**Introduction**

Modern industrial societies reveal some of their most basic ordering instincts in the construction and regulation of new technologies. A minor explosion of works in the emerging field of science and technology studies (S&TS) during the past twenty years has dispelled the notion that technological hazards are givens of the physical world and that the task of social policy is to predict and regulate the dangers they pose to human health, safety, and the environment. We know instead that a society’s perceptions of the hazards of technology are intimately linked to its need for social certainty and political order. In pre-industrial societies, pollution myths were often constructed to safeguard important social relationships and to draw clear boundaries between acceptable and unacceptable behavior. In industrial societies as well perceptions of danger are linked in subtle ways to the distribution of power and authority among different social actors, including importantly citizens, scientists, and the state. For the individual citizen, the perception of technological risks reflects not only scientific uncertainty and ignorance, but also feelings of dread and lack of control occasioned at times by loss of trust in the institutions charged with safeguarding public welfare.

The public evaluation of technological risks and benefits proceeds within a space that is bounded and structured by innumerable prior commitments, many of which have been more or less stably “black boxed” in the form of organizations, institutions, policy cultures, and social relations or practices. As analysts of our own country’s policies, we may take these black boxes so much for granted that we overlook their constitutive role in the shaping of technology and its
risks. Interpretive studies of decisionmaking, informed by approaches from S&TS, offer a means of foregrounding the interaction between such backgrounded institutional commitments and the decisions about the risks or harms of particular technologies that can be observed in specific cases and controversies. Legal systems, in particular, offer fertile ground for this kind of analysis. Obsessed with its self-image as a maker of rules, the law has on the whole neglected the sustained, reflective, critical theorizing about its sources of power that has, in recent years, illuminated the epistemic and cultural authority of science and technology. Critical legal studies, after an initial period of ferment, has largely vanished as a powerful reformist presence in U.S. legal scholarship. Even in its heyday this body of work focused more on the law’s role in perpetuating social classifications (race, class, gender) than its involvement in constructing the technoscientific orders of modernity.5

My objective in this paper is to examine, through theoretical lenses shaped by S&TS and through the examination of a few leading cases, how the law has shaped the social meaning and acceptance of biotechnology in the United States over the past two decades. Central to the S&TS method is the observation that certain basic features of the world that are taken as lying outside politics, interests or the idiosyncratic exercise of power—in particular, scientific facts and the technologies they support—can be fruitfully examined as social achievements, underpinned by particular histories, resources, practices, values, and discourses of problem-solving. S&TS research, in short, sees the forms of science and technology that permeate our lives as being made, not given. Increasingly, as well, this body of work has come to question the separations we make between what is human or non-human, natural or unnatural, normal or abnormal.6
Legal proceedings provide an especially rewarding site for studying the reciprocal constructions of technoscientific and political order in advanced industrial societies. Whether by means of lawmaking or litigation, actors in the legal arena enlist the power of established legal doctrines to assert control over technology’s potential uses. The adversarial dynamics of the legal process offer proponents and opponents of technology the opportunity to deconstruct each other’s interpretations of what is at stake; at the same time, the discursive strategies employed in these proceedings permit us, as analysts of the law, to explore in detail how certain themes come to prominence and others are set aside—in short to examine how the law imposes limits on the interpretation, use, and operation of particular sociotechnical arrangements.

In looking at the nexus of law and biotechnology, in particular, a productive entry point is the theme of newness, which has become especially prominent in debates about genetics and the manipulations it enables of living things and processes. The idea of newness seems at first sight to cut in contradictory directions with respect to ideas of control. If biotechnology is “novel” in the sense of posing previously unknown or unimagined risks, then it seems to merit the most stringent responses, including new legal regimes of monitoring and control. If, on the other hand, it is seen as an extension of nature through human ingenuity—a better way of doing nature’s business—then the technology is “natural,” and serious concern about it may be unwarranted. Further, if biotechnology can be ranged alongside other, more familiar ways of adapting nature to human ends, then the technology is “normal”; in this case again, the argument for giving special attention to this technological development recedes.

Legal decisions play an indispensable part in determining how society will locate particular features of biotechnology in relation to claims of novelty, naturalness, and normality. Yet, institutionally, the theme of novelty poses an interesting challenge for the law. In
confronting questions about the rights and wrongs of biotechnology, courts are thrown back upon their conventional mode of reasoning, which is precedent-based, retrospective, even tradition-bound. How such a backward-looking social institution accommodates the forward thrust of a revolutionary technology poses a significant puzzle for legal analysis.

By focusing on the law, this paper also adds a new dimension to S&TS work on technoscience, which has tended to explicate the emergence and shaping of technological systems mainly in terms of the organization and practices of scientists and technical practitioners. In line with approaches that stress the hybrid character of most technological achievements, this paper suggests that important features of technoscience are built by institutions which are not conventionally regarded as either scientific or technological. Nor is it appropriate to look at institutions like the law simply as resources that are mobilized by actors wishing to shape technological outcomes toward their desired ends. Rather, legal institutions actively and constructively intervene in the controversies surrounding science and technology; they bring to this task pre-existing understandings and commitments which their decisions help inscribe into the very forms of technoscientific production. Therefore, as societies seek to master their most ingenious discoveries and inventions, they create orders that are at once natural and social, epistemic and normative, material and institutional. It is this co-production of disparate types of order that can be observed in legal disputes arising from biotechnology.

A Brief Regulatory History

Some knowledge of the pathways by which biotechnology took shape as a policy issue is essential for properly appreciating the role of law in normalizing this cluster of technoscientific practices and artifacts in the United States. To begin, it was scientists, not government agencies or social movements, who identified recombinant DNA (rDNA) research as a potentially risky
activity in need of regulation. The story of how concerned molecular biologists blew the whistle on the implications of their own research has attained almost mythic status through many retellings. It began, innocuously enough, at a scientific meeting where a student working with Stanford biologist Paul Berg reported a planned experiment in which DNA from a cancer virus would be introduced into *escherichia coli* (*E. coli*), a bacterium that inhabits the human intestine. Dismayed by the prospect of a public health disaster, Robert Pollack, a cancer researcher at Columbia University, urged Berg to abandon the experiment until the dangers of such work could be canvassed more thoroughly. After months of preparation and a worldwide moratorium on rDNA research, a star-studded, international cast of scientists met at the Asilomar conference center in California to hammer out a consensus position on the safe performance of experiments involving genetic manipulation. The principles developed at that historic meeting were eventually converted into guidelines for publicly funded research issued by the National Institutes of Health (NIH). In modified and considerably relaxed form, these guidelines still govern the conduct of rDNA work in laboratories.

Once the NIH guidelines were in place, U.S. scientists successfully lobbied against attempts by Congress to legislate more comprehensive controls. Some localities with high concentrations of research facilities and exceptionally well-informed citizens (such as the city of Cambridge, Massachusetts) did adopt tougher standards than the NIH. But a legislative bill backed by Senator Edward Kennedy of Massachusetts succumbed to charges that federal law would stifle a fast-moving area of research and could hurt American scientific and industrial competitiveness. NIH’s own review and relaxation of the guidelines just two years after they were first issued appeared to confirm these suspicions. Complacency grew as year after year went by without reports of serious mishaps in or out of rDNA research laboratories.
Conventional wisdom began to state that the Asilomar conferees had greatly exaggerated the risks of genetic engineering.

As the first commercial products of biotechnology gradually made their way to the marketplace, it became evident that the NIH guidelines would have to be supplemented with additional regulatory controls. In particular, the highly publicized Ice Minus controversy, involving the first attempt to release a genetically engineered organism into the environment, underscored important weaknesses in NIH’s decisionmaking process for rDNA products. Other federal agencies—most notably the Environmental Protection Agency (EPA), the Food and Drug Administration (FDA) and the U.S. Department of Agriculture (USDA)—became involved in regulating biotechnology, finding authority to do so under existing laws governing chemicals, pesticides, foods, drugs, plant pests, and the like. The legacy of Asilomar persisted in the form of continued resistance by scientists to new legislation. Neither the disputes over deliberate release nor subsequent controversies over animal patenting, cloning or stem cell research mobilized enough support in Congress to overcome the entrenched opposition to legislation.

Some of the most momentous decisions involving American biotechnology accordingly were made in non-legislative venues such as courts and administrative agencies, where public access and deliberation were necessarily more restricted than in Congress. In 1980, for example, a five to four decision of the U.S. Supreme Court authorized the patenting of living organisms. Later decisions to patent higher animals were made even more invisibly by the Patent Office under the broad authority granted by the Court. In the mid-1980s, the Office of Science and Technology Policy, a relatively invisible arm of the White House, took the lead in coordinating federal regulatory efforts with respect to biotechnology’s commercial products. As a result, technical negotiations among agencies, rather than broad public participation, shaped major
elements of federal policy. A landmark decision affecting both researchers and ordinary
individuals occurred in California in 1990, when a leukemia patient named John Moore
unsuccessfully sued to obtain property rights in the cells taken from his body in a University of
California research hospital. Principles governing the application of new genetic technologies
to human reproduction were also articulated in the first instance by courts, as the ongoing
abortion debate inhibited legislatures from taking action.

**Natural, Normal, and Novel: The Discursive Politics of Biotechnology**

The concept of novelty has proved particularly contentious in the context of biotechnolo-
gy regulation because, to decide how “new” the technology and its products “really” are, the
advocates and opponents of regulation have to choose how to position the technology in relation
to nature and to existing social practices. Is biotechnology simply a cleaner, quicker, more
targeted way of doing what nature already does in haphazard fashion through mutation and
natural selection? Are the products of agricultural biotechnology, such as genetically engineered
corn and soybeans, “natural” because they are “substantially equivalent” to products already
known in nature? Does the application of biotechnology to medicine, by way of genetic
screening and gene therapy, offer a “natural” method of correcting nature’s mistakes? Or,
alternatively, is the project of modern biotechnology profoundly alien to the processes of nature
because it violates nature’s classifications?

In the social sphere as well biotechnology raises questions about continuity versus
rupture. Is gene splicing just a way of speeding up the work that plant and animal breeders have
engaged in for centuries—a comforting variation on age-old traditions of wine and cheese
making, agricultural hybridization, and selective breeding of domestic and farm animals? If so,
we should perhaps justly celebrate biotechnology for its enabling capacity, not deplore its destabilizing potential. But critics have argued that this way of connecting biotechnology to the past misreads the power of genetic manipulation. Biotechnology is not mere breeding. Its very speed makes possible the by-passing of natural selection. It allows the creation of hybrids that could not have been developed through traditional techniques. Many also find troubling the prospect that biotechnology will promote a reductionist, oversimplified view of biological processes that denigrates humane values and facilitates the mechanization and commodification of the natural world. Others see it as modifying, manipulating, and blurring important normative distinctions, including those that are most deeply relevant to being human. If these worries are well founded, then the risks of biotechnology lie as much in the moral and spiritual domain as in the physical.

Determinations of newness also bear on who may profit from the technology’s promised cornucopia of benefits. Unless the inventions of biotechnology can be characterized as new (neither pre-existing in nature nor prior art), no patents may be awarded for their creation. Genetic manipulation must also be constituted as a technological practice that meets the particular conception of innovation embedded in western intellectual property laws; otherwise it may not be entitled to legal protection at all. Thus, indigenous knowledge of how to extract medicinal products from plants, such as the neem tree in India, or how to cultivate highly prized agricultural commodities such as basmati rice is not patentable. Yet, the extraction and industrialization of these very products, and even the products themselves, may be seen as novel under legal regimes that reward individual entrepreneurship and explicitly (or scientifically) characterized ways of harvesting nature’s products. Ironically, then, the very processes that are represented on the one hand as “traditional,” “natural” and “normal” for purposes of avoiding
regulation must, on the other hand, be positioned as innovative and inventive in order to gain protection as intellectual property.

These contradictory ways of conceptualizing biotechnology shape society’s collective responses at the most fundamental level. They determine, for instance, whether the products and processes of biotechnology will be perceived as benign, indifferent or threatening; more generally, these framings also influence which historical analogies and cultural concerns will be deemed relevant, or even controlling, in deciding what to do about biotechnology. Is genetic manipulation about pathologies of control: “playing God,” creating new “Frankenstein” monsters or realizing Aldous Huxley’s cold vision of the “Brave New World”? Or is it about benevolence, fighting famine and disease, substituting choice for chance, and extending human flourishing through gene therapy and genetic enhancement?

In many earlier controversies about new technologies, participants papered over profound differences about the relations among technology, society, governance, and culture by conducting the debate in the apparently neutral discourse of science. By marshalling technical information to support constructions of risk, for example, disputing parties sought, as it were, to enlist nature as an ally in their cause. The power of this rhetorical move flows from the assumption that nature, as represented by science, cannot lie and is impervious to politics. In conflicts over biotechnology, however, the strategy of scientization has proved to be more heavily contested than in prior disputes over toxic chemicals and nuclear power. Finding an appropriate technical language for representing biotechnology’s dangers has proved difficult in part because these are as yet more speculative than many other threats to human health, safety, and the environment. There is no Hiroshima or Chernobyl, no Minamata or Bhopal that defines the full catastrophic potential of biotechnology—whether in “soft” symbolic or “hard”
quantitative terms. That chemicals or radiation may kill us is not in doubt at the threshold of the 21st century. By contrast, for many applications of biotechnology, including pharmaceutical and food production, whether human activity poses any danger remains an open question. And while people recognize that biotechnology threatens settled normative expectations, the impact on values remains as imprecise as the biological limits to which genetic manipulation may appropriately be pushed.

Relating biotechnology both to known processes of nature and to familiar practices of society assumes special political relevance in this context. If it can be established that human manipulation of nature only replicates what nature regularly does, then all of evolutionary history can be called upon to support the extreme improbability of untoward consequences. If, moreover, new genetic capabilities permit people to fulfill their natural and normal desires—for health, beauty, longevity, physical or mental prowess, and, not least, children—a little better than they could have done without technological assistance, then again there is no cause for acute moral concern. This is why contestants in the debate have found it so important to impose their favored discursive readings on biotechnology’s novelty or conventionality. Much of the struggle to discipline biotechnology has to do with fitting it into manageable categories of the natural, the normal, and the novel, and, in the United States at least, this struggle has been conducted prominently within the jurisdiction of the courts.

**Constructing Biotechnology in the Courts**

For purposes of legal administration, the nub of a court decision lies in its holding, the brief declaratory statements in which the judges announce the disposition of the conflict between the parties and the new or modified rule that the decision stands for. Read this way, even the
most resonant of cases may represent something rather precise and narrow. As a legal judgment, for example, *Brown v. Board of Education*\(^{16}\) stated simply that the “separate but equal” schooling ordained by many American municipalities for Black children right up to the 1950s violated the constitutional requirement of racial equality. The nine Justices who signed the unanimous opinion understood, of course, that this was a historic ruling, negating as it did the Court’s own conclusion some sixty years before that segregation did not violate the Constitution.\(^{17}\) Yet, only when historians, legal scholars, and other social analysts began to interpret the court’s bare words within a wider context did the case come to be seen for what it more truly was: a monument in America’s continuing struggle to shed the trappings of racism, and hence quite possibly the most important Supreme Court decision of the 20\(^{th}\) century. The *Brown* that emerges from these cycles of reflection is no longer merely a prescription, however far-reaching, to alter the racial composition of public school facilities. It serves a site of social identity formation, a touchstone to which anyone must turn, and return, who wishes to come to grips with the complex dynamics of race in America.\(^{18}\)

In the history of judicial engagement with the life sciences of the later 20\(^{th}\) century, several cases have assumed this dual character of rulings, significant in themselves, that also serve as foundational social texts demarcating moments of changed or changing consciousness. To read these decisions “thickly,” one needs to look not only at what they held, their “black letter” conclusions as rules of law, but also at the contexts that gave rise to them, the language in which they were expressed, the interpretive pathways they failed to follow as well as the ones they helped to cement. The meaning of these landmark cases necessarily emerges gradually rather than all at once, for it is only through repeated revisitation from many viewpoints that they assert their staying power and begin to occupy, as it were, their place in history. With regard to
judicial constructions of biotechnology, a reasonable starting point is *Diamond v. Chakrabarty*, the decision that made possible the patenting of living organisms created through biological manipulation. Two other cases that have likewise established their central position in the canon of biotechnology regulation are *Moore v. Regents of the University of California*, concerning the ownership of human tissues and cells, and *Johnson v. Calvert*, a California Supreme Court decision on the competing rights of “genetic” and “gestational” mothers in surrogacy controversies.\(^{19}\)

*Diamond v. Chakrabarty*

The U.S. Patent Act gives inventors a limited property right to their inventions. This was traditionally justified on a Lockean “fruits of labor” theory and rests today on a more modern theory of incentives. The Supreme Court has interpreted the Act as excluding both products of nature (e.g., a naturally occurring plant or organism) and laws of nature (e.g., Einstein’s famous equation \(e=mc^2\)), again either on the older ground that these are “discoveries” rather than “inventions” or on the more modern view that granting property rights in such fundamental things would hinder progress rather than stimulate it as the Act intended. The development of molecular techniques of DNA manipulation presents a fundamental challenge to this conceptual framework by raising the possibility that living organisms such as bacteria or mice, formerly classified as products of nature, may become sufficiently manufactured to be considered inventions.

This issue ripened to the point of legal contestation when Ananda Chakrabarty, then a research scientist with General Electric, sought a patent for a strain of bacterium of the genus *Pseudomonas*, which he had modified using molecular biological techniques. The resulting
organism was intended for cleaning up toxic spills and degrading other environmental pollutants such as Agent Orange. The Patent Office originally denied the claim on the bacterium itself (as opposed to the process patent, which was not controversial) because the subject matter Chakrabarty sought to patent was a living organism. The Court of Customs and Patent Appeals reversed this decision on the ground that the language of the Patent Act permits patenting of any “manufacture or composition of matter,” assuming it meets other criteria set out in the Act. The court held that the relevant criterion was not whether the subject matter was living or not but the degree to which it had been altered by human intervention. In Chakrabarty’s case, the bacterium in question had properties not found in any naturally occurring members of its species; therefore, it could be protected by a patent.

On appeal to the Supreme Court by the Commissioner of Patents and Trademarks, the question was narrowed to one of statutory interpretation: do genetically modified living organisms fall within the Patent Act’s definition of “patentable subject matter”? The battle now turned on whether genetic modification was so revolutionary a technology as to have been unforeseen by Congress when it passed the Act, and thus whether Congress should be required to decide anew what to do about the patentability of its products. Put differently, the case focused on whether Chakrabarty’s bacterium could be constructed as novel and on the implications of that construction for the application of the Patent Act. It is instructive to see how the opposing parties and the Court went about deciding what was novel and what was not.

The Patent Commissioner’s position was perhaps most straightforward. In the absence of a “clear signal” from Congress, he argued, the Patent Act should not be extended into “new areas.” Asserting that biotechnology was a “new area” that raised “complex social, economic, and scientific questions,” petitioner sought to convince the Court that Congress was the right
party to decide whether the living products of biotechnology could be patented. To support his counsel of restraint, the petitioner cited the existence of substantial controversy which spoke in favor of a legislative rather than a judicial resolution of the issues. The Court’s five-justice majority did not heed this argument, but Justice Brennan, writing in dissent, agreed that it is uniquely the role of Congress “to broaden or narrow the reach of the patent laws,” especially “where, as here, the composition sought to be patented uniquely implicates matters of public concern.”²¹

Among the amici who filed briefs in the Chakrabarty case, only one argued against the patenting of living organisms, the People’s Business Commission (PBC), an organization founded by Jeremy Rifkin, one of the most outspoken critics of biotechnology. Although PBC accepted the petitioner’s position, they added two further arguments of their own. First, they too emphasized biotechnology’s novelty, stating that through genetic techniques humans were now in an unprecedented position “to contemplate manufacturing life itself.” The technology, PBC suggested, would give rise to new, as yet poorly understood social problems, possibly including risks of an irreversible nature. Second, echoing an array of influential scientific and social critics, PBC deplored the connections of biotechnology to modern science’s reductionist, objectifying, and manipulative views of nature, which threatened “to turn living material into yet another factor of economic production.”²² These themes resonated with concerns voiced in Europe and elsewhere concerning biotechnology’s disruptive potential,²³ but they awakened no sympathetic chords from the Supreme Court.

All of the other amicus briefs, as well as the Court’s holding, denied that the newness of genetic engineering was of a kind that justified a modification of existing patent law.²⁴ Several discursive strategies were employed to support this outcome. First, the proponents of patenting
stressed that the Act was designed precisely to stimulate revolutionary new inventions and that a technology’s novelty was thus no argument for renewed congressional attention. Second, several parties sought to deny that the social and ethical controversies generated by genetic engineering had any bearing on the patentability of modified organisms. This, they argued, had to be the legally correct position because, on the one hand, the question before the Court was “a narrow one of statutory interpretation,” leaving no space for addressing larger social concerns, and, on the other hand, the patent law was not a suitable tool for regulating biotechnology, thus putting any novel social or ethical issues outside the Court’s immediate jurisdiction. Third, patent supporters tried to connect genetic engineering to past manipulations of life forms, arguing for example that patent protection had already been extended to hybrid plant species created through non-molecular techniques. Finally, several of the *amici* downplayed the significance of the life/nonlife distinction by suggesting that there was no intrinsic difference between human modification of physical and biological environments.

In sum, *Diamond v. Chakrabarty* resolved the debates over biotechnology’s newness by employing the law’s discursive force to normalize novelty itself. Implicitly, the decision declared the new set of life-manipulating techniques to be merely a normal extension of prior inventive practices; at the same time, it construed as normal the very production of novelty through the creation of things not found in nature. The manufacture of a new life form was held, from the standpoint of intellectual property rights, to be no more remarkable than any other inventive step taken by American commerce and industry since the passage of the Patent Act some two hundred years before. One of the nation’s longest established laws was thus revalidated as needing no renewed reflection in the light of biotechnology’s forward march.
Moore v. Regents of the University of California

The question of property rights arose in a different guise in a California case involving gene manipulation. John Moore, an engineer from Seattle, Washington, was diagnosed in 1976 with hairy-cell leukemia, a life-threatening condition for which he sought treatment at the Medical Center of the University of California at Los Angeles (UCLA). Here, on the recommendation of his treating physician Dr. David Golde and his assistant Shirley G. Quan, Moore underwent an operation to remove his diseased spleen in order to slow the progress of his disease. Unbeknownst to him, Golde and Quan determined that Moore’s T-lymphocytes, a type of white blood cell, overproduced certain lymphokines or proteins that regulate the immune system and could be useful in the treatment of AIDS and other similar disorders. Using sections of Moore’s excised spleen, the UCLA researchers established a self-reproducing culture of cells, or a cell line (named, after its source, the MO-cell line), on which they together with UCLA eventually filed for a patent. In 1984, a patent on the cell line was issued to Golde and Quan as inventors, with the university as patent assignee. Golde and the university in due course also negotiated a profitable contract with Genetics Institute, a private company, for the development of products from the MO-cell line; such derivatives were estimated at the time to be worth up to $3 billion, although the proceeds actually proved to be more modest.

During this entire period, Moore was repeatedly summoned back to UCLA from Seattle, ostensibly for further treatment, but in fact to permit the research team to take more samples of his blood, blood serum, skin, bone marrow aspirate, and sperm. He gradually became suspicious about the medical need for these visits and finally sought legal assistance when, in 1983, Golde insisted a little too strenuously on his signing an informed consent form permitting the use of his cells for research. Moore eventually sued UCLA and the research team claiming, among other
things, that his doctors had violated their fiduciary duty by not informing him of their research interests and that his cells had been unlawfully appropriated—in short, stolen—without his consent. The trial court ruled against Moore on the ground that he had no legitimate cause of action for the theft, or more formally conversion, of the cell line. The Court of Appeal reversed this decision and the case moved to the California Supreme Court for final resolution.

In a much-discussed decision, the state’s highest court ruled for Moore on the issue of the physicians’ fiduciary duty, holding that research or economic interests unrelated to a patient’s health must be disclosed to the patient before medical procedures are undertaken. On the issue of conversion, however, the court ruled against Moore, stating that he had no legally recognizable ownership rights in his cells. As in Chakrabarty, the outcome importantly hinged on what the court saw as new about Moore’s condition and its relations with existing law.

Both the appeals court and the supreme court recognized that Moore’s claim was novel in the sense that it was without precedent in the law, but from this point the two courts reached strikingly different conclusions. For Judge Rothman, author of the majority opinion in the appellate court, the absence of law on the relevant point opened the door to a recognition of new rights. Adopting a position reminiscent of the PBC’s amicus brief in Chakrabarty, Rothman argued that

An inference of abandonment is particularly inappropriate when it comes to the use undertaken by defendants involving recombinant DNA technology. Almost from the beginning, this technology has incited intense moral, religious, and ethical concerns. There are many patients whose religious beliefs would be deeply violated by use of their cells in recombinant DNA experiments without their consent, and who, on being informed, would hardly be disinterested in the fate of their removed tissue.

In other words, the novelty of the technology militated in favor of extending Moore’s ownership rights over something so private as his body. For Judge Panelli, who wrote the opinion of the Supreme Court, the absence of directly controlling legal authority merely provided a reason to
reexamine the policy issues underlying the law of conversion. This theoretical inquiry persuaded the high court that Moore’s interest in the use of his cells should not be characterized as a property right.

More than a decade after Moore was decided, one continues to be struck at the ease with which the California high court denied ownership rights to the person whose cells were used for research while recognizing such rights on the part of the researchers who made use of the cells. Indeed, the multiple asymmetries of the court’s analysis remain perhaps the most distinctive feature of the case. Moore’s conversion claim was novel, hence questionable; Golde’s and Quan’s patent claims by contrast were neither novel nor open to further analysis. Moore was not the inventor of his cells or their products, and his claim concerning the uniqueness of his genetic material likewise could not be supported, since the lymphokines his body produced “have the same molecular structure in every human being.” Yet, the extraction of the very same proteins from a cell line based on Moore’s cells was both sufficiently original and sufficiently different from his body’s natural functioning to justify the award of a patent. Granting property rights to the human “sources” of biological specimens, the court opined, would introduce uncertainties that could be detrimental to both academic research and industry. No such concerns, however, were flagged in connection with granting intellectual property rights to the UCLA research team; the patent was simply assumed to promote rather than hinder the unconstrained circulation of biological materials. Finally, in giving Moore a cause of action for lack of informed consent, the court recognized his sovereignty as a consumer of medical services; at the same time, by refusing him proprietary rights over his cells, it denied him autonomy as a research subject. In short, as the legal scholar James Boyle pungently observes, “As far as the majority was concerned, Moore was the author of his destiny but not of his spleen.”
Johnson v. Calvert

The last in the triad of cases I consider in this essay dealt with the archetype of natural human relationships, that between mother and child. A 1988 decision of the New Jersey Supreme Court, *In the Matter of Baby M*,\(^{30}\) had called worldwide attention to the practice of surrogate motherhood, in which a woman agreed, usually in return for money, to bear a child for another woman who was either physically unable or unwilling to undergo the biological process of reproduction. *Baby M* involved such an agreement gone wrong. Here, the surrogate mother, Marybeth Whitehead, was artificially inseminated with the sperm of the intended father, William Stern, but after the child’s birth she refused to give up the baby to the Stern couple. The New Jersey court found the surrogacy contract between Whitehead and the Sterns unenforceable, but used the traditional test of the child’s “best interests” to determine that the Sterns should have custody of the baby. Whitehead, the biological mother, was granted limited visitation rights.

As many commentators noted at the time, the *Baby M* dispute involved not so much a use of new technology (only the well-established procedure of artificial insemination was involved) as a change in the social practice of assisted reproduction through which infertile women now sought to gain a benefit previously reserved for infertile men. The technology of *in vitro* fertilization, however, soon introduced new wrinkles to disputes involving non-traditional forms of parenthood.

In September 1990, a baby boy was born to Anna Johnson, an African-American single mother of a three-year-old daughter. Johnson had been impregnated with a zygote formed from the egg and sperm of a racially mixed couple, Crispina Calvert, a Filipino woman who had undergone a hysterectomy and hence could not bear a child, and her white husband, Mark Calvert. Relations between the parties broke down some six months into the pregnancy, so that
by the time the child was born both sides were already in court demanding to be recognized as his legitimate parents. As the dispute wound its way through the judicial system, California courts were forced to consider for the first time whether to give priority to the “genetic” motherhood of Crispina, the ovum donor, or the “gestational” motherhood of Anna, the woman who had carried the child to term. Under the state’s family law, each had a statable claim to motherhood, one based upon blood tests and the other on having given birth. The concept that emerged as controlling in the struggle to sort out their competing kinship claims was “natural.”

California courts were in no doubt that the “natural” mother in this case was also the legal mother of the disputed child. But what, they had to ask themselves, should count as natural in the novel context of gestational surrogacy: the donation of gametes, which determine unpredictable aspects of appearance, temperament and behavior, or the equally necessary contribution of carrying the child to term, a process through which women may bond with babies prior to birth? Before Johnson v. Calvert, dominant narratives in both law and culture had recognized the special claims of “birth mothers,” acknowledging thereby women’s special role in reproduction.31 The California Supreme Court, however, endorsed the view that the common law’s emphasis on gestation could simply be seen as an insistence on irrefutable evidence of the “more fundamental genetic relationship” between mother and child. In any case, the court concluded, when genetic consanguinity and giving birth “do not coincide in one woman, she who intended to procreate the child—that is, she who intended to bring about the birth of the child that she intended to raise as her own—is the natural mother under California law.32 In this case, that intending mother was Crispina Calvert.

The decision to favor Calvert’s maternal claim stabilized not only the boundaries of the contested family unit, but also some underlying scripts about categories of the “natural” and
“normal.” The courts’ formal task was to fit the state’s ambiguous parentage law around the troublesome fact of gestational surrogacy so as to declare a single woman to be the legal as well as the natural mother. In resolving this problem, however, the judges also drew lines between what would and would not be seen as natural reproductive behavior in the era of technologically enhanced opportunities. Thus, the decision of Mark and Crispina to have a child “of their own genes” was represented as an extension of the ordinary human urge to procreate, while Anna’s provision of a womb was designed merely to “facilitate” the Calvert’s intentions. Crispina was the mother in all respects save for her unfortunate physical disability, Anna the willing instrument of Crispina’s wholly understandable desire.

By normalizing the Calverts’ actions in this way, the court obviated the need to open up any wider discussion of the unprecedented relationship between the intending parents and the gestational surrogate. Indeed, Anna’s contribution to the reproductive process looked to the court no different from any exercise of individual capability for economic gain in a liberal society:

The argument that a woman cannot knowingly and intelligently agree to gestate and deliver a baby for intending parents carries overtones of the reasoning that for centuries prevented women from attaining equal economic rights and professional status under the law. To resurrect this view is both to foreclose a personal and economic choice on the part of the surrogate mother and to deny intending parents what may be their only means of procreating a child of their own genes.33

The discourse was all about the liberation of women, but the repeated phrase “of their own genes” calls attention to the normalizing work going on just beneath the surface. The “natural” order as understood by the court resides in people who wish to perpetuate their genes by whatever means possible, even if to do so requires the instrumental use of another’s body—a use associated since time immemorial with the very essence of motherhood. That this novel construction of motherhood as excluding gestation assigned parental rights to the racially and
economically advantaged parties only rendered the court’s conclusions that much more “natural” from a social standpoint.

In *Johnson*, as in *Chakrabarty* and *Moore*, the court had to consider whether the issues presented were deviant enough to require legislative attention and, once again, the demarcation lines were drawn in such a way as to sidestep the need for legislative deliberation. To begin with, the majority used the test of parental “intent” in effect to repair what could have been seen as a defect in the governing statutory law. Further, though Anna’s arguments that gestational contracts may dehumanize women and cause psychological harm were deemed to raise empirical issues appropriate for resolution in a legislative forum, the court was able to determine on the facts of this particular case that the surrogate had suffered no remediable harm.

*Johnson* thus preserved a permissive atmosphere for continued case-by-case experimentation with novel procreative arrangements. Another new frontier was reached in the 1998 case of *In re Marriage of Buzzanca*. Here, a couple decided to employ a married surrogate to carry to term an implanted embryo created from the ovum and sperm of unknown donors. Six days before the birth, the marriage dissolved and the male member of the couple refused to accept legal or custodial responsibility for the child. A trial court concluded at first that the child—who could potentially have claimed kinship to any of six different adults—lacked any legal parents at all. The Appellate Court reversed this bizarre judgment, ruling that, pursuant to *Johnson*, the Buzzanca couple’s intent to produce the child made them the legal parents. In this way, the court achieved the socially desirable goal of providing a newborn with a clearly identified father and mother. But the deeper question about whether society should place any limits at all on such unbridled reproductive experimentation was set aside for another day.
Conclusion

In the half-century or so since the structure of DNA was decoded, the theoretical possibility of “improving” upon existing biological objects and processes and even of creating new life forms has been realized in many spheres of human activity: agriculture, medicine, human reproduction, environmental protection, and the like. Scientific discoveries and technological inventions, as well as new social practices enabled by novel biological tools, have begun to challenge ancient understandings of the relationship between human beings and nature. A fair number of the resulting controversies have found their way into the courts, particularly in the United States, where a culture of litigation places courts at the vanguard of policy change. Time after time, as illustrated by the three landmark cases, judges have been forced to wrestle with cases of first impression arising from American inventors’ growing love affair with biotechnology. In these encounters, the law’s traditional task of demarcating the permissible from the impermissible has often revolved around the question of technology’s newness. Are the issues posed so novel as to strain established concepts of what is normal or natural? Can the problem be mastered through existing policies or is it different enough to call for new legislative action? And how can the law’s essentially retrospective and precedent-based analyses cope with things until so recently undreamt of in human philosophy?

The three cases considered in detail above arose from different factual circumstances and were decided in different legal jurisdictions, but their resolution displays some striking commonalities. In each case, prior law was used to narrow a potentially explosive issue so that courts could approach them as matters of statutory construction or applications of existing law. Larger questions about morality, ethics, distributive justice, and other socio-economic impacts were recognized as lurking outside the boundaries of the courts’ immediate purview, but the
resolution of the narrowly framed issue in each case defused the pressure for deliberating these matters of wider concern. In each case as well, constructions of novelty and naturalness were applied, sometimes asymmetrically, to normalize the actions of the socially and economically more powerful players: corporate inventors in *Chakrabarty*; academic researchers in *Moore*; and the intending parents in *Johnson*. By contrast, the claims of research subjects and gestational surrogates were seen as more questionably novel, requiring no protection under existing law.\(^{35}\) In particular, in none of the cases did judges respond sympathetically to arguments about the commodification of the human body or the power of biotechnology to extend science’s objectifying gaze to new domains of nature.

Together, these cases most obviously lowered the impediments to continued development of an economically promising technological sector. Of more lasting significance, however, is the fact that each decision helped to ratify and strengthen a particular conception of the human subject which has long been accepted as “normal” in America’s liberal political culture. This subject is entitled to respect and autonomy—and, above all, full information—when acting as an economic agent, even if the commodity being purveyed is the use or product of his or her own body. No such consideration is due, however, with regard to the underlying question of whether such instrumentalization should itself be seen as an intrusion upon the condition of being human. *That* question is set aside as irrelevant, unimportant or meaningless by the majority authors of each decision. Biotechnology thus emerges as a flowering of human ingenuity that makes possible the untrammeled expansion of America’s endless economic frontier. With its meanings fundamentally shaped by legal thinking and discourse, genetic manipulation becomes a device for inscribing American exceptionalism on the very face of nature.
NOTES

1 This paper was adapted from a talk given at the invitation of Politeia in Milan in May 2000.


5 Here and elsewhere in the paper, I use the somewhat awkward terms “technoscience” and “technoscientific” to denote the fact that science and technology are intertwined in the production of contemporary technological systems. From an analytic viewpoint, there is thus no clear line of demarcation between the two sets of practices—the scientific and the technological—although everyday language may designate particular practices as either “science” or “technology.” The term “sociotechnical” similarly points to the fact that technological systems are at one and the same time both social and technical.


9 For an account of the regulatory and communication failures surrounding this episode, see Sheldon Krimsky and Alonzo Plough, Environmental Hazards-Communicating Risks as a Social Process (Dover, MA: Auburn House, 1988).


14 In current U.S. regulation, a genetically engineered product is exempted from stringent risk assessment if it is deemed “substantially equivalent” to a product that is already accepted as safe. This position flows in turn from the determination that genetic modification per se poses no risks; risks are to be calculated instead on a product by product basis. See “Product, Process, or Programme: Three Cultures and the Regulation of Biotechnology,” in M. Bauer, ed., Resistance to New Technology (Cambridge: Cambridge University Press, 1995), pp. 311-331.


17 Plessy v. Ferguson, 163 U.S. 537 (1896).

18 For a history of the decision in the context of the civil rights movement, see Richard Kluger, Simple Justice: The History of Brown v. Board of Education and Black America’s Struggle for Equality (New York: Knopf, 1976). Inevitably, controversy persists about Brown’s ultimate impact on race relations in America, as well as its


20 Petitioner’s brief at p. 9.

21 447 U.S. at 321-322.


24 Elsewhere, I have spoken of the contradictory views of judicial power that supported this decision. The majority at once presumed that the law has a duty to foster technological progress and that their decisions were powerless to control or further research. See Sheila Jasanoff, *Science at the Bar: Law, Science, and Technology in America* (Cambridge, MA: Harvard University Press, 1995), pp. 144-145.

25 For example, the Court noted, “A rule that unanticipated inventions are without patent protection would conflict with the core concept of the patent law.” 100 S. Ct. at 2211.


27 “Because of the novelty of Moore’s claim to own the biological materials at issue, to apply the theory of conversion in this context would frankly have to be recognized as an extension of the theory. Therefore, we consider next whether it is advisable to extend the tort to this context. *Moore*, 51 Cal.3d at 136.

28 *Moore*, 51 Cal.3d at 139.


31 This position is reflects the fact that, while both males and females provide the genetic material from which a child is formed, only women physically sustain and nurture the fetus through pregnancy and experience the labor of giving birth. Marybeth Whitehead’s maternal claim in *Baby M* was founded in part on such assertions of bonding during pregnancy, although she was of course also the genetic mother. See also Valerie

32 5 Ca.4th at 93.

33 5 Ca.4th at 97.

34 61 Cal.App.4th 1410.

35 Similarly, in constitutional jurisprudence, some of the U.S. Supreme Court’s landmark legal dispensations can be seen as upholding the existing economic order. Cass R. Sunstein, *The Partial Constitution* (Cambridge, MA: Harvard University Press, 1993).