of the HD webforum analyzed by Novas is one example of the growing
array of virtual communities of somatic individuals organizing key axes
of their forms of life around their sickly, risky, improvable, or manipulable
corporeality.

More fundamentally, criticisms posed in terms of biological and genetic
determinism fail to recognize a significant change that is occurring in conceptions
of life itself. The explanatory form of the genetics they criticize
is that of a depth ontology. For these critics, biologists are thought to construe
the genetic code as a deep inner truth, the cause of sickness or
health, merely expressed in the surface of corporeality, conduct, character,
etcetera. Explanatory structures that operate in terms of depths and sur-
faces clearly characterize much modern thought—political economy with
its arguments about the hidden hand of the market or the causal powers of
the mode of extraction of surplus value; the depth ontologies of the
human subject associated with psychoanalysis and all the dynamic psycholo-
gies. I would not wish to deny that such explanatory forms are also
prevalent in biological thought, especially in its semipopular forms (such
as Richard Dawkins or the writings of the sociobiologists). The spontane-
ous philosophy of the biologist is undoubtedly “modern” in this sense—
reflecting on their practice and representing it to others, they tend to as-
cribe a deep ontological reality to their concepts and portray them as the
hidden truths that produce and determine a realm of observable effects.
But, as a whole tradition of philosophers of science from Bachelard on-
wards has taught us, one should not mistake the spontaneous philosophy
of the scientist for the operative epistemology or ontology of scientific
activity. In this sense, despite popular and pseudosophical accounts,
I suggest that contemporary genetics is beginning to operate in a “flatt-
tened” world, a world of surfaces rather than depths. In the developing
explanatory schemas of postgenomics, the genetic code is no longer
thought of as a deep structure that causes or determines, but rather as only
one set of relays in complex, ramifying, and nonhierarchical networks,
filitations, and connections (Deleuze 1988b).

I would not claim that the metaphysics of the gene has been abandoned.
But I would argue that such an ontology is not unchallenged, and that
these challenges and alternatives will accumulate over the next decade.
Perhaps, that is to say, we need to analyze the way that genetics and ge-
netic risk might figure in the forms of personhood associated with a post-
ontological conception of life, a vitality not of depths and determinations
but of surfaces and associations.

Chapter 5
Biological Citizens

A new kind of citizenship is taking shape in the age of biomedicine, bio-
technology, and genomics. This is a shift in what I term “biological citi-
zenship.” Since Marshall’s classic essay (Marshall 1950) it is conven-
tional to think of a kind of evolution of citizenship since the eighteenth
century in Europe, North America, and Australia: the civil rights granted
in the eighteenth century necessitated the extension of political citizenship
in the nineteenth century and of social citizenship in the twentieth cen-
tury. This perspective is useful, to the extent that it breaks with political-
philosophical considerations of citizenship and locates citizenship within
the political history of “citizenship projects.” By citizenship projects, I
mean the ways that authorities thought about (some) individuals as poten-
tial citizens, and the ways they tried to act upon them in that context. For
example: defining those who were entitled to participate in the political
affairs of a city or region; imposing a single legal system across a national
territory; obliging citizens to speak a single national language; establish-
ing a national system of universal compulsory education; designing and
planning buildings and public spaces in the hope that they would encour-
age certain ways of thinking, feeling, and acting; developing social insur-
ance systems to bind national subjects together in the sharing of risks.
Such projects for creating citizens were central both to the idea of the
national state, and to the practical techniques of the formation of such
states. Citizenship was fundamentally national.
Many events and forces are placing such a national form of citizenship in question. As anguished debates about “multiculturalism” indicate, the nation can no longer be assumed to be a cultural or religious unity, nor can citizenship be so easily tied to hopes for a single national identity. As debates about “globalization” indicate, the idea of a single territorially bounded national economy has become problematic. As debates about economic and political migration indicate, the capacity of states to delimit citizens in terms of place of birth or lineage or race is placed in question. Discussions of these challenges rarely touch on issues of biology, biotechnology, or biomedicine. But developments in these areas also challenge existing conceptions of national citizenship, and intersect with all these other developments in significant ways. Indeed I would make a wider claim: biological presuppositions, explicitly or implicitly, have underlain many citizenship projects, shaped conceptions of what it means to be a citizen, and underpinned distinctions between actual, potential, troublesome, and impossible citizens.

Of course, there have been many discussions of the importance of biological beliefs for the politics and history of the nineteenth and twentieth centuries. But the biologization of politics has rarely been explored from the perspective of citizenship. Yet histories of the idea of race, degeneracy, and eugenics, of ideas and policies around women, motherhood, and the family, and of demography and the census show how many citizenship projects were framed in biological terms—in terms of race, blood lines, stock, intelligence, and so forth. I use the term “biological citizenship” descriptively, to encompass all those citizenship projects that have linked their conceptions of citizenship to beliefs about the biological existence of human beings, as individuals, as men and women, as families and lineages, as communities, as populations and races, and as species. And like other dimensions of citizenship, biological citizenship is undergoing transformation and is reterritorializing itself along national, local, and transnational dimensions.

Inevitably, in discussing these issues, the specter of racialized national politics, eugenics, and racial hygiene is summoned from its sleep. Such biological understanding of human beings were clearly linked to notions of citizenship and to projects of citizen building at the level of the individual and of the nation-state. Nonetheless, contemporary biological citizenship, in the advanced liberal democracies of “the West” that are my principal focus here, does not take this racialized and nationalized form. The forms of biological citizenship that I discuss here are differentially territorialized. As analyses of bioprosppecting and biopiracy show, not all have equal citizenship in this new biological age. Nonetheless, the links between biology and human worth and human defects today differ significantly from those of the eugenic age. Different ideas about the role of biology in human worth are entailed in practices of selective abortion, preimplantation genetic diagnosis, and embryo selection. Different ideas about the biological responsibilities of the citizen are embodied in contemporary norms of health and practices of health education. Different citizenship practices can be seen in the increasing importance of corporeality to practices of identity, and in new technologies that intervene on the body at levels ranging from the superficial (cosmetic surgery) to the molecular (gene therapy). A different sense of the importance of “bare life” of human beings as the basis of citizenship claims and protections is bound up in contemporary transnational practices of human rights. And while it is true that many states are, once more, regarding the specific hereditary stock of their population as a resource to be managed, these endeavors are not driven by a search for racial purity. Instead, they are grounded in the hope that certain specific characteristics of the genes of groups of their citizens may potentially provide a valuable resource for the generation of intellectual property rights, for biotechnological innovation, and for the creation of biovalue. However an analysis of biological citizenship cannot merely focus on strategies for “making up citizens” imposed from above. The languages and aspirations of citizenship have shaped the ways in which individuals understand themselves and relate to themselves and to others. Projects of biological citizenship in the nineteenth and twentieth century produced citizens who understood their nationality, allegiances, and distinctions, at least in part, in biological terms. They linked themselves to their fellow citizens and distinguished themselves from others, noncitizens, partly in biological terms. These biological senses of identification and affiliation made certain kinds of ethical demands possible: demands on oneself; on one’s kin, community, society; on those who exercised authority.

It is this sense of biological citizenship that is most clearly developed by Adriana Petryna in her study of post-Chernobyl Ukraine (Petryna 2002). The government of the newly independent Ukraine based its claims to a right to govern on the democratically expressed will of its citizens. And those citizens who had, or who claim to have, been exposed to the radiation effects of the nuclear explosion at the Chernobyl reactor, believed that they had rights to health services and social support that they could claim from that government in the name of their damaged biological bodies. In this context, she argues “the very idea of citizenship is now charged with the superadded burden of survival . . . a large and largely impoverished segment of the population has learned to negotiate the terms of its economic and social inclusion using the very constituent matter of life” (5). Biological citizenship can thus embody a demand for particular protections, for the enactment or cessation of particular policies or actions, or, as in this case, access to special resources—here “to a form
of social welfare based on medical, scientific, and legal criteria that both acknowledge biological injury and compensate for it" (4). Life acquires a new potential value, to be negotiated in a whole range of practices of regulation and compensation. This is not a unique situation. We can see something similar in campaigns for redress for the victims of Bhopal (Kumar 2004), and in numerous American examples of fights for compensation for biomedical damage, portrayed in semifictionalized accounts in films such as Erin Brockovich and A Civil Action. Of course, there are very different political, legal, and ethical framings in these different locales. But in each case claims on political authorities and corporate entities are being made by those who have suffered biological damage, in terms of their "vital" rights as citizens.

Biological citizenship is both individualizing and collectivizing. It is individualized, to the extent that individuals shape their relations with themselves in terms of a knowledge of their somatic individuality. Biological images, explanations, values, and judgments thus get entangled with other languages of self-description and other criteria of self-judgment, within a more general contemporary "regime of the self" as a prudent yet enterprising individual, actively shaping his or her life course through acts of choice (Novas and Rose 2000). The responsibility for the self now implicates both "corporeal" and "genetic" responsibility: one has long been responsible for the health and illness of the body, but now "somatic individuals" must also know and manage the implications of one's own genome. This responsibility for the self to manage its present in the light of a knowledge of its own future can be termed "genetic prudence": a prudential norm that introduces new distinctions between good and bad subjects of ethical choice and biological susceptibility (on prudence, see O'Malley 1996).

Biological citizenship also has a collectivizing moment. Paul Rabinow proposed the concept of "biosociality" to characterize these forms of collectivization organized around the commonality of a shared somatic or genetic status, and has drawn attention to the new ethical technologies that are being assembled around the proliferating categories of corporeal vulnerability, somatic suffering, and genetic risk and susceptibility (Rabinow 1996a). Biosocial groupings-collectivities formed around a biological conception of a shared identity-have a long history, and medical activism by those who refuse the status of mere "patients" long predates recent developments in biomedicine and genomics. Many of these earlier activist groupings were fiercely opposed to the powers and claims of medical expertise. Some remain implacably antimedical; others operate in a manner that, while not explicitly opposed to established medical knowledge, prefers to remain complementary to it. Nonetheless collectivities organized around specific biomedical classifications are increasingly significant. The forms of citizenship entailed here often involve quite specialized scientific and medical knowledge of one's condition: one might term this "informational biocitizenship." They involve the usual forms of activism such as campaigning for better treatment, ending stigma, gaining access to services, and the like: one might term this "rights biocitizenship." But they also involve new ways of making citizenship by incorporation into communities linked electronically by email lists and websites: one might term this "digital biocitizenship."

Both in its individualizing and its collectivizing moments, contemporary biological citizenship operates within the field of hope. Hope plays a fundamental yet ambiguous role in contemporary somatic ethics. Sarah Franklin introduced the idea of "hope technologies," in the context of her study of assisted reproduction: within such technologies, professional aspirations, commercial ambitions, and personal desires are intertwined and reshaped around a biosocial telos (Franklin 1997). The maintenance of hope has become a crucial element, not merely in the reproductive technologies, but more generally within the therapeutic armory of nursing care for patients with cancer and other life-threatening illnesses; it is also, some suggest, threatened by the contemporary obligations not to deceive patients, but to give them full information about the nature of their condition and the statistics of recovery and mortality (Hickey 1986, Hinds 1984, Hinds and Martin 1988, Miklusak-Copper and Miller 1991, Peräkylä 1991, Ruddick 1999). It was this dilemma that Mary-Jo Delvecchio Good, Byron Good, and their colleagues pointed to in 1990, discussing not only the ways in which, in American treatment practices for cancer, physicians sought to install and maintain the hope of their patients in the possibility of cure or remission as a therapeutic tool, but also the way in which physicians maintained their own hopefulness through commitment to the progressive efficacy of biomedical therapeutics (Good et al. 1990). Although they focused on the patient-physician relationship, and the norms of disclosure of information to patients, they suggested that this was part of a "political economy of hope," because hope linked these elements of therapeutic practice to the funding of "research and treatment institutions, ... the patterns of availability and promotion of particular anti-cancer therapies, [and the] search for treatments and cure by patients and their families" (60). Nik Brown explored similar dynamics in his study of hopes around xenotransplantation, usefully pointing to the semantic complexity of the contemporary term: In a world imbued with a drive to master the future and still clinging to an ambivalent belief in progress, hope draws our gaze to a horizon upon which things are imagined that we expect with desire, or desire with expectation (Brown 1998). Hope, as Brown points out, is not merely a set of beliefs, but is infused with affects that structure the actions of many of those involved in work-
ing in situations where illness, and the fear of illness, can generate despair, desperation, and terror in the face of the future. And deeply emotional representations of the fears and hopes of sufferers, and their expectations that new medical technologies will deliver them from their suffering, structure many popular representations of patients and their illnesses, and are often deployed by medical charities, support groups and others in seeking to raise funds to keep that hope alive (Brown 1998, especially chapter 4).

Carlos Novas has expanded and deepened the sense in which we might understand the political economy of hope that has taken shape around contemporary biomedicine (Novas 2001). He shows how this economy has been constituted by interlinking hopes of many different types and of diverse actors: the hope of patients and their families for effective treatment; the use of hope as a therapeutic instrument by medical practitioners; the hope of those managing health services that might minimize or mitigate the impact of common disorders such as stroke, heart disease, or cancer; the hope of those with a family history of genetic disease for children who are not suffering from debilitating conditions; the hope of us all for an old age not marred by Parkinson’s or Alzheimer’s disease; the hope of the pharmaceutical industry and biotech companies for treatments that will generate increased profits and shareholder value; the hope of scientists and researchers for career advancement and fame. Thus many new experts and forms of professional expertise have been involved in the generation, modulation, instrumentalization, and management of these hopes, and of the fears, anxieties, and disappointments that provide them with such a powerful dynamic.

Biological citizenship is a more general version of what Deborah Heath, Rayna Rapp, and Karen-Sue Taussig have termed “genetic citizenship” – a way of understanding human differences, especially those related to health, in terms of genetic influences. They argue that developments in genetics are not just engendering new ways in which individuals and authorities are seeking to manage procreation according to genetic criteria, but also giving rise to “new forms of democratic participation, blurring the boundaries between state and society, and between public and private interests” (Heath et al. 2004: 152). This is manifested in a range of struggles over individual identities, forms of collectivization, demands for recognition, access to knowledge, and claims to expertise. It is creating new spaces of public dispute about the minutiae of bodily experiences and their ethical implications. It is generating new objects of contestation, not least those concerning the respective powers and responsibilities of public bodies, private corporations, health providers and insurers, and individuals themselves. It is creating novel forums for political debate, new ques-

tions for democracy, and new styles of activism. Heath, Rapp, and Taussig argue that “it is “genetic citizenship” that connects discussions of rights, recognitions, and responsibilities to intimate, fundamental concerns about heritable identities, differential embodiment, and an ethics of care” (57, emphasis in original). And, in a context in which all of us, not merely those already ensnared with disease, are potentially subjects of genetic screening for susceptibilities, they suggest that these movements and contestations may indicate something of shape of a future genetic citizenship for us all (166).

The organization of citizenship in genetic terms is undoubtedly significant, and it is already possible to identify programs to extend genetic education beyond those immediately involved, to educate parents, schoolchildren, and citizens in genetic literacy (see, for example, Jennings 2003). But I think that genetics contribute only one dimension to contemporary biological citizenship, one axis of the ways in which the biological makeup of each and all can become an issue for political contestation, and for recognition and exclusion, and for demands for rights and the imposition of obligations. Biological citizenship has taken different forms in different national contexts, and in relation to different types of disease, disfigurement or disability. Its form is shaped by many factors, notably their biopolitical histories and modes of government, their traditions of activism, and their presuppositions about persons and their rights and obligations. In the remainder of this chapter, I will explore these issues in relation to some empirical examples. My aim is descriptive and diagnostic—to begin to map the new territory of biological citizenship and to develop some conceptual tools for its analysis.

Making Up the Nation

Paul Gilroy has suggested that gene-oriented constructions of “race” are very different from “the older versions of race-thinking that were produced in the eighteenth and nineteenth century” (Gilroy 2000: 15). As the relations between human beings and nature are transformed by genomics, the meaning of racial difference is changed; he believes that this provides the possibility of challenging the tainted logic of raciology. His assessment may be optimistic, but it points to the way in which certain presuppositions about biology bound together thinking about nation, people, race, population, and territory from the eighteenth century onwards. To think of individual and collective subjects of European nations was to think in terms of blood, stock, physiognomy, and inherent moral capacities. Those over whom Europeans would exercise colonial domi-
ion were also thought of in these terms. In short, citizenship was grounded on what, from the early nineteenth century onwards, would be termed “biology.” Distinctions within nations as to those more or less worthy of, or capable of, citizenship, and distinctions between peoples as to their respective capacities to rule and be ruled, were built on an explicit or implicit biological taxonomy inscribed in the soma of both individual and collective and passed down through a lineage.

This is not the place to review the various ways in which people, race, nation, history, and spirit were linked in the blood, divided and placed into hierarchies and patterns of descent. These can be traced from the philosophers of eighteenth-century liberalism, such as Locke and Mill, through eighteenth- and nineteenth-century raciology, into the political debates about racial deterioration and degeneracy in the second half of the nineteenth century, and concerns about the consequences of the size and fitness of the population for the fate of nation-states in imperial rivalry. Ideas of character and constitution, of blood, race, and nation, remained inextricably intertwined in the eugenic arguments of the first half of the twentieth century, which shaped the political imagination of the nation-states of North America, the Nordic countries, Australasia, South America, and elsewhere. Such ideas were translated into many different strategies to preserve the biological makeup of the populations of states. Some focused on outside threats, such as those posed by immigration from lower races. Others focused on threats from within, such as the dangers posed by the breeding of defective, insane, sick, or criminal individuals and their kin. Conceptions of the biological basis of national identity and national unity underlay many legal definitions of nationhood and citizenship in terms of descent. In Germany, the citizenship law of 1913, which was framed in these terms and defined citizenship in terms of the line of descent, survived the Nazi experience and remained in force until 1999. In the 1920s, Chinese citizenship was built on the presupposition of a single lineage of blood of “the yellow race” (Dikötter 1998). In the same period in Mexico, some attempted to argue that it was the fusion of blood that gave the Mexican race its defining characteristics (Stepan 1991). In each version, the nation was not only a political entity, it was a biological one. It could be strengthened only by attention to the individual and collective biological bodies of those who constituted it.

Within these twentieth-century projects of biological citizenship, there were clear differences between those who felt that their objectives could only be reached by strategies involving compulsion and those who opposed compulsion in the name of liberty. But this distinction did not map onto a simple division between strategies of reproductive control and strategies of health education and public health. Emphasis on the need to educate individuals so that they take personal responsibility for the genetic implications of their reproductive decisions is not new. For example, the genetic education of the citizen was a constant theme in the eugenic period, and early eugenicists developed all sorts of events to encourage individuals and families to reflect on themselves, their marriage partners, and their past and future lineage in eugenic terms, with a view to enhancing healthy procreation. Through education, the genetic citizen was to be enabled to take responsibility for his or her own heredity. I shall return to this question presently.

What, then, of the present? It would be too simple to believe that such concerns with the biological and / or genetic makeup of the population and the individual citizen have ceased to be matters of national political concern. The very existence of state-supported public health measures indicates that the vital biological existence of the citizen remains an issue within the political rationalities of the present. The very existence of certain practices that have now become routine in medical care—ultrasound, amniocentesis, chorionic villus sampling, and more—shows that judgments of value concerning certain features of the bodies and capacities of citizens have become inescapable, even if it is the individual citizen and her family who must carry the responsibility for the choice now rendered calculable for them. And successive state-funded health promotion programs show how the biological education of the citizen remains a national priority, although it is now supplemented by a host of other forces seeking to shape the reflexive gaze through which the citizen views his or her past, present, and future biological corporeality.

From another perspective, national genetic peculiarities have become a key resource for biomedicine and for commercial exploitation. This has involved the search for lineages with a high incidence of particular diseases and the belief that the study of such pedigrees would provide the key to unraveling the genetics of disease. Finland can serve as an initial example. It has long been recognized by geneticists that sectors of the Finnish population are attractive for gene hunting because of a combination of low geographical mobility, relatively high rates of “inbreeding,” good genealogical and health records, and high rates of prevalence of certain diseases. For example, many claims about the discovery of genes linked with schizophrenia, manic depression, alcoholism, and other disorders were based on genetic research in Finland. In the age of genomics such conditions, once seen as burdens on the national population and its health service, have become potentially valuable resources: hence, they are included in the Finnish proclamation of biotechnology as a national imperative. As we discuss in detail later, the national population has become a resource not only for understanding particular pathologies, but also for profitable biomedical exploitation.
Making Biological Citizens: From Public Value to Biovalue

Over the past decade, in many countries, there have been attempts to educate citizens so that they will be better able to engage in informed debate over the complex ethical and democratic dilemmas brought about by scientific and technological progress. The “public understanding of science” is seen as one way of regaining the confidence and trust of lay members of the public in the regulatory mechanisms that govern science. It is also seen as a way of redressing a kind of “democratic deficit” that is said to exist when citizens do not actively participate in shaping scientific and technological futures. Such arguments concerning the need to enhance the scientific understanding of citizens have a long history. As far as biology and biomedicine are concerned, I have already commented on the attempts by eugenicists and similarly minded educators in the 1920s and 1930s to inculcate a particular version of scientific literacy—in this case the capacity to reflect in a eugenically informed manner on reproductive and marital choices. This is only one way in which the capacities of the individual for citizenship have been linked to his or her understanding of “advances in science.”

Attempts educate the public about science and technology are part of strategies for “making up” the biological citizen. “Making up citizens” has involved the reshaping of the way in which persons are understood by authorities—be they political authorities, medical personnel, legal and penal professionals, potential employers, or insurance companies—in terms of categories such as the chronically sick, the disabled, the blind, the deaf, the child abuser, the psychopath. These categories organize the diagnostic, forensic, and interpretive gaze of different groups of professionals and experts. Classification of this sort is both dividing and unifying. It delimits the boundaries of those who get treated in a certain way—in punishment, therapy, employment, security, benefit, or reward. And it unifies those within the category, overriding their specific differences. New biological and biomedical languages are beginning to make up citizens in new ways in the deliberations, calculations, and strategies of experts and authorities: for example the emergence of categories such as the child with attention deficit hyperactivity disorder, the woman with premenstrual dysphoric disorder, or the person who is presymptomatically ill because of genetic susceptibilities.

Making up biological citizens also involves the creation of persons with a certain kind of relation to themselves. Such citizens use biologically colored languages to describe aspects of themselves or their identities, and to articulate their feelings of unhappiness, ailments, or predicaments. For example, they describe themselves as having high levels of blood choles-

...terol, as vulnerable to stress, as being immuno-compromised, or as having a hereditary predisposition to breast cancer or schizophrenia. They use these phrases, and the types of calculation to which they are attached, to make judgments as to how they could or should act, the kinds of things they fear, and the kind of lives for which they can hope. In part, of course, the languages that shape citizens’ self-understandings and self-techniques are disseminated through authoritative channels: health education, medical advice, books written by doctors about particular conditions, documentaries on television that chart individuals coping with particular conditions. Thus, for example, Bruce Jennings of the Hastings Center, in a 2003 concept paper pointed to the work of groups from Genetic Alliance through the March of Dimes to the Oregon Health forum that are working to “bolster the social capital and genetic citizenship of ordinary citizens and particularly of cultural and ethnic minorities”—the kind of work he considers vital to ensure that genetic literacy and genetic citizenship are part of a movement of civic renewal and democratic empowerment (Jennings 2003: 4–5). Indeed, whatever may be said about their general level of scientific literacy, in biomedical arenas individuals are actively engaging with biological explanations and forming novel relations with scientific or medical authorities in the process of caring for, and about, health. But the contemporary biological citizen sits at the intersection between these more or less authoritative endeavors and a variety of other flows of information and forms of intervention. Or perhaps, “sits” is the wrong term, for even while sitting, an active scientific citizenship is increasingly enacted, in which individuals themselves are taking a dynamic role in enhancing their own scientific, especially biomedical, literacy. The active search for scientific knowledge is particularly marked in that of health and illness, of medicine, genetics, and pharmacology—in what Rabinow has termed “the third culture” (Rabinow 1994)—where what is at stake is each individual’s own life, or that of those for whom they care. In engaging with such issues, the language with which citizens are coming to understand and describe themselves is increasingly biological.

For those suffering directly or indirectly from illness or disability, reading and immersing oneself in the scientific literature of the illness that oneself or a loved one suffers from can be a key technique. This knowledge can be used to gain a better understanding of the disease process, to provide better levels of care to those suffering from an illness, and to discuss and negotiate with the doctor a range of therapeutic possibilities. Over the last decade the Internet has come to provide a powerful new way in which those who have access to it, and who are curious about their health or illness, can engage in this process of biomedical self-shaping. But a key feature of the Internet is that it does not only give access to material disseminated by professionals, it also links an individual to
self-narratives written by other patients or carers. These accounts usually offer a different narrative of life with an illness, setting out practical ways of managing a body that is ill, the effect and harms of particular therapeutic regimes, ways of negotiating access to the health care system, and so forth. That is to say, these narratives provide techniques for the leading of a life in the face of illness. They have a further distinctive feature, which relates to truth itself. Strategies for making up biological citizens “from above” tend to represent the science itself as unproblematic; they problematize the ways in which citizens misunderstand it. But these vectors “from below” pluralize biological and biomedial truth, introduce doubt and controversy, and relocate science in the fields of experience, politics, and capitalism.17

In response to the perceived power of such problematizations from below, those whose investment in biomedicine is measured in terms of capital returns and shareholder value—the biotech, biomedicine, and pharmaceutical companies—now actively engage themselves with the self-education of active biological citizens. They set up and sponsor many of the consumer support groups that have sprung up around disorders from attention deficit hyperactivity disorder (ADHD) to epidermolysis bullosa (EB). In doing so, they seek to represent their activities and their products as beneficial, to counter the claims of the critics, and to educate actual or potential consumers of their products. In the United States pharmaceutical companies are permitted to engage in “direct to consumer advertising” and television advertisements for the benefits of different brands of drugs are widespread: notably drugs for treating experiences of mental malaise, now coded as depression, anxiety, and panic disorders. But, across all jurisdictions, such companies are now using the Internet for this purpose. It is thus worth considering one example from this domain in some detail.

Eli Lilly’s Prozac website, in 2001, was emblematic of techniques to promote a particular version of scientific or biological literacy.18 The home page of this site was titled “Your Guide to Evaluating and Recovering from Depression.” Prozac.com thus represented itself as a resource center where individuals could learn more about depression, its treatments, and ways to securing a recovery. It claimed—characteristic of all such direct to consumer practices—that the information and knowledge provided on this website were not intended to supplant the authority of the health professional, but rather to encourage the person suffering from depression to form an “active” alliance with the medic in the realization of a program of care. But, of course, this activity was to take a specific, brand related, form: a form supported through the provision of information on how Prozac can aid in recovery from depression.

In part, this is a matter of forming the problem in a particular manner. The Prozac.com website used a biological explanation of depression, couched in terms of the action of neurotransmitters. Text and animated images were used to provide a way for individuals to understand their depression at a molecular level, in terms of chemical imbalances and the action of neurotransmitters, and to imagine the ways in which Prozac could directly target and correct these molecular imbalances. It was, it seems, important for the depressed individual to learn about the action of Prozac at the neurochemical level. This was not because taking the drug was all that was required. On the contrary, it was because the individual should know “what to expect while you work toward your recovery.”19 The process of recovering from depression did not simply require compliance with a drug regime: “You can and should be an active participant in your recovery from depression.”20 This process of recovery enlisted a whole range of techniques of the self: practicing self-discovery, liking yourself, being kind to yourself, reducing stress, engaging in physical exercise, eating well, writing lists and keeping diaries, building self-esteem, joining a support group, and reading the Prozac.com newsletter. This website thus was clearly a node in a political economy of hope: it sutured together hopeful personal beliefs that one can recover from depression if one knows how to manage it, with the commercial hopes embodied in the marketing of Prozac itself.

The role of biomedical authority here is not to encourage the passive and compliant patienthood of a previous form of medical citizenship. Citizenship is to be active. The actual or potential patient must try to understand his or her depression, to work with doctors to obtain the best program of medical care, to engage in self-techniques to speed the process of recovery—and, of course, to ask his or her doctor to prescribe Prozac by name. Indeed, as the daily form of Prozac was out of patent, the website sought to maintain market share. On every single web page, a banner advertised a free trial of Prozac® Weekly™—which was in patent—and told patients that they could ask their doctor about this new formulation. Another page suggested that there may be differences between brand name Prozac and its generic equivalent, fluoxetine hydrochloride, explaining to potential customers that there is no such thing as “generic Prozac”—for example the generic version comes in different packaging—and that if they feel uncomfortable about changing to a generic, they should ask their doctor to prescribe brand name Prozac.21 What kind of scientific literacy is being promoted here? What kinds of active biological citizens are being shaped, and to what ends? This is the citizenship of brand culture, where trust in brands appears capable of supplanting trust in neutral scientific expertise. The weaving together of Eli Lilly’s commitment to education and brand marketing suggested the title of this section
of the chapter—from public value to biovalue—for this is just one example of the way in which biovalue is entwined with, and sometimes supplants, public value in the biological education of citizen-consumers.

**Biosociality: Active Biological Citizens**

Perhaps the account so far has given the impression that biological citizens are individualized, required to understand their nature and cope with their fate alone or with their own family, accompanied only by the ministrations and advice of experts, the solitary reading of informative material, or seated alone at their computer searching the Web. Undoubtedly such isolation is the condition of many. But it is not the destiny of the biological citizen to be an isolated atom, at least in circumstances where the forms of life, ethical assumptions, types of politics, and communication technologies make new forms of collectivism possible. Early exemplars of these new forms of biological and biomedical activism were the campaigning groups that arose around AIDS, especially in the English-speaking world. AIDS activists organized themselves into groups, and constituted those who were actual or potential sufferers from the condition as “communities”—communities for which they would speak, and to which they were responsible. These groups had a number of functions: to spread information about the condition; to campaign for rights and combat stigma; to support those affected by the illness; to develop a set of techniques for the everyday management of the condition; to seek alternative forms of treatment; and to demand their own say in the development and deployment of medical expertise.

The case of HIV and AIDS activism is exemplary for another reason: while initially relations between the activists and the conventional biomedical community were antagonistic, gradually an alliance developed. The HIV/AIDS community, and the identifications it fostered, came to provide key elements for the government of the virus. That is to say, it was through their identification as members of this community, that those in “high risk groups” were recruited to their responsibilities as biological citizens; health educators came to realize that it was only by means of the pathways provided by AIDS activists that they would be able to gain the allegiance of the active gay men who were their primary target. In allaying itself with the health establishment in promoting the message of safer sex, AIDS activists, in return, would have their say in the organization and deployment of social resources, and indeed gain the resources necessary for their activities. This was not a matter of cooption, although some saw it as such, but of alliances and translations. And “governing through community” produced its own problems. Most notably, that of shaping the conduct of a younger generation of gay men who did not identify themselves in the same terms as the previous generation, and that of governing the conduct of “men who had sex with men” but who did not identify themselves as part of any gay community.

Since the 1980s, biosocial communities following a roughly similar form have proliferated, and, since the advent of the World Wide Web, they have found the Internet a congenial host territory. Take, for example, the issue of manic depression. Until quite recently, in the United Kingdom at least, in addition to physicians and medics, those with such a diagnosis or their families (if they were not among the very few actively allied to the antipsychiatry movement) could access only one other organized source of information and support: the National Association for Mental Health (MIND). Things began to change in the 1980s. In 1983, the Manic Depression Fellowship (MDF) was founded, which described itself as a “user led” organization whose aims are to “enable people affected by manic depression (bi-polar) to take control of their lives” through the services this organization offers. These services include: MDF self-help groups, information and publications, employment advice, the MDF Self Management Training Programme, a 24-hour Legal Advice Line for employment, legal, benefits, and debt issues, and a travel insurance scheme. MDF also seeks to combat the stigma and prejudice experienced by those affected by manic depression, raise awareness of the disease, and develop partnerships with other organizations concerned with mental health.

Throughout the 1980s, the MDF was joined by a host of other user- and survivor-led organizations, some local and some national. True that those based in the United Kingdom are somewhat few and far between, but outside the United Kingdom such biosocial communities are proliferating. For example, Pendulum Resources is a website that presents itself as a “Bipolar Disorders Portal,” a gateway to comprehensive quasi-medical and other information. It urges people with bipolar disorder to participate in the NIMH-funded Bipolar Genome Study at the Washington University School of Medicine and in other similar projects in the hope that “this kind of study will enable medical researchers to find safer, more effective treatments for Mental Illness and brain disorders.” Pendulum also provides links to at least twenty-four home pages of people diagnosed with, or living with, bipolar disorder who describe, in very different ways, their modes of living with the condition. These include, for example, “A Better Place to Be” which contains, among other things, a diary of the website author’s “personal struggle with bipolar disorder,” a journal and a link that enables readers to ask questions.
These new forms of citizenship are not always premised on genetics. Many of these biosocial communities do indeed refer to genetics, but its significance varies. While in single gene or single substitution disorders such as Huntington’s, PXE or Canavan’s disease, genetics clearly plays an organizing role, in the biosociality forming around other conditions, genetics is not dominant. In the case of “A Better Place To Be,” under the page entitled “Sources of My Depression,” the author writes under the heading of “serious reasons”: “a genetic heritage that comes from being half Finnish,” and “other genes in my DNA that tend toward improper chemical balance,” but also cites her “need for more vocational satisfaction and personal fulfillment,” her “lack of recovery from a dysfunctional childhood,” and what she terms “whiney reasons” such as “nobody loves me,” “everyone hates me,” “tendency at times to identify any negative feeling as depression,” and “lack of disposable income to purchase all the fun and necessary things I must have!” Indeed, in relation to psychiatry, the pertinence of genetics, and of biomedicine, is the subject of intense biopolitical dispute. But nonetheless, these websites do demonstrate some significant features of contemporary biosociality.

Rayna Rapp, writing about women and men facing complex reproductive decisions brought about by the technology of amniocentesis, designates them as “moral pioneers” (Rapp 1999). Her argument—which would include AIDS activists (Epstein 1996, 1997; Martin 1994)—captures something crucial. These women and men were pioneers because, in their relation with their bodies, with their choices, with experts, with others in analogous situations, and with their destiny, they had to shape new ways of understanding, judging, and acting on themselves, and also to engage in a kind of reimagining of those to whom they owe responsibilities—their progeny, kin, medical helpers, co-citizens, community, society. Perhaps the language of pioneering implies too much heroic struggle, when many of those engaged in such issues do so through small-scale achievements in the everyday realities of their lives. Nonetheless, the new biosocial communities forming on the Web and outside it can be seen as moral pioneers— or perhaps “ethical pioneers”—of a new kind of active biomedical citizenship. They are pioneering of a new informed ethics of the self—a set of techniques for managing everyday life in relation to a condition, and in relation to expert knowledge. While some might deride these techniques of the biomedical self as a kind of narcissistic self-absorption, in fact they show an admirable ethical seriousness. Like those techniques Foucault found among the Greeks (Foucault 1978, 1985, 1986), they identify an aspect of the person to be worked on, they problematize it in certain ways, they elaborate a set of techniques for managing it, and they set out certain objectives or forms of life to be aimed for.

Of course, in a certain political, cultural, and moral milieu, this idea of activism in relation to one’s biomedical condition can become a norm. Activism and responsibility have now become not only desirable but virtually obligatory—part of the obligation of the active biological citizen, to live his or her life though acts of calculation and choice. Such a citizen is obliged to inform him or herself not only about current illness, but also about susceptibilities and predispositions. Once so informed such an active biological citizen is obliged to take appropriate steps, such as adjusting diet, lifestyle, and habits in the name of the minimization of illness and the maximization of health. And he or she is obliged to conduct life responsibly in relation to others, to modulate decisions about jobs, marriage, and reproduction in the light of a knowledge of his or her present and future biomedical makeup. The enactment of such responsible behaviors has become routine and expected, built in to public health measures, producing new types of problematic persons—those who refuse to identify themselves with this responsible community of biological citizens (Callon and Rabeharisoa 1999, 2004).

These obligations, and the forms of biosociality with which they are linked, are specific to certain times and spaces. Despite the much vaunted global span of the Internet, Manuel Castells has documented the national and regional variation in Internet access, which is dependent on the availability of telephone lines and other basic communication technologies, as well as the penetration of the computer hardware and software necessary to access it (Castells 2000). While young travelers of the world may be able to log on to their Internet connection from almost anywhere, the same is hardly true of those who are the prime potential subjects of biosociality. The kinds of biosociality found in the United States, Europe, and Australia are not merely products of the availability of certain technological means of communication, but linked to particular conceptions of citizenship and personhood. In particular, they connect up, in various ways, with the history of previous forms of political activism, with the varieties of identity politics, and with the existence of a vociferous politics of rights and recompense. But such forms of biosociality described here have no visible presence in many geographical regions. AIDS biosociality in sub-Saharan Africa is very different from that of Paris, San Francisco, or London. Biological citizenship in Ukraine is not a matter of contesting the power of medical expertise, nor of sculpting an autonomous life in which collectively shaped self-understandings are a pathway to self-fulfillment: it takes the form of demanding redress from the state for certain ills, in the form of benefits, and activism is oriented toward demanding medical recognition for a condition and obtaining expert judgment as a credential to obtain state benefit (Petryna 2002).
Organizing Hope

Citizenship has long associations with forms of local political activism: involvement with the local work of political parties, working in charitable organizations, and for causes such as reducing inner city poverty or improving literacy, as well as small-scale activities such as charity bake sales, car washes, or raffles in order to support the local church, school, or community center. These aspects of citizenship are constantly reshaped in relation to new causes and are often inventive in their styles of organizing and activism. As already noted, since the 1980s there has been an upsurge in citizen activism and political inventiveness around issues of health and illness. But while patients’ organizations and support groups have been around for many years, today there is one notable innovation: the formation of direct alliances with scientists. Patients’ organizations are increasingly not content with merely raising funds for biomedical research but seek an active role in shaping the direction of science in the hope that they can speed the process by which cures or treatments are developed. Thus, in the context of the hopes attached to recent discoveries in the fields of genetics and the neurosciences, patient groups have engaged in new forms of political activism, seeking to act directly on the truths and technologies generated by biomedical research. Contemporary biological citizenship thus both depends on and hopes that the science of the present will bring about cures or treatments in the near future (Novas 2001, 2003). Hope, here, is not mere wishing and anticipating—it postulates a certain achievable and desirable future, which requires action in the present for its realization.

Novas exemplifies his argument with reference to Huntington’s Disease and in particular to the role of an on-line email discussion list called Hunt-Disc. He points to the extraordinary personal advocacy work of some people involved on Hunt-Disc such as Carmen Leal, whose ex-husband Dave suffers from HD, and who is still actively involved in his care. She engages in a whole variety of activities for HD, editing a collection of stories and poems about people’s experiences with the disease (Leal-Pock 1998), using her speaking and singing skills to provide inspiration to others, and maintaining a website alongside others called the Huntington’s Disease Advocacy Center. Her hope, as Novas points out, is for “this to be the last generation to have to worry about Huntington’s Disease. Thanks to researchers, there is now tremendous hope that this will definitely be the last generation.” And she urges those with the disease to contribute actively to this work: they should educate themselves and read about the disease; talk to others about the disease; save money and donate it to research; and participate in fund-raising activities, not only to contribute to the cure, but also to help to raise awareness of the disease. Biological citizenship here is financial, ethical, public, and active: it tries to shape a new public arena in which those who have a stake in the suffering wrought by a disease can participate. In such a public arena, the hopes and responsibilities of citizens are closely tied to their biology.

Hope is also manifested in the Huntington’s Disease Advocacy Center website, again studied by Novas. It too encourages visitors to educate themselves, and provides links to scientific articles on HD, articles that will also generate hope as they demonstrate the advances made in understanding HD, the contribution of the scientists, the researchers. To the search for a cure, the evidence linking HD to other neurodegenerative diseases also under active investigation, the development of mouse models to enable further research, and the funding provided by the Huntington’s Disease Society of America, all provide a rationale to look toward the future with expectation.

Biological citizenship requires those with investments in their biology to become political. The HD website also provides advice on how to achieve this: how to lobby elected officials, how to prepare for a meeting with a political representative, how to build coalitions, a list of who to contact, and samples of correspondence written to political officials. Campaigns by such organizations against President George W. Bush’s ban on stem cell research show that politics, as it is enacted by biological citizens in a political economy of hope, involves profoundly normative judgments about values and ethics concerning the uses and ends of life itself. We can see such political activism around technologies of hope in many other sites. For example, in Switzerland in November 2004, under the Swiss system of direct democracy, more than two-thirds of voters in a referendum approved a law allowing scientists to experiment on human stem cells taken from embryos; the “yes” campaign that prevailed campaigned under the slogan “Hope.” Launching the government’s campaign, Interior Minister Pascal Couchepin had argued that stem cell research offered “hope for incurable illnesses such as Parkinson’s, paraplegia, diabetes and heart disease,” and the result of the vote was welcomed by scientists who said the result was “a vote of confidence in medical research and a positive sign for Switzerland as a centre for science and research,” and by the pharmaceutical industry, which said it “gave patients hope for new cures.”

Producing Biovalue: Materializing Ethics, Health, and Wealth

As politics begins to take on more “vital” qualities, and as biological life itself accrues even more personal and economic significance, the vitality
of each and all of us becomes a potential source of value. The biological life of individual and collective subjects has long had a value that is as much economic as political—or rather, that is both economic and political. From the nineteenth century onwards, the preservation of this vital value and its enhancement became a matter of state: political authorities took on the obligation and responsibility for preserving, safeguarding, and enhancing the biological capital of their population. Along this dimension we can place a whole sequence of developments from clean water and sewage, registration of births and deaths, child welfare and maternity services, medical inspection of school children, and indeed the development of state-organized national health services. Of course, private enterprises played a key role in producing the food, services, and pharmaceuticals that would simultaneously generate private profit and public good. A market economy of health came into being. Over the twentieth century, this market was increasingly shaped by the activities of the “social” state—regulating purity and hygiene of foodstuffs, and the production and marketing of pharmaceuticals. But the regulated political economy of health—consisting of relations between the state apparatus, scientific and medical knowledge, the activities of commercial enterprises and the health-related consumption of individuals—is being reshaped, as the potentialities embodied in life itself become sources of value.

Bodily processes have long been productive of economic value, from the fees charged by physicians and hospitals to their patients, the market in medical technologies and, most notably, the commercialization of pharmaceuticals. However, contemporary biomedicine, by rendering the body visible, intelligible, calculable, and manipulable at the molecular level, has generated novel relations between life and commerce, and enabled older health technologies such as those of social citizenship, to link in new ways to circuits of capital. Two examples of this logic can be found in Sweden and Iceland.

In 1999, an article in Science opened with the following lines: “Sweden and some other Nordic countries are sitting on a genomic gold mine. Their long-standing public health care systems have been quietly stockpiling unique collections of human tissue, some going back for decades. . . . The samples were originally stored for possible therapeutic or diagnostic uses for the patients themselves, but researchers now realize that they could contain valuable information about inherited traits that may make people susceptible to a variety of diseases” (Nilsson and Rose 1999: 894). In many Nordic countries, census data, patient records, and tissue samples maintained in the process of providing health care in the past—through a heritage that runs from the pastoral government of the church, through that of the strong state to that of the social state—have been combined with large-scale genomic analysis in order to transform their citizenry into a resource for the production of wealth and health. Perhaps the best-known example comes from Iceland, where deCODE Genetics was given an exclusive license to create and operate such a database by an Act of the Icelandic parliament in 1998. They declare in their mission statement that they are “Making the Map of Life . . . a Blueprint for Health.” Similarly, the Swedish firm UmanGenomics, studied by Klaus Hoyer, describes the “unique resources” that are available to it, including a “unique collection of blood samples and data in the Medical Biobank of Umeå,” derived from records of health examinations of the local population amalgamated in a 1985 epidemiological study of the population combined with samples from state-supported medical examination and blood donation (Hoyer 2002, 2003). Despite the origins of these samples in public health, “UmanGenomics has the exclusive rights to commercialize information derived from these samples.” In the 1930s, Nazi propaganda focused on the cost of genetic illness to the German Reich. But today, the genomic disease heritage of a population, far from being conceived of as a drain on national resources, is seen as a potential resource for the generation of wealth and health, and one that provides great economic opportunities for the novel alliances of state and commerce taking shape within contemporary circuits of biovalue.

This transformation, in which high levels of certain genetic illness become potential sources of biovalue, need not be driven from above, from the state and private enterprise. It can also come from below, from patients’ organizations themselves. Novas, along with a number of other researchers, have explored this in the case of a patients’ organization called PXE International, founded by Patrick Terry and Sharon Terry in 1995, after their two children, Elizabeth and Ian, were diagnosed with pseudoxanthoma elasticum (PXE). The Terry’s played an important role in forming networks of support among affected families, getting researchers interested in studying the disease, organizing conferences for scientists and patients, and lobbying the U.S. government for more funding to be directed toward the study of PXE, but also of skin diseases more generally. PXE International also established a blood and tissue registry in order to create a central repository, and to avoid the need for patients suffering from the disease to donate multiple samples. By maintaining this registry PXE International not only wished to exert an influence on how this material was used, but also was able to demand a share of the intellectual property rights that arise from it.

The productivity of this blood and tissue registry for the generation of biovalue was demonstrated in 2000, when the gene for PXE was discovered by researchers at the University of Hawaii and announced in two consecutive articles in Nature Genetics, each with Sharon Terry as a coauthor (Bergen et al. 2000, Le Saux et al. 2000). This discovery not only
generated new insights into the pathology of the disease, but also had significant potential for the exploitation of intellectual property rights. The technology transfer unit at University of Hawaii was initially reluctant to yield patent rights to PXE International, but as they had previously negotiated the terms and conditions of access to the registry, which included Sharon Terry being named as a coinventor, they were able to work out a process of sharing royalties and deciding on licensing deals.

The “PXE model” for lay advocacy and active lay engagement with research is one that has been advocated by other groups with similar concerns around rare genetic conditions. The Terrys argued that PXE International’s stake in the patent for this gene sequence was not driven by a logic of commercialization, but rather to serve the interests and values of persons suffering from genetic diseases. Thus Patrick Terry defended the potential of patient-controlled patents and asserted that, “We’re not interested in lining our pockets. We just want a cure” (Coghlan 2001). Nonetheless, the Terrys hoped that knowledge of this single and quite rare condition could have wider implications for the health of those who suffer from apparently unrelated disorders. For example, it appeared that studies of this particular genetic pathway on Chromosome 16 might shed light on hypertension and cardiovascular research, since the mineralization of the midsize arteries in PXE mimics the general aging of the arteries (Fleischer 2001). PXE might also provide clues to macular degeneration; this affects the eyesight of many individuals suffering from this disorder, but another sixty million Americans are thought to be at risk for this condition due to ordinary aging. Clearly, PXE International has the chance of making significant financial gains if a broader use for the sequence is found. However, Sharon Terry says that PXE International will resist the temptation of profiteering; she claims in an article in The American Lawyer, “It’s been suggested that we could make a killing because who cares if we’re making the cost of cardiovascular treatment huge. We always say, we don’t just represent people with PXE, we represent anybody, who has anything.”

The new circuits of biovalue, and the new markets they inhabit, not only create new possibilities for the generation of wealth, but also embody and generate new ethical values. As life itself is penetrated by market relations and becomes productive of wealth, the morality governing some forms of economic exchange is being reconfigured. In an economy where the vitality of biological processes can be bought and sold, ethics becomes both a marketable commodity and a service industry in its own right. UmanGenomics in Sweden, for example, trades on the fact that all the blood samples in its collection have been collected with full informed consent (Hoyer 2002, 2003). It proclaims that “Correct ethical handling of human tissue and medical data is essential,” and highlights how it has been “internationally recognized for its ethical stance and procedures.” Ethics, in this instance, is not only a means of access to a valued resource, but is also a marketable asset that a company can trade on in its commercial relationships with other enterprises and in its relation with public bodies and medical practitioners (Rosell 1991). Some additional aspects of the Terrys’ work can illustrate this further. At the same time as the discovery of the PXE gene, in August 2002 Patrick Terry joined with Randy Scott—who earlier had founded the biotechnology company Incyte—in establishing a biotech company called Genomic Health (in Redwood, California), initially funded with seventy million dollars of venture capital, and later attracting major investment from merchant banks and pharmaceutical corporations, for the development and marketing of genetic tests and targeted therapies that would individualize treatment to patient’s genomics. This does not undermine the ethical claims of the Terrys, but illustrates the new relations between ethics and biocitizenship in the production of value. The recruitment of Patrick Terry to Genomic Health, and his title of “Director of Consumer Advocacy,” was intended as an outward and visible sign of the ethical nature of the company and its commitment to patients, which went alongside its ambition to bring affordable genomics to the consumer. Thus Randy Scott, writing as Chief Executive Officer in 2001, insisted that the future of the genomics industry rests on the “education, trust and support of the consumer” and that the uptake of these new products will only take place on “a foundation built on bioethics”—a foundation “critical to engaging consumers . . . whether for research, for medical treatment, or for business” (Scott 2001). Ethics and biovalue are inextricably intertwined, contributing to the commercial value of products through demonstrating a commitment to the ethical values of the biocitizen-consumer of health and his or her requirements for trust.

The values embedded in new genomic artifacts are polyvalent: indeed they bear upon the meaning of life itself. Once more, Randy Scott illuminates this point. It is critical, he suggests “for industry to begin to create an open public dialogue with all stakeholders in order to facilitate understanding and to build trust.” And while this dialogue will be both difficult and complex, “our quest to cure disease and prolong life will ultimately lead to much deeper questions—the very definition of what it means to be human” (Scott 2001). That is to say, judgments as to the nature and value of different forms of life—different ways of being human—are actually inscribed in the outputs of the life sciences and biomedical research today, not just in their conditions and consequences. The process of generating biovalue embodies and transforms conceptions of human life: to that extent biomedical artifacts themselves have ethics.