Prologue

Science in High Places

On a somber fall weekend in mid-November 2001, Europe was forming in the oddest of places. The scene was Genshagen, a nondescript small town with an ancient pedigree[1] just south of Berlin in the former East German state of Brandenburg. Site of the largest Daimler-Benz aircraft engine plant in wartime Germany,[2] Genshagen is now home to the Berlin-Brandenburg Institute (BBI) for German-French Cooperation, a privately supported organization dedicated to furthering cross-national exchanges in the fields of economics, politics, science, and culture. Schloss Genshagen, the institute's headquarters, provides an elegant if modest venue for consolidating the new Europe. Built in 1878 as the manor house of Baron Leberecht von Eberstein, the imposing, four-story building and its surrounding seven hectares of parkland are among the region's protected monuments. Inside, the DM 4 million (€ 2 million) renovations undertaken since BBI's founding in 1993 have restored the main salon to something like its former dignity. Whitewashed walls, tall windows, and a painted and gilded coffered ceiling form a quiet backdrop for reflecting on matters of state. German Chancellor Gerhard Schröder and French Prime Minister Lionel Jospin have attended events here, as have scores of French and German ministers, academics, and intellectuals.

Outside on this particular weekend, Genshagen was not at its most inviting: gray sky and bare branches, a faded façade, a drizzle of snow on crumbling steps and rutted drive created an atmosphere of gentle melancholy. The subject, too, was suitably grave, though not at first glance political. Officially it was a conference on basic European values in bioethics (*europäische Grundwerte in der Bioethik*), but politics lurked palpably beneath the surface. Conceived in two parts, with a follow-up scheduled for January

2002, the BBI meeting was a precursor to the German Parliament's (Bundestag's) debate at the end of January 2002 on whether embryonic stem (ES) cells could be imported into Germany. Members of the ethics advisory councils of both participating nations were meeting with leading scientists, lawyers, clerics, and politicians to consider the issue. Their task was to discuss in French and German (this was definitely a *continental* European gathering) whether Europe has a common basis for deciding if and when research in the life sciences violates fundamental human values. Is an embryo entitled to full protection under constitutional guarantees of human dignity? Do ES cells merit similar consideration? Do German and French experts agree on these points? And what consequences might there be for "Europe" if the continent's two most powerful legal cultures hold different views from Britain, their skeptical partner and ally across the English Channel?

For Germany's ruling "red-green" coalition of Social Democrats (SPD) and Greens in 2001, these questions were not only metaphysical and moral. With national elections less than a year away, the government's future was on the line, hostage to a stagnant economy, rising unemployment, an aging population with insufficient high-tech skills, and the continuing fiscal burdens of reunification. Like other Western states, Germany too was increasingly looking to technological breakthroughs to boost the economy. A seemingly arcane debate about the embryo's moral status thinly concealed programmatic concerns about the relationship of science to the state and of innovation to economic recovery. Britain's relatively unproblematic embrace of embryo research posed a particular challenge. Not for nothing did the German sociologist Wolfgang van den Daele, a member of Chancellor Schröder's National Ethics Council (Nationaler Ethikrat), take pains to defend British policy. The important point, van den Daele argued, was that Britain's decision had been reached by democratic means in an open society; it was the process, not the particular outcome, that conferred legitimacy.

But politics ran deeper at the Genshagen meeting than the Schröder government's immediate electoral concerns. At stake as well was the meaning of citizenship in the emerging politics of Europe. The question on the table was about *European* values, and by no means trivially so. If there was a transcendent European identity, would it not be defined around the very kinds of issues under consideration in that airy, dignified room? The problem of bioethics centered, after all, on finding agreed upon moral spaces for the new entities brought into the world through developments in genetics, molecular biology, and industrial biotechnology. Embryos and stem cells had to be located within a discourse of rights and duties once reserved for fully developed human beings. Are these new biological constructs continuous with our existing selves, and hence entitled to protection under already elaborated notions of individuality and personhood, or are there principled reasons to divide the conscious, reasoning, human self from these products of human

invention? As the list of conference participants bore witness, it was not enough simply to produce answers. Who spoke on the issues was just as important. Religious viewpoints had to be represented, for instance, along with legal and cultural expertise, and the secular, progressive imagination of science.[3] At issue as well was the degree of internal dissension that Europe could tolerate on fundamental values and still remain, meaningfully, a single Europe. In secluded Genshagen, with its complex memories of war and reconciliation, under the improbable rubric of bioethics, participants were deliberating on the constitution of Europe for the twenty-first century.

. . .

Andere Länder, andere Sitten, the Germans like to say, or "other lands, other customs." With regard to the life sciences, however, this adage holds only partly true. Though doubts persist about the appropriate limits of biological research and development, Western nations are united in thinking that the issues deserve attention at the highest political levels. On January 22, 2001, for example, Britain's House of Lords voted to permit the cloning of human stem cells by a 120-vote majority.[4] Just a year later, on February 13, 2002, a Select Committee of the Lords issued a report endorsing research with stem cells.[5] The report's conclusions set U.K. policy apart from Germany's on some key points, as we will see later. More interesting for now is that this issue was deemed suitable at all for consideration by Britain's unelected upper legislative chamber. Simon Jenkins, conservative commentator for the *Times of London*, noted the irony of the Lords' 2001 vote, but also its oddly constitutional significance.[6] "On Monday night," Jenkins sourly observed, "British stem cell research was left in the hands of a group of people with no democratic, professional or territorial legitimacy."[7] Moral authority to speak about stem cells should not be separated, he implied, from the political authority to speak for the nation on a question of such gravity. The unelected peers, in Jenkins' view, did not possess the necessary standing.

Across the Atlantic in the United States, stem cells were also on the national political agenda, although here the issue was entangled with presidential politics. On August 9, 2001, a month before the terrorist attacks that transformed his presidency, George W. Bush delivered his first televised address to the nation. His topic was not national security, tax policy, or education, all of which had figured prominently in his lackluster 2000 election campaign; rather, it was federal funding for stem cell research. Steering between the Christian fundamentalists to his right and the business and scientific interests of the center-left, Bush announced an uneasy compromise. Federal funds would not be spent on creating new embryonic stem cells, but they could be used to fund research on cell lines that already existed. The news made headlines in the quiet days before September 11, 2001, but it was

not the first time that presidential pronouncements about biological research had drawn so much media attention. Only the previous year, on March 14, 2000, President Bill Clinton and U.K. Prime Minister Tony Blair had issued a joint statement calling for "fundamental information" about the human genome to be made freely available to all researchers.[8] Inaccurate reports of their press briefing caused an immediate, precipitous drop in the price of biotechnology stocks, wiping out some $10 billion or 25 percent of their value in one day.[9] In that respect, it was quite unlike the presidential accord of March 1987, when America's Ronald Reagan and France's Jacques Chirac publicly resolved the priority dispute over which country's researchers had first identified the AIDS virus. By agreeing to share the credit, the two heads of state tacitly acknowledged the discovery's huge economic potential—and signaled their unwillingness to compromise those gains through continued uncertainty over the allocation of credit.

These vignettes dramatize the central role of science and technology in contemporary economic and social development and support sociologists' claims that we are in transition from the old industrial societies of the nineteenth and twentieth centuries to a new form of global social organization called "knowledge societies."[10] In this emerging formation, knowledge has become the primary wealth of nations, displacing natural resources, and knowledgeable individuals constitute possibly the most important form of capital. State policies, correspondingly, are geared more and more toward nurturing and exploiting knowledge, with scientific knowledge and technical expertise commanding the highest premiums. These far-reaching alterations in the nature and distribution of resources, and in the roles of science, industry, and the state, could hardly occur without wrenching political upheavals. Within the biotechnology sector alone, disagreements about the moral status of stem cells are only one of a series of flash points that also include controversies about the risks of transgenic crops, transatlantic battles over the acceptability of genetically modified (GM) foods, discord about the international management of biosafety and biodiversity, and rising worldwide concern about the limits of human genetic manipulation. The salience of these debates underlines the deeply contested character of the transition to the tightly interdependent, knowledge-dominated, high-tech economies of the twenty-first century. They also spotlight the life sciences as the sector in which these restructurings are preeminently taking place.

Conflicts about the management of biotechnology within and among nations point to wider uncertainties about the relationship of science and democracy at the threshold of the third millennium. What consequences will the shift from industrial to knowledge societies have for organized power, social stratification, and individual liberty? What will happen to core democratic values such as citizen participation and governmental accountability in such a transformation, and who will be the winners and losers? How will

rapid developments in science and technology affect and transform more stable elements of national politics and culture? What will it mean for existing institutions of governance if science and technology, far from operating as objective legitimators of policy, themselves appear as catalysts of domestic and international political turmoil? And are there criteria by which we can evaluate responses across countries, in order to judge whether some are handling change more effectively, ethically, or democratically than others?

These are the questions I set out to explore in this book through a comparative study of the politics of biotechnology in Britain, Germany, the United States, and the European Union (EU). The debates of the 1970s concerning the safety of recombinant DNA (rDNA) experiments supply the background for my story, but the book's primary focus is on events from 1980 to the present. There are three main reasons for choosing this period. First, there is an extensive and multifaceted literature on the historic Asilomar conference of 1975 and its impact on the development of guidelines for rDNA research by the U.S. National Institutes of Health (NIH).[11] Later developments have received less attention from historians and sociologists of science, and still less from students of democratic theory. Second, whereas U.S. biotechnology policy led Europe's in the 1970s, distinctively European forms of politics and policymaking took shape in the 1980s, inviting systematic comparative analysis. Europe's growing economic and political integration propelled the European Commission to new activism in both sponsoring and regulating biotechnological research and development. At the same time, EU member states emerged as independent players, with their own stakes in the future of biotechnology. Third, as researchers' dreams moved closer to industrial production, the ethical, social, and environmental ramifications of biotechnology began to attract more serious attention. Monolithic positions in support of or opposition to genetic engineering dissolved into more nuanced conversations about the appropriate objectives of research and development in the life sciences. In Europe as well as the United States, new forums, actors, instruments, and discourses arose to grapple with a significantly broader and more diversified political agenda. The implications of all these transitions for democratic politics and governance are only now becoming apparent and merit careful study.

Questions for Democracy

The political reception of biotechnology serves as a window for looking into a number of large contradictions confronting democratic governments in the twenty-first century. Science and technology have been regarded for centuries as instruments of social progress and personal liberation. Yet, as scientific knowledge becomes more closely aligned with economic and political

power, producing new expert elites, the distance between the governors and the governed can be expected to grow—a dismal prospect in societies where low levels of electoral participation and citizen engagement are already causes for concern. Science, moreover, has historically maintained its legitimacy by cultivating a careful distance from politics.[12] As state-science relations become more openly instrumental, we can reasonably wonder whether science will lose its ability to serve either state or society as a source of impartial critical authority. New questions about access and equality can be expected to arise as biotechnology becomes more global, as they already have in connection with existing techniques such as in vitro fertilization and promised ones such as "genetic enhancement." Will continued advances in the life sciences produce a new genetic underclass, and will they simultaneously increase the state's already immense power to define, classify, and regulate life itself?[13] These are some of the considerations that prompt a detailed investigation of the politics of the life sciences. As I hope to show, there are particular gains to be had from making this inquiry comparative.

The stories told in this book are partly about invention, both scientific and social. They relate how public and private actors in three Western nations, and to some extent the European Union, assisted in the production of new phenomena through their support for biotechnology, and how they reassured themselves and others about the safety of the resulting changes—or failed to do so. Inventiveness in the life sciences and technologies went hand in hand with institutional and procedural inventiveness in the political realm, as national actors developed new capacities for assessing and regulating the processes and products of genetic engineering. Just as importantly, though, the stories in this book are about *re*invention. They show how and with what degrees of success attempts to master the concerns generated by biotechnology drew on, reproduced, or reinforced old ways of coping with hazards. In this respect, the politics of biotechnology serves as a theater for observing democratic politics in motion.

The comparative accounts in this book develop and expand upon three major arguments that have featured in my earlier work, though perhaps never with quite the centrality they are accorded here. The first is that democratic theory cannot be articulated in satisfactory terms today without looking in detail at the politics of science and technology. That contemporary societies are constituted as *knowledge* societies is, of course, an important part of the reason. It follows that important aspects of political behavior and action cluster around the ways in which knowledge is generated, disputed, and used to underwrite collective decisions. It is no longer possible to deal with such staple concepts of democratic theory as citizenship or deliberation or accountability without delving into their interaction with the dynamics of knowledge creation and use. More specifically, biological sciences and their applications have brought about ontological changes and reclassifications in

the world, producing new entities and new ways of understanding old ones. Such changes entail a fundamental rethinking of the identity of the human self and its place in larger natural, social, and political orders. We will see throughout the book that unexpected innovations in administrative and judicial practices, forms of citizen participation, and discourses of public persuasion happened around genetics and related areas of science and technology. Together, these developments suggest that some of the liveliness of contemporary democracy is to be found away from the polling booths, where one often looks for it in vain, in the less examined machinery of science and technology policy—that is, in technical advisory committees, court proceedings, regulatory assessments, scientific controversies, and even the ephemeral web pages of environmental groups and multinational corporations.

The book's second major argument is that, in all three countries, policies concerning the life sciences have become embroiled to varying degrees in more or less self-conscious projects of nation-building or, more accurately, projects of reimagining nationhood at a critical juncture in world history.[14] The case is clearest in Germany, where deliberation on what is at stake in biotechnology policy has been tied to two recurrent narratives of nationhood: the still unfinished project of reconstituting German identity after two world wars and the Holocaust, and more recent questions about how that identity should be articulated in the aftermath of reunification; competing and increasingly intense discussions of Europeanization only make more urgent the need to work out the meanings of German nationhood. In Britain, too, questions of national identity have been woven into the conflicts around biotechnology, although understandably in a lower key than in Germany. British debates on the life sciences were caught up with two larger sets of *fin de siècle* concerns: the reinvention of the Labour Party in the post-Thatcher years, and Britain's ongoing struggle to modernize and democratize institutions seen to be out of touch with the economic and social realities of the twenty-first century. How to regain a technological edge, and what social compromises to make or not make in that process, figured as subtexts in virtually every major structural reform initiative, from the devolution of political power to Scotland and Wales to creating an independent high court and imposing fees on university students.[15]

In Brussels, no less than in Berlin or London, dilemmas about political identity and institutional legitimacy became wrapped up with those related to biotechnology policy. In the early millennial years, the EU wrestled with, and often seemed stymied by, the problem of enlarging its borders without increasing already troubling levels of electoral apathy and distrust. "When a reality TV show attracts more votes than an election," a British journalist lugubriously observed about European electoral politics, "democracy is in trouble."[16] How much diversity could the Union tolerate and still remain a viable union? When should national values and political traditions trump policies put forward at the European level? The answers to these questions

were worked out in part in discussions of what to do about biotechnology—both within the EU framework and in relation to the ever-present competitive challenge from the United States.

On its face, nation-building is hardly a term one would think to apply to the United States at the turn of the millennium. Secure in its borders, and victorious in its military interventions in Afghanistan and Iraq, the United States in the early twenty-first century seemed untroubled by wrenching doubts about its territorial integrity, identity, or purpose. Yet the end of the cold war and the beginning of the "war on terror" brought a necessary reevaluation of the U.S. position in the world and a tacit renegotiation of what American democracy means in relation to a host of issues on the national and transnational political agendas.[17] Triumphalism about the market, with attendant reassertion of domestic ideologies of technological leadership and deregulation, profoundly shaped the U.S. environment for the life sciences. A conceded world leader in research and development, the United States encountered unexpected opposition in finding global markets for the early fruits of its inventiveness. Resistance to biotechnology became almost a surrogate for resisting America's imperial power. In tracing connections between the macropolitical dynamics of nationhood and the micropolitics of biotechnology in the United States or Europe, I will not argue for any simplistic notions of causality, but I will show at many points how the framing of particular debates at once fed into and was influenced by deeper concerns about national identity at a time of significant geopolitical ferment.

The book's third argument, not unrelated to the second, is that political culture matters to contemporary democratic politics: however slippery this concept may seem to analysts, students of politics in a globalizing world must try to come to grips with it. In much relevant literature on politics, there has been a tendency to relegate political culture to "other" places and times—much in the way that nineteenth- and early twentieth-century cultural anthropologists found culture only in alien, primitive, or marginal societies, assuming that their own social beliefs were founded on the universals of science and reason. Accordingly, political culture has been invoked primarily in studies of non-Western political systems or of older, premodern polities.

Comparative analysis of the sort undertaken here reveals disconcerting problems with the understanding of political culture as exotic or foreign. To begin with, even economically and socially integrated Western nations are seen to differ importantly in their reception of science and technology. These differences cannot be explained in terms of discrepant ideologies, national interests, policy priorities, or states of technological development. They occur despite the leveling effects of protechnology state policies, global movements of knowledge and capital, and the role of transnational actors such as scientists, social movements, and industry. There are persistent differences in national ways of meeting common economic and social challenges, and the fact

that these are hard to pin down and account for, and are contested even as they are reproduced, only makes the task the more intellectually engaging. An important locus of difference is in the systematic practices by which a nation's citizens come to know things in common and to apply their knowledge to the conduct of politics. I term these culturally specific ways of knowing "civic epistemologies" and discuss them in detail in chapter 10. How democratic polities acquire communal knowledge for purposes of collective action emerges in my telling as a particularly significant feature of political culture.

A renewed appreciation of political culture allows us to make sense of particular puzzles in each of the three country studies. In the United States, we address why a once robust debate on environmental issues such as nuclear power and chemical pollution has given way to a relatively complacent acceptance of the risks and benefits of genetic engineering. In Britain, the problem is almost the opposite, for here a nation historically tolerant of pollution and technological risk and relatively resistant to institutional innovation has emerged, in some ways, as the most active experiment station for the politics of biotechnology. By contrast, in Germany, an extremely sophisticated public debate conducted in expert committees, academia, and the elite mass media has failed to produce comparable innovation in the institutions of public policy.

There are also some comparative puzzles that I hope to elucidate. Some of these focus on the divergent political pathways traced by the same event or issue across the three countries. Why, for example, have agricultural biotechnology and GM food not become openly controversial in the United States or Germany but did turn into matters of intense concern in Britain? How, to the contrary, did Britain succeed in carving out a relatively uncontested space for embryo research, while American politics on this issue remained deeply divided, and Germany refused to allow the most difficult choices to rise to political salience in the first place? Why is patenting life forms seen as an ethical issue in Europe but not in the United States? And what accounts for the fact that bioethics, simultaneously and energetically embraced as a policy discourse in the EU and in three sovereign nations, nevertheless is understood in vastly different ways in each of its contexts of development?

The range and specificity of these cross-boundary differences militate against the easy generalizations about Europe and the United States offered by Robert Kagan in his light and lively essay on Western power at the millennium.[18] Kagan wishes us to "stop pretending that Europeans and Americans share a common view of the world, or even that they occupy the same world." I, too, challenge the notion of a globally shared "common view of the world," but my arguments begin and end in different places. In the context of biotechnology, I show, to start with, that terms like "European" and "American" are far more fluid and contested than is presumed by monolithic accounts of culture such as Kagan's. Clashes are endemic both within and between these cultures, particularly in relation to scientific and technological change, and the analyst's task is to probe

how cultural identities are dynamically reasserted or transformed in these processes. Europe in particular is a multiply imagined community in the minds of the many actors who are struggling to institutionalize their particular visions of Europe, and how far national specificities should become submerged in a single European nationhood—economically, politically, or ethically—remains far from settled.[19] Moreover, if Europe and the United States do not occupy the same world, it is because the nature of that world is itself a thing that remains uncertain and contested. The world occupied by nation states never was a single place, but always a work in progress, represented and fought for according to different normative conceptions of the appropriate kinds of economic, political, social, and technological integration to be attained. Globalization has not resolved the tensions; it has if anything made the problems of coexistence more self-evident. Whose vision of the world should be naturalized or made "real" under these circumstances is of the utmost political and epistemological consequence. The politics of biotechnology, I suggest, is a remarkably productive site in which to observe competing ways of worldmaking being contentiously, often forcefully, negotiated, though not by military means.

Throughout the book, I use the methods of the interpretive social sciences to make sense of complex social and political phenomena, including most especially resources from the field of science and technology studies. Through a combination of historical reflection, close textual reading, personal interviews, observation of key institutions, and qualitative analysis of legal and political developments, I try to characterize how three wealthy, technologically advanced, deliberative democracies have tried to come to terms with one of the most far-reaching advances in the human ability to intervene in nature. In the process, I take issue with or reject as incomplete some commonly held views about cross-national divergences in the politics of biotechnology. One is the notion that U.S.–European differences on such matters as genetically modified crops and foods are simply the result of European protectionism, and hence are bound to persist as a form of international political gridlock.[20] Another is the countervailing proposition that convergence across countries is bound to happen, and is in fact happening under the prod of scientific and economic rationality. A third is the asymmetric invocation of "history" as an explanation for German opposition to some forms of genetic engineering, but not for British or American acceptance of the same developments—which by extension are seen as natural and inevitable. A fourth is the equally asymmetric attribution of the rejection of GM products in each country to public hysteria, media hype, or the public misunderstanding of science—without invoking comparable social explanations for the acceptance of the same technologies.[21]

As a comparatist of many years standing, I am aware of course that some readers will approach these arguments skeptically. To those inclined to view the world as embarked upon a course of increasing economic and social

convergence, any attempt to characterize policy outcomes in terms of national political cultures may seem backward-looking, overdoing the differences between nations at the expense of flows that are increasingly drawing us all closer together. Some will charge that cross-*national* comparison, in particular, is full of intellectual dangers: it reifies national boundaries, overlooks heterogeneity and change, and perhaps reinforces parochial stereotypes of national identity. In answering similar criticisms of her seminal work on Dutch art fo the seventeenth century, the noted art historian Svetlana Alpers had this to say: "To those who will protest that . . . I exaggerate differences within European art by slighting the continuous interplay between the art of different countries, I would reply that they are mistaking my purpose. I do not want either to multiply chauvinisms or to erect and maintain new boundaries, but rather to bring into focus the heterogeneous nature of art."[22] What Alpers wished to do for northern European art, I aim to do here for Western democracy, that is, to bring into sharper relief its own heterogeneity, especially as displayed in its multifaceted, culturally differentiated encounters with science and technology.

The comparative accounts I offer are not designed to make it easier to predict where and when the next crisis over biotechnology will erupt or what procedures will then be best suited to restoring trust in science and government (although readers of this book may find it easier to appreciate which kinds of scientific and technological issues are most likely to become sensitive in each national setting). Far more, I want to display the separate logics that have driven three closely similar political traditions toward disparate ends in managing fateful encounters with biology and biotechnology. My purpose is to enhance our capacity for political and cultural appreciation of these developments—or, in tenns elaborated by MaxWeber and other German political philosphers, to aim for *Verstehen* (understanding) rather than *Erklärung* (causal explanation).[23] It is to set aside reductionist, linear accounts of some of the most significant sociopolitical transformations of late modernity in favor of a kind of story-telling that does justice to the ambiguity of these experiences, and to their richness.

POLITICAL SCIENCE / SCIENCE & TECHNOLOGY

Designs on Nature

Sheila Jasanoff

SCIENCE AND DEMOCRACY IN EUROPE AND THE UNITED STATES

Biology and politics have converged today across much of the industrialized world. Debates about genetically modified organisms, cloning, stem cells, animal patenting, and new reproductive technologies crowd media headlines and policy agendas. Less noticed, but no less important, are the rifts that have appeared among leading Western nations about the right way to govern innovation in genetics and biotechnology.

In this sweeping study of some twenty-five years of scientific and social development, Sheila Jasanoff compares the politics and policy of the life sciences in Britain, Germany, the United States, and in the European Union as a whole. She shows how public and private actors in each setting evaluate the products of biotechnology and try to reassure themselves about their safety and worth.

"*Designs on Nature* should be read by all interested in the science or management of biotechnology, whether red or green, on both sides of the Atlantic."
—Julian Kinderlerer, *Science*

"Anyone who reads this book and still thinks that science is a politics-free zone has not understood the argument. On the other hand, by understanding the argument, a reader can gain a nuanced appreciation of the ways in which science and technology decision making crucially depends on, and interacts with, political culture."
—Erik Millstone, *Issues in Science & Technology*

"Magisterial in its scope."
—Philip Campbell, *Nature*

"*Designs on Nature* manages to communicate the results of sustained scholarship in a lively and engaging style, and should be required reading for anyone interested in the social dynamics of innovation."
—James Wilsdon, *Financial Times*

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