

## **POLITICS, SCIENCE, AND HUMAN PROGRESS— 1820, 1998, AND BEYOND**

**Christopher DeMuth  
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My remarks this evening will span four subjects that have dominated the morning headlines and evening news throughout the year: genetics and biotechnology; the uneven performance of the global economy; the quest to break Babe Ruth and Roger Maris's home run records; and politics and sex (after all, it's Friday evening). I am going to demonstrate that these matters are deeply related to each other and I am going to finish in time for the salad course in thirty minutes. And just to make it interesting I am going to begin not in 1998 but in the year 1820, when the whole story really got going.

Eighteen-twenty was a political year and epoch strikingly like our own. The recent defeat of the Napoleon's Evil Empire had put an end to nearly fifty years of continuous war and revolution in Europe and North America—leaving the world suddenly at peace and releasing vast, pent-up social energies for science, commerce, art, and literature. Yet the one remaining superpower, Great Britain, seemed consumed by a sensational sex scandal at the heart of the government. Queen Caroline, wife of the new King George IV, was a woman with a past, and also a present. A team of special government investigators had compiled overwhelming evidence of her adulteries and delivered it to the House of Lords, which began proceedings to strip her of her queenship. The lurid details of the Queen's assignations shocked even the most cosmopolitan, and presented embarrassing challenges to newspaper editors, hostesses of dinner parties, and parents of young children throughout the realm. Yet the nation was deeply divided over what, if anything, ought to be done, and the pro-Queen and anti-Queen forces reflected partisan political divisions as much as disagreements about sex and lying. One contemporary wrote that "I never remember any question which so exclusively occupied everybody's attention and so completely absorbed men's thoughts and engrossed conversation."

But not everybody's thoughts and attention. For in that same year of 1820 John Dalton delivered his landmark "Memoir on Oil, and the Gases Obtained from it by Heat," the scientific origin of the modern oil and petrochemical industries; papers by Ørsted and Ampère described an amazing relationship between magnetism and electricity, propelling Michael Faraday on his quest for machines to generate electrical energy from physical motion and vice versa; and Charles Lyell began his first work on geology, which, by treating the origin and history of the earth as natural and continuously changing rather than supernatural and fixed, was to inspire the lifework of his friend Charles Darwin.

By year's end the British public had wearied of the Queen Caroline scandal and wished that it would go away and the Queen with it; the proceedings in the Lords were soon abandoned amid bitter political recriminations, and within a year the Queen herself was dead. But in a decade Faraday had bequeathed the world his electric dynamo and Darwin was embarked on HMS *Beagle* on the most consequential voyage in the history of mankind. The quiet scientific advances of that tumultuous year lived and grew and transformed the world.

The events of 1820 mark the beginning of the modern age—the age when science and industry have displaced politics as the driving force of social and economic development. Great men and scoundrels continued to devote themselves to politics, terrible wars were fought, governments grew bigger and busier than they had ever been before—yet the society we know today was made by the wholly unprecedented and mostly private and apolitical progress of our knowledge of the natural world and the rapid commercial deployment of that knowledge.

Many of the great technological feats of those 178 years—in energy, construction, transportation, and communications—have dramatically changed our physical environment and the ways we live and work and spend our time. But it has been advances in biology and in the health and agricultural sciences that have had the most profound effects on human welfare and social structure.

Improvements in diet and medicine have made men and women far taller, stronger, healthier, and longer-lived than ever before—a transformation of the species far beyond any change discernible in the previous 11,000 years following the invention of agriculture. In an era when social equality has become a central political concern, improvements in public health have done more to equalize real life circumstances than any government policy. In 1820, the typical adult male worker in Britain was five inches shorter than his upper-class countryman; today the difference is about one inch. As recently as 1870 the average lifespan of the British upper class was more than seventeen years longer than that of the population as a whole; today the difference between the richest and poorest Brits is less than two years.

These historic reductions in social inequality came about mainly in the twentieth century—indeed they appear to have worsened during much of the period of rapid industrialization of the nineteenth century. What turned the tide were huge investments in biomedical technology and clinical medicine, cleaner public water and sanitation, and cleaner, cheaper, and more nutritious supplies of basic foods—all yielding relatively greater benefits for the poor than for the well-to-do. A powerful secondary effect of improved medical care and farm production was to launch women on the path toward social equality, a trend augmented in recent decades by the growth of the service and white-collar sectors: over the past century women's wages have risen on average 50 percent more rapidly than those of men. During the past third of a century, the development of cheap and effective contraception has probably had a more profound effect on social mores and family structure than any other technological advance, television and the automobile included.

These examples illustrate that achievements in the biologic sciences have yielded not only tremendous improvements in material welfare but also momentous changes in social relations and ethical norms. It is important to understand the range of consequences, because our knowledge and mastery of

nature seems now to have entered an entirely new and more powerful phase. Beginning with Watson and Crick's identification of the basic architecture of DNA in 1953, and especially since the development of recombinant DNA techniques starting in 1973, a cascade of astounding discoveries concerning the mechanics of genes and their complex interactions within living organisms, and inventions for the direct manipulation and duplication of genes, justify the media's prediction that we are entering an "age of biogenetics." In 1998 these developments were front-page material about once a month, such as the recent announcement of the successful isolation and *in vitro* cultivation of human stem cells—the critical link between the fertilized egg and the construction of the embryonic human body with its differentiated cells, tissues, and organs—which will give us the power to repair (indeed regrow) diseased or damaged organs in living adults.

The newspapers and business press naturally place heavy emphasis on imminent practical applications of genetics and biotechnology. Just now investors are more excited about agricultural and food applications and less so about medical applications than they were a year ago. No matter. The great medical advances of this century, as Lewis Thomas pointed out some years ago, have come not from applied but from basic research—that is, from new knowledge of underlying biological mechanisms—and in genetics our understanding of underlying mechanisms is increasing exponentially with no end in sight. One byproduct of the growth of basic science is that we can now say with virtual certainty that a given set of technical problems *will* be solved, long before we know exactly *how* they will be solved—just as NASA engineers were confident that they could land a man on the moon several years before they knew how they would do it, and as today the wizards at Intel are confident that they will continue to increase microprocessor speeds at rates comparable to those of the recent past.

So although geneticists and biotechnologists cannot say exactly how they will do it, and although there will be many flops and lucky breaks along the way, they know for certain today that they are going to bring many miracles to pass in

the coming decades. I will mention six developments—three in food and agriculture and three in human medicine and biology—that are highly likely and in some cases well advanced. And I will suggest a few possible social consequences of these developments.

- Development 1. Agricultural yields, both of plants and livestock, will increase greatly, due to genetic engineering of reproduction and growth and of resistance to pests, disease, and weather.
  - *Some consequences. As food continues to become cheaper and more plentiful, famine, malnutrition, and hunger will become, even more than they are today, purely political and economic phenomena—not to be explained away or tolerated as the inevitable result of too little supply or too many mouths. The first nations to accept the widespread introduction of genetically engineered foods will be the United States and Bangladesh; the last will be Germany and France.*
- Development 2. Foods will be genetically designed both to improve nutritional properties and to combine them with medicinal properties, including the reduction of risk of specific diseases.
  - *Some consequences. The link between diet and health, including disposition to disease, will come to be much more generally recognized than it is today. But continued poor eating habits and increased FDA regulation of “nutraceutical” foods will eliminate some of the potential health benefits.*
- Development 3. Genetic engineering of plants will yield effective substitutes for many critical materials such as plastics and metals that are now derived from petroleum and other minerals.
  - *Some consequences. The substitution of renewable resources for nonrenewable resources will alleviate many serious environmental problems. But environmental groups will be as divided as The*

*Business Roundtable over these developments, because they will dramatize the politically incorrect truth that economic growth and environmental improvement are not enemies but allies. Tax provisions will be enacted to subsidize certain renewable substitutes—but they will back the wrong technologies.*

- Development 4. Genetic diagnostics will improve dramatically, making the medical diagnosis of patients' symptoms much faster and surer and also permitting much more precise identification of individuals who are predisposed to certain diseases.

- ▶ *Some consequences. Genetic diagnostics will permit great improvements in the efficacy of medical treatment and also in the organization of health care—from the design of insurance to the introduction of highly specialized treatment centers in place of general hospitals. But progress in diagnostics will also prompt great political controversy—legislation will be introduced to ban “genetic discrimination” by employers and health insurers and to enact a “right of privacy” to one’s own genetic information.*

- Development 5. The advance of genetics and biotechnology will produce historic breakthroughs in the medical treatment of inherited and acquired diseases, burns and other traumas, birth defects—and even baldness, which will become a social memory in the way cavities in children are becoming today. The medical response to dread diseases, including many forms of cancer, AIDS, and Alzheimer’s, will progress from treatment, to cure, to prevention. Medical intervention will progress to pharmaceuticals that are custom tailored to the genetic profile of individual patients, and to “gene therapy”—direct genetic alteration of the cells of living organs to supercharge their response to disease, infection, and trauma. And someday, somewhere, gene therapy will move to “germ-line therapy”—the now-taboo genetic alteration of sex cells to affect the attributes of an

individual's progeny and successive generations, for example in the disposition to certain inherited diseases.

- ▶ *Some consequences. These are the Holy Grails of genetic research; their social consequences will be extensive. First and foremost will be immense reductions in human pain and suffering and increases in health and longevity. Healthy and active people in their eighties and nineties will become commonplace. Pundits will assert that these blessings are really a curse—bringing ruinously high health care expenditures and Medicare and Social Security bankruptcy—but they will be mistaken. The problems ascribed to better health and longer lives will really result from outmoded government financing arrangements, and these will be promptly reformed along lines proposed by the American Enterprise Institute. But serious new social challenges and ethical dilemmas will indeed arise: an older society may be more stable but also more stodgy and risk averse; ameliorating the biologic causes of disease will lay bare the role of their social and behavioral causes, intensifying debate over many sensitive and uncomfortable subjects; germ-line therapy will present monstrous as well as benign eugenic possibilities.*
- Development 6. Finally, animal cloning will progress all the way up the mammalian tree. Laboratory and domestic animals will be successfully cloned, then commercial livestock, then endangered species, then man himself.
  - ▶ *Some consequences. Popular opposition to animal cloning will evaporate when the Bengal tiger is cloned, then maybe even the spotted owl and the snail darter—but environmental groups will once again be conflicted by the prospect of technology-driven success. Human cloning will first be justified by, and limited to, infertile married couples, extending their options for children beyond*

*the current ones of adoption, artificial insemination, and surrogate motherhood. No one knows how many couples will prefer a baby identical twin of one parent to a natural child of one parent and an unknown mate or to an adopted child. And no one knows what will be the nature and extent of the demand for individual cloning, the ethical issues raised by extramarital cloning, or the social consequences of the introduction of asexual human reproduction.*

Developments such as these suggest that history may view 1998 as a reprise of 1820; indeed one of Washington's leading political journals recently interrupted its energetic coverage of the Clinton-Lewinsky affair for an essay on biotechnology policy that began with the proposition that 1998 may be remembered as much for discoveries about animal cloning as for discoveries about sex in the Oval Office.

In fact, governmental interest in science and technology is nothing new. For more than a century, every large-scale technological development has sooner or later attracted the attention of ambitious politicians who have sought to take credit for its social benefits, mitigate its social costs, and harness it for political purposes. This was true of the railroads and airlines; of electric power, telephony, and radio and television; of Standard Oil; of pharmaceuticals and processed foods; of the automobile. Washington has recently become keenly interested in computers and information technology, launching antitrust suits, special taxes and subsidies, encryption standards, export restrictions, and other projects for putting government in the driver's seat on the "information superhighway." There is no reason to suppose that biotechnology will be exempt from similar attentions.

So far, government regulation of biotechnology has been relatively benign and unintrusive, limited to such things as EPA controls on field testing of bioengineered plants. The good reputation of the biotechnology industry has even been a force for good in moderating the FDA's severe overregulation of new pharmaceuticals. But this is likely to change as genetics and biotechnology

progress beyond the laboratory and the manufacture of foods and pharmaceuticals—and as the exigent public issues move from the familiar ones of environmental *side effects* to the unsettling economic and ethical consequences of *intended effects*. The coming controversies that I alluded to in my examples will be animated by two important circumstances.

First, the government is already heavily involved not just in the funding of biomedical research but in the regulation and direct financing of medical care and old-age income, generally through insurance programs that are poorly designed for contemporary demographic circumstances and that are already in serious trouble. In the 1980s the Office of Management and Budget was seriously concerned about the implications of bovine growth hormone for federal expenditures on the milk price-support program. The abolition of the farm subsidy programs is now well underway and probably means that progress in agricultural biotechnology will proceed relatively unimpeded. But the organization, financing, and provision of medical care are now major, and evidently durable, parts of our government and politics. This means that the deployment of every miraculous new pain-relieving, disease-curing, life-improving, and life-lengthening medical advance will be affected and in many cases afflicted by the decisions of large government bureaucracies with interests of their own. Washington's growing propensity to regulate even the most particular aspects of medical practice and private insurance coverage, such as whether women in their 40s should receive annual mammograms, will be increasingly problematic as the number of diagnostic and therapeutic procedures multiplies. We can expect that inventions affecting sympathetic diseases and populations will be favored—to the detriment of those with less populist appeal and those affecting cosmetics or fitness rather than disease. I am not going to tell any Viagra jokes, but the recent controversy over Medicare and private insurance coverage for this drug is certain to be repeated many times over with genetic interventions that promise better fitness, appearance, aptitude, and just plain happiness rather than relief from

disease and suffering.

Second, the progress of genetic research is presenting humankind for the first time with true and detailed knowledge of the material essence of life itself. The power for good and evil bestowed by this knowledge presents ethical dilemmas more profound than anything encountered since the Garden of Eden, involving issues of family, sex, reproduction, abortion, and euthanasia that are already the most vexing and contentious of the age. The congressional debates during the past eighteen months over President Clinton's proposed ban on human cloning, raising concerns ranging from fetal tissue research to freedom of scientific inquiry, hint of what is to come.

Forbidding human cloning, which large majorities of the public and the Congress favored following the birth announcement of Dolly the cloned sheep, seemed a straightforward matter until the legislative draftsmen set about defining the word "human." The biotechnology industry was not opposed to a ban, but argued, with some persuasiveness, that the ban should not extend to human embryos in very early stages of development—which might dramatically accelerate research and development of new genetic therapies and might produce new breakthroughs as momentous the recent cultivation of human stem cells. But pro-life advocates, including some who were sympathetic to the industry's position, pointed out that a ban beginning with a developed embryo or fetus would produce a bizarre anomaly: cloned human embryos would be permitted, but once alive it would be forbidden to allow them to grow and develop into fetuses and living beings—thus the destruction of human life would be required by law! In the meantime, some strongly pro-choice institutions, including the *Washington Post*, joined the pro-lifers in calling for a total ban: here, unlike the abortion case, there is no interest of a pregnant woman to weigh in the ethical scales, so the *Post* felt that the special respect due even to embryonic human life argued for putting all human cloning out of mortal reach. Thus does scientific progress generate new moral perceptions and shatter established political alignments.

The appearance of strange political debates such as these, and the prospect that they will grow in number and profundity in the years ahead, is more than a little unnerving. American politics takes moral issues very seriously but is also skeptical about government and well disposed toward science and progress. The genius of our system is to combine principled leadership, free-wheeling democratic argument, slavish adherence to public opinion polls, and unprincipled legislative compromise to produce policies that leave everybody a little unhappy but able to move on. We have regulated new technologies, but never so heavily as to prevent them from working their transforming magic on private economic and social life. Is this likely to remain the case with technologies as powerful as genetics and biotechnology? Will my earlier proposition—that in the modern age science and industry have displaced politics as the driving force of social development—continue to hold?

It is important to note that my proposition is not *universally* true even today, two centuries into the scientific revolution. An ordinary citizen in Korea or Japan this year—who has worked terribly hard and scrimped and saved to support his family over a long period of time, who has been told that his nation has become an economic powerhouse, and now has witnessed the sudden destruction of 30 or 40 percent of his life savings, due to a financial catastrophe that is at bottom a catastrophe of failed politics and political institutions—would hardly agree that politics has receded as a factor in social progress. And what he has suffered is only one episode of an old story going back to 1820 and earlier. For the stupendous advances in individual welfare and social equality I have described have been largely confined to the nations of Western Europe and North America. Indeed there has been a marked and continuing *divergence* in the circumstances of richer and poorer nations throughout this period, despite many scientific developments, such as the eradication of smallpox, whose benefits have been global and most consequential in the less-developed world.

In 1820, when large-scale international travel was first getting underway,

systematic differences in economic welfare between richer and poorer nations first attracted general notice and prompted the first schemes for global aid and development. We now know that, in that year, Gross Domestic Product per person in the wealthiest Western nations—those of Western Europe, Great Britain, the United States, Canada, Australia, and New Zealand—was about 50 percent higher than in Eastern Europe and Russia, 70 percent higher than in Latin America, twice that in Asia, and 2.5 times that in Africa; the ratio of incomes in the richest nation, Great Britain, and the poorest African nation was about 3 or 4-to-1. But those differences have been growing dramatically and pretty much continuously ever since. In 1992, per capita GDP in the same Western nations had grown to nearly four times higher than in Eastern Europe and the USSR nations, three times that in Latin America, 3.5 times that in Asia—this despite Japan’s having reached income parity with the West and Korea and Taiwan’s having achieved half of Western income—and 13 times that in Africa. The ratio of incomes in the richest and poorest nations had grown from 3 or 4-to-1 to over 70-to-1. Almost every nation grew at least somewhat between 1820 and 1992, and most grew substantially—but Western Europe and the English-speaking nations, plus Japan after the 1950s, grew at fabulously higher rates. Even as the societies of the Western nations became vastly more equal, *international* economic inequality grew by more than an order of magnitude.

It is conventional today to ascribed the uniqueness of Western economic progress to our institutions of limited government, free markets, civil liberties, and the rule of law. Limiting the influence of politics was not mere historical happenstance in the West but a deliberate and hard-fought enterprise; its great apotheosis was the American revolution and Constitution in the generation preceding the economic flowering of the nineteenth century. A decade ago, at the time of the collapse of Soviet communism and Third World socialist ideology, it seemed natural to believe that the global spread of free markets and democratic government, combined with the spread of medical and public health and other

new technologies, would at last produce convergence in productivity, economic output, and individual welfare between the West and the rest. But so far we see only continuing divergence. This has been dramatized by this year's financial collapse, which particularly afflicted two Asian nations that have been converging with the West, Japan and Korea, and the largest of the post-Communist experiments in instant capitalism, Russia herself.

The past year's events, and one decade of post-Communist economic reform, are of course only blips in economic history. Yet it is unnerving for advocates of free-markets and the rule of law to observe nations with tolerably honest governments and sensible economic policies—such as the former East Germany, which had the singular advantage of importing Western economic policies and legal institutions wholesale—where there is nevertheless little domestic entrepreneurship and economic growth and where cities teem with unemployed men and women. Something must be at work that goes beyond science and technology, which is universal, and beyond formal laws and political institutions, which vary but not nearly so much as levels of economic welfare—and which have changed over time not nearly so much as the changes in economic welfare I have described.

A growing body of scholarship, such as David Landes's *The Wealth and Poverty of Nations* published earlier this year, argues that something is *culture*—a people's traditions, customs, and habits or thought and action. Sound economic policies such as stable money, discipline in government taxing and spending, and free trade are necessary but not sufficient. Effective political and constitutional institutions such as representative democracy, checks-and-balances on government power, civil rights, and an independent judiciary, are also necessary but also insufficient. A culture conducive to economic growth is not only necessary but antecedent: the West's unique prosperity is due not so much to its economic policies and political institutions as to the culture which gave rise to them and sustained them.

This view was well expressed by my colleague Herbert Stein in 1989, in an address to a group of Russian economists who had come to an American Enterprise Institute conference in the early days of *perestroika*, to educate themselves on the workings of the American economy and perhaps to learn a few of the secrets of our success. In the course of a detailed account of the structure and performance of the U.S. economy and the various factors affecting its performance—economic policies, taxation, regulation and antitrust, business investment, foreign trade—Mr. Stein observed that: “The basic reason for our prosperity is that 120 million Americans get up in the morning and go to work to do the best they can for themselves and their families and previous millions did the same thing for two centuries.”

Our Russian visitors, if they fastened on this passage at all, probably considered it very bland and opaque and certainly not very helpful; but it was the deepest moment of the lecture. Part of its force is that it captures so many different aspects of culture in a single thought: people prosper because they work hard over a long period of time; they work hard out of individual self-interest and also out of attachment to their families; their attachment to their families leads them to spend a considerable part of their lives away from their families, engaged in activities with outsiders.

The culture of a people or nation is a complicated thing—rather like a molecule of DNA—with numerous attributes acting sometimes in isolation and sometimes in league with other attributes to produce a certain result. Particularly important in determining propensity for economic and scientific progress seems to be the cultural genes for individualism and competition on the one hand, and for social association and cooperation on the other, and how they interact. There is a strong tendency in the new growth literature to emphasize the remarkable Western, especially American, knack for voluntary cooperative association—for grasping the potential for fruitful social cooperation beyond the family unit, forming churches, community organizations, universities, giant corporations that

require intricate and continuous trust and cooperation for success. But at least equally important is the equally remarkable Western cultural attribute of individualism, self-reliance, and hard competition. I am speaking here not only of business culture but of attitudes and habits that pervade American society. They are the cultural inheritance of a thousand years of history in which, in the West and only in the West, no one institution of church or state and no private power has been able to maintain a monopoly over the lives and allegiances of citizens for any considerable period of time—a history in which every institution had to fight it out constantly, often violently but increasingly over time in peaceful civil competition, with equally strong and durable rivals. Limited government, private enterprise, the independent judiciary, and freedom of the press, religion, association, and inquiry are important parts of this inheritance, but only parts. Ours is also a culture where the sheer pleasures of striving and self-realization, and the hope of winning and fear of losing, keep many of us at the office early and late long after our material needs have been amply provided for. It is a culture where scientific research—basic as well as applied, academic as well as commercial—is as ferociously competitive as anything on display in the *Microsoft* antitrust trial. It is a culture where government and business misconduct are pitilessly exposed and punished rather than left to fester and grow. These tough and often lamented cultural attributes are not easily emulated, much less dictated by the International Monetary Fund. Their tendency to produce continuous improvement is dramatized by the another striking artifact of Western culture: that Babe Ruth's home run record is always broken *in twos*, when one great slugger is driven not just by the hope of an entry in the record books—that is, by the hope of glory in the abstract—but by the relentless daily rivalry of another great slugger threatening to outdo him.

If I am right, then our future prospects depend primarily on maintaining a private culture of liberty and competition, while nurturing those forms of cooperation and communal enterprise that are most successful when built on

individual freedom rather than state coercion. If we do, then keeping politics in its proper place, and progressing in spite of whatever the government may do, will come naturally, if not always easily.