desire to know, and particularly man's desire to know *himself*. Alone among the animals, human beings possess the capacity, drive, and ability to look upon ourselves as objects of inquiry. We study ourselves because we are not content to live unself-reflectively. We are not satisfied living immediately in nature like the other animals do, asking no questions about who we are, where we came from, or where we are going. We do not merely accept the given world as it is; we seek to uncover its meaning and structure. Modern biology, of course, is only one avenue of self-understanding. But it is an especially powerful and prominent way of seeking self-knowledge in the modern age. Instead of asking who we are by exploring human deliberation, judgments, and choices, or human achievement in the arts, humanities, and sciences, or human polities, societies and cultures, the biologist seeks knowledge of the human by examining what might be called the "mechanics" of human life. Genetics fits perfectly within this vision: it seems to offer us a code for life; it promises to shed empirical light on our place in nature; it claims to tell us something reliable about our human design, our pre-human origins, and, perhaps, our post-human fate.

But the more we learn about genetics, the more we seem to confront the limits, as well as the significance, of genetic explanation. As the cell biologist Lenny Moss put it:

> Once upon a time it was believed that something called "genes" were integral units, that each specified a piece of phenotype, that the phenotype as a whole was the result of the sum of these units, and that evolutionary change was the result of new changes created by random mutation and differential survival. Once upon a time it was believed that the chromosomal location of genes was irrelevant, that DNA was the citadel of stability, that DNA which didn't code for proteins was biological "junk," and that coding DNA included, as it were, its own instructions for use. Once upon a time it would have stood to reason that the complexity of an organism would be proportional to the number of its unique genetic units.[1]

But in fact, the triumph of modern genetics has also meant the humbling of modern genetics. Big hypotheses now seem to require revision and greater measure. And in many ways, we are probably relieved that genetics does not tell

[1] Lenny Moss, *What Genes Can't Do* (Cambridge: MIT Press, 2003), 185. Quoted in Steve Talbott, "Logic, DNA, and Poetry," *The New Atlantis*, no. 8 (Spring 2005), 66.

us everything we need to know about ourselves. For human beings, this means that we are a great deal freer than we would be if it were the case that a purely genetic account of being human answered all the interesting and important questions.

Even as we are relieved at discovering the limits of genetic determinism, however, our hunger for genetic understanding remains strong. Disease is a threat to our freedom as well as to our very lives, and we still hope that genetics might help us conquer that mortal threat. We still hope that genetics is the secret of disease, if not the secret of life.

Genetic Therapy

And this leads us to the second dimension of the new genetics: the search for medical cures. Modern science, unlike ancient science, does not rest on the foundation of curiosity alone. It seeks not merely to understand nature, but also to control it for the sake of other ends. Human beings understand knowledge as something often worth pursuing for its own sake, but they recognize at the same time that many types of knowledge are instrumentally quite valuable as well. While man may be the only truly curious animal, his curiosity is not his only guiding passion and probably not his most powerful passion. He also understands the value of health and looks for ways to preserve it; and he certainly fears death and seeks to fend it off. Like other animals, human beings seek comfort and survival. But unlike other animals, we possess the capacity to pursue comfort and survival through the systematic application of reason. Modern science, especially modern biology, promises the "relief of man's estate," in Francis Bacon's famous phrase, in return for the right to explore nature without limits. Descartes skillfully negotiated this bargain centuries ago, and we quote here a passage much cited by those interested in the origins of modern science:

> 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 for 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.[2]

Not surprisingly, the "nature" we most seek to "master" is our own. We seek

[2] Rene Descartes, *Discourse on Method*, in *The Philosophical Works of Descartes*, vol. I, ed. Elizabeth S. Haldane and G. R. T. Ross (Cambridge, Eng.: Cambridge University Press, 1931), 119-120. Originally published in 1637.

to conquer human disease, and perhaps even to make death itself a series of conquerable diseases. Evidently, our genetic code has fitted us to revolt against our genetic fate.

Of course, the "speculative philosophy" of the Schools that Descartes sought to leave behind was suffused with religion, and quite centrally concerned with the search for man's place in the cosmological whole and before God. The new science and the old religion thus seem to present us with two different ways of revolting against our biological fate: The religious believer seeks such revolt beyond nature in God, by looking beyond our genetic deficiencies to the hope of eternal salvation. The scientist seeks such revolt through nature in science, by understanding nature's mishaps (or mutations) so that we might correct them. The unknowable God, if one believes He exists and interests Himself in the affairs of men (as Jews and Christians believe), promises better long-term results; He may begin "curing" (or perfecting) us now, but will complete the job only after we breath our last mortal breath. The empirical scientist, if you give him enough funding, specializes in near-term results; he cures us now, but only for a while. This does not mean that science and religion are enemies: religious people are often great scientists, and great scientists are often deeply religious. But it does suggest that the cure-seeking scientist lives on the narrow ridge between holiness and rebellion: He imitates the old God by healing the sick; yet, at the cutting edge, he always risks supplanting the old God by believing that he can in some truly comprehensive way "relieve man's estate," by working within nature rather than looking beyond it.

Genetics, in this sense, is simply a new frontier in the long ascent of modern medicine. It aims to repair broken genes or correct disease-causing mutations by direct intervention. And it aims to use our growing understanding of the human genome to diagnose and treat human disease with greater precision.

But it turns out that most diseases are too complicated to be conquered or even effectively managed by genetics alone, and that markers for identifying and predicting a given disease do not always or easily translate into usable knowledge about the disease's causation. The capacity to fix genes with perfect precision and without side effects is also proving remarkably difficult. Already, there have been some high-profile examples of gene-therapy trials going terribly wrong, and the field now proceeds with perhaps a more befitting caution. Over time, of course, there is little doubt that our genetic knowledge will improve modern medicine and thus prove a great blessing to us all. But there also seems little doubt that the new genetics will not be the therapeutic panacea that many once hoped, and which many scientists and policymakers offered as a (perhaps *the*) central justification for the human genome project. Biological knowledge and biological control are simply not the same, even when it comes to curing diseases, and most certainly when it comes to so-called genetic engineering.

Genetic Design

This brings us to the third dimension of the new genetics: the prospect of designing our descendants, a prospect much-feared, much-discussed, much fancied, and probably much over-stated. In the reproductive context, the real dilemma (already here, in its early form) involves picking and choosing human embryos for implantation based on the genetic characteristics that nature gave them. But this is significantly different from designing human beings with genotypes entirely of our own creation. By focusing so much on the dream and the nightmare of genetic engineering, we risk treating the real-life possibilities of genetic control as less profound than they really are. Yet again there is the danger that we will worry too much too early or too little too late.

To be sure, it may turn out to be possible (perhaps soon) to engineer genetic monstrosities—like a human version of the monkeys with jellyfish genes that glow in the dark. Perhaps some modern-day Frankenstein will create human fetuses with primordial wings; or children with seven fingers; or human beings that are part male and part female by design. If human life is seen as a mere canvas, and if the biologist sees himself as an artist thriving on "transgression," then genetic engineering will indeed prove to be a nightmare. And sadly, there is little doubt that someone, somewhere, will attempt such terrible experiments, and may succeed in producing at least embryonic or fetal monsters. But there remain good reasons to believe that most democratic societies, in the name of safety if not morality, will enact legislative barriers to the biological equivalent of postmodern art. Precisely because it is so grotesque, such monster-making is not our most urgent ethical problem.

Democratic societies, after all, do not seek the monstrous; we tend, rather, to seek the useful. And the worst abuses of biotechnology may come in trying to make the difficult, often harsh, dimensions of life disappear (like physical deformation, childhood disease, early causes of debility and death) in the name of compassion or mercy, and to do so by screening and aborting those with handicaps or deformities that some people are tempted to believe make their lives not worth living. There will always be knaves who engage in monstrous acts merely for the thrill of transgressing social norms. But the real challenge is to consider those uses of genetic knowledge and genetic choice that are both technically feasible (as science, not art) and that seem to run with rather than against the grain of liberal society. It is those potential abuses that have some utilitarian justification—such as improving life, or ending suffering, or guaranteeing every child a healthy genome, or expanding reproductive freedom—that we must confront squarely and without delay.

But since many people worry so much about full-blown genetic engineering, we should not ignore it entirely. So let us offer a brief critique. The most tempting reason to engage in genetic engineering is to assert new kinds of control over our offspring, and to design children with certain desirable human attributes: children

with high IQs, perfect pitch, beautiful appearance, remarkable strength, amazing speed, and photographic memories. Some might even seek to design human offspring with better-than-human attributes. But these scenarios strike us as technically unlikely, and not merely humanly misguided. Technically, we doubt whether we will acquire soon, or perhaps ever, the sophistication to engineer certain human traits de novo, and we doubt whether the traits some enthusiasts seek to engineer are so clearly rooted in a definable genetic pattern that we can deliberately replicate or improve the pattern. At the very least, we believe the project of trying to find such patterns and implement such designs would involve so many grotesque failures that the backlash would be swift and overwhelming.

More deeply, we doubt that human ingenuity and technical skill will ever prove up to the task of designing a better human being—even as a genetic thought experiment. If the goal of the designer is human excellence or better-than-human excellence, he must begin with an idea of excellence itself. And here, we face two insurmountable hurdles: First, we doubt that modern scientists can improve upon nature when it comes to making a better musician, or artist, or scientist. It is hard to imagine a composer better than Mozart or a playwright better than Shakespeare. In seeking to maximize some human trait by genetic manipulation, we will most likely deform other crucial traits, and thus deform the excellent human wholes that nature so mysteriously and so remarkably supplies. And if we seek, say, to make faster men to run our races, have we really created better men—or just biological machines? Cars move faster than men; pitching machines throw harder than pitchers—but neither invention is better than human; they are merely sub-human things. (This problem is explored in great detail in *Beyond Therapy*, a report produced by the President's Council on Bioethics, on which and for which we both served.) And even if we could make as many Mozarts as we like, do we really serve the cause of human excellence by making that excellence so common?

The second major barrier to the genetic engineering project is the fact that superior talent is not the only form of human excellence. Many of the most admirable human beings do not live lives dominated by measurable achievement, but lives of fidelity, charity, love, courage. Perhaps there are important genetic predispositions to such traits of character, but good genes are rarely enough to make good men, even if bad genes sometimes make individuals so psychologically impaired (or chemically imbalanced) that virtue is beyond their reach. Moreover, we suspect that even replicating these good genetic predispositions will be beyond the engineer's reach, because they involve so many biological factors that go beyond mere genetics. Even if our technology improved, we are dubious about the possibility of engineering more virtuous offspring—which is the only real measure of whether genetic engineering would make human life truly better.

All that said, the one form of "genetic engineering" that does demand our attention is the very real prospect of human cloning—a way of controlling the genetic make-up of our offspring with great precision, by copying the genetic make-up of someone already here. The ethical and social significance of human cloning is profound, involving a deep violation of the relationship between parent

and child. But technically, cloning is remarkably simple compared to other imagined forms of genetic engineering. It does not involve manipulating the interlocking pieces of the human genome, but the wholesale replication of an existing genotype. It is more like copying a great novel already written than writing a great novel from scratch.

And it is this comparative technical ease, in fact, that makes cloning a genuine worry, not simply a distracting dream or nightmare. Cloning involves a perverse form of self-love, by imposing our own genomes on our children. In a sense, it robs new life of an open-ended future, and it forces the young clone to live always and forever in the shadow of his elder genetic twin—in the shadow of both his past accomplishments and past failures. In the end, human cloning may prove a test case of our capacity to limit the dehumanizing uses of biotechnology, and our capacity to defend those human goods—like the family—that make human life truly human.

Genetic Foreknowledge

But if most forms of genetic engineering, beyond cloning, are probably not in the offing, this hardly means that the new genetics is socially and ethically insignificant. What it means is that we need to pay much closer attention to the human meaning of genetic knowledge itself—both how we use it and what it does to us once we possess it. And this brings us to the fourth dimension of the new genetics: the meaning of our gaining partial foreknowledge about our biological fate, and especially the meaning of our knowing bad things (or good things) about our biological future.

Of course, to be self-aware at all is to have some foreknowledge of our mortal destiny: We know that death will one day take us; we know that natural disasters, or terrible accidents, or vicious attacks could make this day our last day; we know that some mysterious ailment could strike us without warning. Those of us who eat the wrong foods and spend too much time at our desks know that heart problems and clogged arteries may lie in our future; even without sophisticated genetic tests, we know about the presence of hereditary diseases in our families; and we all know that time will eventually win its final victory, whether at age 70, or 80, or 90, or 100.

And yet, most of us live our day-to-day lives without focusing too much on our own mortality. For better and for worse, we do not live each day as if it could be our own last; we do not make the fact of death a dominant reality in our everyday lives. When a loved one dies or some tragedy strikes, we are perhaps reminded of our mortal condition; we might imagine our children throwing dirt into our graves. But the immediacy of life quickly returns, and we live again, for a while, as if the horizon of the future were very long, if not indefinite.

Strangely, modern individuals are both more obsessed with death and less aware of death than our less-modern forebears. We are obsessed with trying to

avoid death through better diets and better medicine, yet we are less aware of death because it rarely strikes us in untimely ways, at least compared to the omnipresence of death in the lives of our ancestors. In advanced societies today, most people die after living full lives, not from mass plagues, or mass killings, or infant mortality.

In an essay on the meaning of mortality, the philosopher Hans Jonas quotes the following passage from Psalms: "So teach us to number our days, that we may get us a heart of wisdom." His point is not primarily religious but existential. If we lived as if tomorrow were forever, we would lack the urgency to live boldly and love deeply. And if we believed that this life would last forever, even the sweetest things would become routine.

But in the age of genetic testing, the instruction to "number our days" takes on new meaning, since these tests may allow us—or force us—to number them with increasing precision. Today, we can diagnose numerous deadly diseases using genetic testing with absolute or near-absolute certainty, and long before we experience any visible symptoms. For some of these diseases—like Huntington's—there is no cure; the diagnosis is a death sentence, giving the likely age of onset, the likely period of decline, and the likely age of death if nothing else kills first. For other diseases—like breast cancer—genetic tests can offer a highly reliable, though not quite perfect, indication of a person's susceptibility to the disease, with potential treatments ranging from preemptive surgery to remove one's breasts and ovaries to intense monitoring to detect the coming cancer as early as possible.

But does this genetic foreknowledge make life better or worse? Is there a case for genetic ignorance? At what age and under what circumstances should people know their genetic fates? These are hard questions with no easy answers. They also present difficult questions of law and governance: In protecting the individual father's or mother's right to know his or her genetic fate, are we undermining the child's right to genetic ignorance? Should those with healthy genes be allowed to benefit from their good fortune by paying less for health insurance? Or does this right to benefit from one's genetic profile in the free market necessarily come at the grave social cost of making those with bad genes uninsurable? All hard questions—morally, existentially, socially, legally—with no easy or obvious answers.

In those situations like Huntington's, where the diagnosis is clear and there is no cure, genetic self-knowledge seems like both a blessing and a curse. It is a blessing, because it might lead individuals to an uncommon wisdom about the preciousness of life; it might move them to live without wasting time, because they know just how short their time really is. And yet, such foreknowledge must also seem like a curse; the permanent presence of looming death might make living seem worthless; there are too many projects they know they can never finish and too many ambitions they know they can never fulfill. Their genetic death sentence may come to feel like a living death.

In those situations where some therapeutic intervention is possible, like for

those who test positive for the breast cancer mutation, the young often face drastic and wrenching decisions: Is the greater chance of longer life worth living with the scars of mastectomy, or living without the possibility of bearing children? Is it really better to have the knowledge that makes such a tragic choice necessary, rather than the ignorance that would allow us to live without being so haunted until the disease really comes?

Right now, the number of diseases we can test for genetically is somewhat limited, and many of these tests offer clear positive or negative diagnoses. But what may be coming is a world of imperfect knowledge about terrible possibilities—with a battery of tests that give greater and lesser probabilities of getting certain diseases, at certain times, compared to the general population. All of our human fears will be sharpened; our anxiety made more precise; our worries and fears given a genetic scorecard. What good is this knowledge to us, especially when the power to diagnose will come long before the power to cure—the so-called "diagnostic-therapeutic gap"? And yet, will we be able to resist this new form of high-tech astrology? Will it teach us to number our days and make us wise? Or will it make life seem like a short trip through a genetic minefield—by forcing us to confront every morning the ways in which we might die?

Genetic Choice

These types of genetic foreknowledge take on new meaning when we move to the reproductive sphere, and when the burden is not simply living with knowledge of one's own potential fate, but deciding whether genetic knowledge may be regarded as justifying decisions to abort an affected fetus or discard an affected embryo. And this leads us to the final dimension of the new genetics: the use of genetic knowledge to decide between "life worth living" and "life unworthy of life."

For a long time, people have worried about the so-called "enhancement problem," and feared that wealthy parents would use genetic technology to get an unfair advantage for their offspring. But perhaps the greater and more urgent danger is that the limitless pursuit of equal results—the desire to give everyone a mutation-free life, and thus an equal chance at the pursuit of happiness—will actually undermine our belief in the intrinsic equality of all persons. The pursuit of genetic equality will lead to an age of genetic discrimination. Indeed, in some ways, it already has.

Of course, if we could cure Tay-Sachs or Down syndrome during any stage of development, from the earliest embryonic stage forward, we would do so. But once conception has taken place, and in cases in which there is no cure, we are left with the decision to accept or reject—to nurture or destroy—a human life in-progress, a life that is real enough to us that we can evaluate and pass judgment on its genetic characteristics. With the arrival of pre-implantation genetic diagnosis (PGD), we may face a radical transformation of assisted reproduction—a

transformation made more significant by the rising numbers of couples and even single women who are now turning to IVF to have children. In this new world, genetic testing would become a standard part of IVF, and the tested embryos would be divided into different classes: those doomed to suffer killer diseases like Tay-Sachs would be separated from those who are not; those doomed to suffer disabilities like Down syndrome would be separated from those who are not; those prone to suffer late-onset diseases like breast cancer would be separated from those who are not.

By making reproduction into a process of division by class, we would transform the welcoming attitude of unconditional love into a eugenic attitude of conditional acceptance. Of course, we would do this in the name of compassion, or mercy, or equality. We seek to give our children healthy genetic equipment, and to spare those who would suffer by "nipping them in the bud." But the pursuit of genetic equality requires a radical program of genetic discrimination and a willingness to discard those judged to be unfit. Whatever one might think about the moral status of the early embryos tested in PGD, they are certainly not nothing. They are developing members of the human species—offspring of their parents—possessing the same genetic identity as embryos that they would possess through life if those who created them in the first place did not decide to cut their lives short.

Seen clearly, the real danger of the genetic age is not that the "gene-rich" will outpace the "gene-poor"; it is that the pursuit of genetic equality will erode our willingness to treat those who are genetically impaired as humanly equal. We will replace the hard but humanizing and elevating work of loving and caring for the disabled with a false compassion that weeds out the inconveniently unfit. It is hard to see how the equal dignity of persons with Down syndrome is served by treating Down syndrome as a legitimate reason to abort—even for those who generally regard themselves as "pro-choice" on abortion. And it is hard to see how parents will experience pregnancy with any equanimity or joy if they have a full genetic read-out of their embryo or fetus, and must decide whether the mutation for breast cancer, or Parkinson's, or Alzheimer's disease is reason enough to abort and try again. This is the moral paradox at the heart of genetic control: In seeking an existence without misery or imperfection, we may make ourselves more miserable and imperfect; and we may even do miserable and ultimately dehumanizing things in the name of mercy.

Moral Wisdom and Modern Politics

The advance of modern genetics is one of the great achievements of our time, an example of the creative and truth-seeking spirit of our humanity. But too often, we thoughtlessly assume that the progress of science is identical to the progress of man. The truth is much more complicated. Many men and women of the past were superior in virtue to many of us now, and many scientific discoveries of the present and future (not unlike some discoveries of the past, such as nuclear

weapons) will prove a mixed blessing—at best.

The new genetics will deliver many goods, but also confront us with many burdens. We will need to make choices, and those choices will require philosophical judgments about "good" and evil" and "better" and "worse," not only scientific judgments about "possible" and "impossible." We will need to think especially about the goods in life that must be honored and respected, and cannot be trumped even by an otherwise legitimate desire to promote human health and longevity. This is a task that modern genetics is not equipped to handle; yet it is this very task, one requiring a return to first principles, that is necessary if we are to choose wisely and govern ourselves well in the genetic age.

In the meantime, however, we need to reflect on what sound governance means today—given the many scientific possibilities and technological unknowns, given the current political and cultural climate, and given the enduring realities of human nature that persist even as the possibilities of the genetic era expand.

First, it is imperative that we sort out the three overlapping issues of abortion, embryo research, and new modes of procreation—which are morally related but also distinct in various ways, and which are governed by different legal regimes and different political realities. Abortion is the destruction of a developing human life, inside the womb, in the supposed interests of the carrying mother, and sometimes because the developing child has a genetic defect or is the "wrong" gender (which usually means female). Embryo research is the exploitation and destruction of embryos in the laboratory, for the sake of medical advances and potential therapies. And new techniques for making babies involve the creation, screening, and manipulation of embryos in the laboratory, with a view, in the future, to implanting these genetically tested, modified, or cloned embryos into the child-seeking mother. In the first case we have a child whose parent or parents do not want him or her; in the second case we seek cures for the ones we love and instrumentalize nascent human life to get them; in the last case, we want a child that we could not otherwise have, or we want a child of a particular sort—cloned, screened, or enhanced.

Taken together, these three issues reveal the profound moral and legal contradictions that have taken shape over the last 30 years surrounding the beginnings of human life: We worry about manipulating embryos in a way that might lead to a new "eugenics," while protecting the legal right to destroy embryos and fetuses for any reason at all. It is legally possible to ban all research on embryos outside the body in some states—and even to treat such embryos, as Louisiana does, as "juridical persons"—while getting taxpayer funding to destroy them in other states. Some supporters of embryo research say that embryos outside the body are not human because they cannot develop to term unless implanted, while pro-choicers say that once we implant them in the very wombs where they might develop we cannot legally protect them. For years, we have been engaging in revolutionary new techniques of producing children in the laboratory—with little or no regulation and often no prior experiments on animals, and recent studies suggest that there might be real dangers and real harms to the resulting

children. We have engaged in this great baby-making experiment with the apparent approval of most American liberals, who seem to care more about not treating embryos as subjects (and thus imperiling, as they see it, the right to abortion) than protecting the well-being of IVF children-to-be. And while the FDA has said that it can regulate cloning-to-produce-children, and that the attempt to do this in the United States must pass its regulatory muster, they can only do so by treating the cloned embryo as a "product" (like a drug) that might imperil the health and well-being of the mother.

The successful efforts of partisans of abortion to persuade the Supreme Court (in the 1973 case of *Roe v. Wade*) to manufacture a constitutional right to abortion itself creates challenges to us as a society in trying to sort out this mess and put into place wise and truly humane policies. *Roe* is already cited by some as standing for a broad principle of "reproductive freedom" that necessarily extends to any and all manners of baby-making as well as to the unconstrained exploitation and manipulation of pre-natal human life. As technology advances, will *Roe* function as a sort of "eugenics license"? In our view, resisting such a development must be made a high priority. Even when it comes to abortion itself, many who regard themselves as generally pro-choice recognize the social harm *Roe* has done, not only as the result of the sweeping nature of the abortion right it created, but also by removing profound moral questions about the dignity of human life and the proper scope of human liberty from the forums of democratic deliberation and placing them in the hands of judges. The resulting "culture war" has left our nation deeply divided for nearly forty years.

Of course, the Supreme Court has on occasion stepped back from treating *Roe* as embodying the radically socially libertarian principle that some on the cultural left wish it to be. In 1997, in *Washington v. Glucksberg* and *Vacco v. Quill*, for example, the justices unanimously rejected lower courts' uses of *Roe* as a precedent for creating a constitutional right to assisted suicide. And the fate of *Roe* itself remains uncertain. Many believe that four of the nine justices currently serving on the Supreme Court would reverse it and return the question of abortion to the democratic process the moment a fifth justice was available to join them.

Whether *Roe* ultimately stands or falls, however, it is critical that it not become the jurisprudential basis for a larger judicialization of bioethics and genetics. These are issues on which reasonable people will disagree, and in most cases the disputed questions will be left unresolved by the text, logic, structure and historical understanding of the Constitution. Sober and thoughtful democratic deliberation will be needed, and should not be short-circuited by judicial interventions and impositions of policy. *Roe* itself was a dubious decision in our judgment; and for judges, now or in the future, to invoke it to rationalize similar usurpations when it comes to publicly disputed bioethical matters would be to multiply the abuse. There are even now decisions that must be made, and policies that ought to be enacted, which under any plausible reading of the Constitution are matters for legislative deliberation and resolution, not judicial imposition under the guise of constitutional interpretation.

These policies include:

- A national ban on all human cloning, which means a prohibition on the creation of cloned human embryos for any purpose.
- A permanent legislative ban on the patenting of human embryos.
- State-level prohibitions on the destruction of embryos for research.
- A new regulatory body that monitors the safety of new reproductive techniques, and that has the power to restrict those techniques that raise legitimate concerns about their long-term impact on the children whose lives are initiated or impacted in the early embryonic stage by these techniques.
- A national prohibition on the creation of human-animal hybrids using human sperm and animal eggs or animal sperm and human eggs.

In the end, of course, many of the moral and existential dilemmas of the genetic age will necessarily remain in the private sphere, faced by individuals who will have to make decisions about what kind of information they want, about themselves and their offspring, and decisions about how to live and act with imperfect information about painful prospects. The reach of politics is necessarily limited, and certain morally charged questions will always remain matters of prudence, best left to individuals and families and doctors and clergy. But certain matters—such as how we treat nascent human life, or the boundaries between man and the other animals—require the setting of public boundaries, and in some cases outright bans on activities that threaten human rights and dignity and the common good. The Constitution, as written and ratified, cannot reasonably and responsibly be interpreted as placing these matters beyond the purview of democratic deliberation and judgment. Otherwise, we will continue down a morally troubling path—seeking the power of gods to make life better, but creating a civilization that compromises and undermines human dignity in the process.

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