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## **When Nature Goes Public**

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The Making and Unmaking  
of Bioprospecting in Mexico

*Cori Hayden*

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**For Robert and Deidre Hayden**

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BSLT	brine shrimp lethality test
CBD	Convention on Biological Diversity (UN)
CECCAM	Centro de Estudios para el Cambio en el Campo Mexicano
CIEPAC	Centro de Investigaciones Económicas y Políticas de Acción Comunitaria
CIT	Center for Technological Innovation (UNAM)
COMPITECH	State Council of Organizations of Indigenous Traditional Healers and Midwives
CONABIO	National Commission for the Knowledge and Use of Biodiversity (Mexico)
COP	Conventions of Parties (UN)
ECOSUR	Colegio del Sur de la Frontera (research institute)
EPR	Popular Revolutionary Army (Mexico)
ETC	Erosion, Technology, Concentration group (formerly RAFI)
EZLN	Zapatista National Liberation Army
GATT	Global Agreement on Tariffs and Trade
GEA	Grupo de Estudios Ambientales
GEF	Global Environmental Facility
GPS	Global Positioning System
HGDP	Human Genome Diversity Project
ICBG	International Cooperative Biodiversity Groups program
IMEPLAM	Mexican Institute for the Study of Medicinal Plants

**LIST OF ABBREVIATIONS**

IMSS	Mexican Institute for Social Security
INBio	Instituto Nacional de Biodiversidad (Costa Rica)
INE	National Institute of Ecology
INI	National Indigenista Institute
INM	National Medical Institute (Mexico)
IPR	intellectual property rights
ISE	International Society of Ethnobiology
IUCN	International Union for the Conservation of Nature
MFO	Mycological Facility (Oaxaca)
NAFTA	North American Free Trade Agreement
NCI	National Cancer Institute
NGO	nongovernmental organization
NIH	National Institutes of Health
NTFP	non-timber forest products
PROMAYA	NGO established through Maya ICBG
PRONASOL	National Solidarity Program (Mexico)
PTO	U.S. Patent and Trade Office
RAFI	Rural Advancement Foundation International (now the ETC group)
SEMARNAP	Secretary of the Environment and Natural Resources (Mexico)
PRODERS	Program for Regional Sustainable Development (Mexico)
TLC	Tratado de Libre Comercio (NAFTA in Spanish)
TRIPS	Trade Related Aspects of International Property Rights (in GATT)
UNAM	National Autonomous University of Mexico
UPOV	International Union for the Protection of New Varieties of Plants
USAID	U.S. Agency for International Development
UZACHI	Unión de Comunidades Productores Forestales Zapoteco-Chinanteca
WIPO	World Intellectual Property Organization
WTO	World Trade Organization

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**Flora Pseudonyma**

In the account to come, I follow conventional anthropological practice by granting pseudonyms to places and people, with the exception of ICBG project directors, public figures, and the scientists whose published work plays a central role in my analysis. Otherwise, I have changed the name of researchers, towns, communities, urban markets, and interlocutors who form part of this prospecting agreement and this ethnography. But the significance and complex politics of this disciplinary convention have been magnified in the present context, as the reach of the ICBG's confidentiality provisions has extended the conventional universe of anthropological naming practices. Specifically, I agreed with the project directors not to reveal the names of plants that are being sent to the United States for chemical analysis. Thus, interspersed throughout this analysis are plant pseudonyms (again, with the significant exception of public and well-published figures)—a reminder of their centrality to the “action” we are following, and of yet another way in which bioprospecting sets up new webs of accountabilities, not just for its participants, but for those of us who enter into critically engaged studies thereof.



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This book is an investigation of the ambivalent promise of bioprospecting—a distinctly late-twentieth-century practice that stands at the very center of contemporary contests over indigenous rights, corporate accountabilities, and ethical scientific research. Bioprospecting is the new name for an old practice: it refers to corporate drug development based on medicinal plants, traditional knowledge, and microbes culled from the “biodiversity-rich” regions of the globe—most of which reside in the so-called developing nations. The novelty lies in some distinctive parameters, which we might tentatively call “ethical,” that have been placed around these longstanding practices of resource acquisition. On the strength of a succession of related, ongoing events and mobilizations in the 1980s and early 1990s—among them, indigenous rights movements, some transformative shifts in academic research protocols, and sustainable development/biodiversity conservation strategies—such “takings” now come with a mandate to “give back.” Drug and biotechnology companies are thus under a fragile obligation to ensure that wealth they create based on biodiversity and traditional knowledge in turn generates some form of “equitable returns” for the source nations and communities who provided them with lucrative leads in the first place.

The 1992 UN Convention on Biological Diversity (CBD) has been particularly influential in reshaping the global topographies of rights and obligations that mark this contentious terrain of appropriation and exploitation. The CBD, drafted at the UN Conference on Environment and Development in Rio de Janeiro, Brazil, is a living and much-contested document, particularly with regard to one of its most distinctive mandates: the

requirement that companies compensate or otherwise share benefits with source nations, as a condition for their continued access to "Southern" biological resources. It is a vulnerable mandate in more ways than one, as we shall see throughout this account. But, however provisionally, the CBD has produced both an idiom of expectation and an institutional framework that together have had some notable effects on the south-north traffic in biological resources. While pharmaceutical and agrochemical companies have long made use of biological material from plants, animals, and microbes found in the biodiversity-rich Southern Hemisphere, they now do so under a new multilateral expectation—backed up by an increasing number of national laws in signatory nations and, not insignificantly, the watchful eyes of international and national activist groups—to turn a one-way process of extraction into a multidirectional form of exchange.

Not surprisingly, this incitement to share generates as many questions as it is meant to resolve. How much, and in what currency (royalties, technology transfer, scientific training, community development projects?) should corporations pay for access to southern plants and local or traditional knowledge about their uses? To whom, precisely, should benefits be directed, and on what basis? Who stands to gain from these exchanges, and who will lose? As these questions indicate, it would be an understatement to call prospecting a controversial issue. It is deeply politicized terrain, in every way. The politics and practice of prospecting are being battled out in sustainable development treatises and policy platforms, in indigenous working groups within the UN and on activist websites, and in world intellectual-property tribunals. But these debates are also taking material shape in, around, and through the myriad benefit-sharing prospecting enterprises that have been put into play across the globe since the early 1990s. These agreements take a range of forms, from large, multi-institutional collaborations to simple bilateral contracts; from agreements that seek to bring indigenous communities into the fold to those that collect exclusively in government-controlled lands and channel benefits back to national biodiversity institutes.

*When Nature Goes Public* is an ethnography of a prospecting agreement between the United States and Mexico, and of the complicated and contradictory practices mobilized in its name. The agreement on which I focus links a team of plant researchers at Mexico's National Autonomous University (UNAM) to the University of Arizona and its industrial partners in the United States. As members of a larger collaboration funded by the U.S. government's International Cooperative Biodiversity Groups (ICBG) program, UNAM researchers send extracts of Mexican medicinal plants to the pharmaceutical company Wyeth-Ayerst. In ex-

change they receive, from Arizona, minimal research funds and promises of a percentage of royalties, ten to twenty years in the future, should those companies develop a drug or pesticide based on Mexican specimens. Crucially, this project is also designed to collect ethnobotanical knowledge about plant uses, and to direct some of the royalties back to the people or communities from which this intellectual resource is culled.<sup>1</sup>

The unexpectedly generative effects of this promise of redistributed value lie at the heart of this ethnography. This generativity will not, I should reveal from the outset, be found in the emergence of a blockbuster drug and a stream of royalties to indigenous benefit-recipients: to date, no product has even made it into the pipeline, and key participants concur that a drug is indeed among the *least* likely results of this collaboration to pan out. There are, however, reasons to keep reading. As we shall see, the promise and threat of prospecting and its redistributive potential have sparked some curious and circuitous webs of possibility, connection, and truncation.

### The Promise and Threat of Bioprospecting

Some of the earliest and highest profile benefit-sharing enterprises—such as those instituted by Shaman Pharmaceuticals, the now-defunct San Francisco based company<sup>2</sup>; the ongoing, U.S. Government ICBG initiative (of which the U.S.-Mexico contract we will read about here is a part); or a 1991 agreement between the drug company Merck and Costa Rica's National Biodiversity Institute (INBio)<sup>3</sup>—have trumpeted some fairly lofty goals. The promise is no less than one of harnessing the (earning) power of corporate drug discovery and feeding these profits back into biodiversity conservation, rural and indigenous community development, and scientific infrastructure-building in developing nations. They have in short promised not just benefit sharing, but the world, or at least that kind of world "brought to you by Merck" on National Public Radio in the United States: more drugs, more health, more biodiversity, more funds for cash-poor developing nations, and more economic resources to communities who are the traditional stewards of biodiversity.

Against this heady set of promises, critics of bioprospecting in Mexico and internationally argue that these contracts hardly hold the promise to reverse the (neo)colonialist histories of resource extraction on which northern nations and corporations have built profits, empires, and nations. To the contrary, these exchanges seem to many skeptics like a dressed-up version of the same old "biopiracy" (see Shiva 1993; Kloppenburg 1991; Harry 2001). In protest against one recent project in Chiapas, Mexico, an indigenous representative from one of the affected communi-

ties argued, “[this] project is a robbery of traditional indigenous knowledge and resources, with the sole purpose of producing pharmaceuticals that will not benefit the communities that have managed and nurtured these resources for thousands of years. . . . [It] returns almost nothing in exchange.”<sup>4</sup> Certainly, one of the central paradoxes of these agreements is that benefit-sharing provisions, offered by their proponents as a form of redistribution of wealth and technology, or even as an ethical act, only make more explicit the historically entrenched gaps in power of the actors involved. Royalties, in the amount deemed acceptable to participating companies (usually in the range of 1 to 10 percent) are not up to the task of mediating the complex histories and futures of inequality into which prospecting interjects, and in which it is deeply implicated. Instead, these promises merely seem to amplify—broadcast, but also exacerbate—those inequalities. As such, bioprospecting lays bare some of the defining contradictions of contemporary neoliberalism and its successor projects: the promises of a millennial capitalism (Comaroff and Comaroff 2000), crosscut by the powerful sense, in Latin America as elsewhere, that such offers of market-mediated inclusion or enfranchisement also contain within them the conditions for unprecedented degrees of exclusion and stratification.

Nowhere has this double vision—prospecting as a promise/threat—been made more vivid than in Mexico in recent years. Starting in late 1998, Mexico became home to some remarkably effective activist campaigns (local, national, and international) against several prospecting collaborations taking place within and across the borders of the Republic. Strikingly, the project on which I focus in this book has managed to avoid most of the controversy (I will discuss this in later chapters). But the controversies surrounding a sibling project, the now-defunct Maya ICBG in Chiapas—a U.S. government-sponsored initiative to use “Mayan” traditional knowledge and remedies as leads for biotechnology research in exchange for promises of future community development funds—have placed Mexico at the center of an international firestorm around the ethics and practice of bioprospecting, particularly where indigenous knowledge and communities are concerned.

As I’ll discuss at greater length in chapter 3, the mobilizations against the Maya ICBG by Mexican intellectuals and activists, a group of traditional healers and midwives in Chiapas, and international organizations such as RAFI (Rural Advancement Foundation International, now the Erosion, Technology, Concentration group [ETC]), have pointedly questioned the legitimacy of Mexican public universities and research institutes acting as “brokers” for both national and indigenous resources. In the absence of any definitive national legislation (a law on the matter has

been under discussion in the Mexican legislature since 1997), they ask, Who has the right to sell such access to U.S. and European researchers and companies; and more pointedly, Is it possible at all for these agreements to transpire in a fair and equitable manner? The protests surrounding this contract have effectively and officially put a halt to the Maya ICBG project. The demise of the Maya ICBG (along with associated mobilizations against several other collaborations) has placed into question the viability of all current prospecting projects in Mexico, including the Latin America ICBG on which this ethnography focuses.

The future of benefit-sharing contracts in Mexico now looks tentative, at best—a remarkably different situation than the one I found when I began my research in 1996. At that point, bioprospecting barely registered on Mexican activists’ radar, though a few agreements, including the one documented here, were certainly up and running and hardly hidden from public view. The subtitle of this book, in its reference to the making and unmaking of bioprospecting, refers in part to this very real sense of a rise and fall in the fortunes of these kinds of collaborations in Mexico, as well as internationally.

This book is an account of bioprospecting “in the making” in a literal sense: the Latin America ICBG, on which this analysis focuses, was in its inaugural phase in Mexico in 1996 and 1997 when I conducted my initial ethnographic research. The study is thus based largely on observations made during a distinctive, formative window in the history of a longer-term project. This perspective affords, as we shall see, particular insights into the processes through which prospecting’s tenuous circuits of exchange are established. And, it also provides a window into a distinctive moment in the public profile of prospecting in Mexico and internationally. It was a moment (it turns out) of relative calm, but as we shall see, the specter of protest and activist mobilizations loomed large for the Mexican researchers implementing the agreement on which I focus. This anticipation, I will argue, has gone a long way in helping shape the contours of that collaboration.

But the reference to prospecting’s making and unmaking is not just meant to signal a retrospective (and closed-off) sense of “trajectory.” It is also meant to signal something “in the works,” an indeterminate and multiform process—a sense of the unexpected twists and turns that we encounter when tracking the processes set in motion simultaneously *in the name of* and *despite* prospecting’s fragile promise of equitable returns. As this ethnography will show, the road to such forms of participation and reciprocity is bumpy indeed, and it leads us to places we might not expect.

## Prospecting in Public

Before previewing where we will find ourselves, a quick word on where we will not. This book is not an ethnography of indigenous knowledge practices, communities, or “local knowledge” in any conventional sense. Nor is it an account of corporate drug discovery per se. One of my aims is to explore the unsettled relationship between a prospecting collaboration and its (oft-imagined) constitutive subjects and objects. As we shall see, bioprospecting is not merely a “channel” along which travel local knowledge, biodiversity, and community or even corporate interests. Rather, these contracts are implicated in producing, invoking, and giving shape to these subjects, objects, and interests in the first place.

This ethnography of prospecting is, primarily, an ethnography of science: it treats scientific research practices as key points of entry into prospecting’s play of resource extraction and compensation. At the center of this analysis are the UNAM ethnobotanists and chemists who are implementing the Latin America ICBG in Mexico. These researchers are both mediators of and participants in this international collaboration, and their research practices are crucial sites of political negotiation. When the UNAM ethnobotanists collect plants, they are also collecting benefit-recipients; when the UNAM chemists test collected plants for their industrial potential, they are also helping broker new kinds of distribution of industrially mediated “value.” In this context, routine decisions about which plants to collect, or what kingdom to scan for potential value, become inextricably laced with the explosive question of who shall become the “beneficiaries” of a new international politics of biodiversity entrepreneurialism, and on what basis.

It is precisely because of the newly delicate nature of these negotiations that the “routine” sites where we *will* find ourselves may seem anything but routine. Following the UNAM scientists “in action” will take us not to indigenous healers but directly to city centers across the north of Mexico—in particular, to the urban marketplaces that are teeming with Mexican biodiversity. We will find ourselves not in uncharted territory but traveling well-worn routes, as these researchers retrace both their own steps and those of the collectors, miners, and colonial explorers whose pathways are intimately bound up in “Mexican biodiversity.” We will become acquainted with both the complex information-management protocols and the very distinctive laboratory animals through which plants must pass if their pharmaceutical value is to be activated—and thus, if their redistributive potential is to be actualized.

It is my aim to show how, in these practices, sites, and relationships, as much as in the negotiations among nations and corporations, we see the

generation of lines of inclusion and exclusion within prospecting’s tenuous circuits of exchange. One of the central tasks animating this analysis is thus to explore how a benefit-sharing contract transforms and is transformed by scientific research practices and relations between these scientists and the local people—urban plant vendors, indigenous collectives, rural collectors—whose interests they now represent. In other words, my task is to understand how scientific practices are, in the context of benefit-sharing agreements, being asked to do new and explicit kinds of political work.

The title of this work is meant to flag this question of the political work that science does. On one level, the “public-ization” of nature refers to a key concern that has emerged out of my ethnography; namely, that the public domain has proven to be an extraordinarily rich site of valuable biodiversity for the UNAM researchers, over and against places marked as “communities.” Purchasing plants and knowledge in urban markets, clipping specimens on the sides of the road, culling knowledge from published ethnobotanical literature—these decisions about where and how to identify promising plant material have some thick disciplinary legacies. At the same time, when they are injected into a benefit-sharing contract, they take on some distinctive levels of complexity. What are the consequences—politically, materially, and analytically—of the UNAM scientists’ decisions to prospect in the public domain? I am particularly interested in the challenge this strategy poses to the vision of bioprospecting’s subjects and objects that is held by prospecting advocates and critics alike: the UNAM ethnobotanists powerfully disrupt the notion of authorship animating the idea of compensating people for their knowledge, and the idea of “communities” having a distinctive claim on something called “local knowledge.” Implicitly, I argue, they also ask social scientists, conservationists, and activists, among others, to rethink how and to what ends local knowledge is invoked as a basis of enfranchisement and participation.

The construction of public domains as collecting sites, with an eye toward the political entanglements that they ostensibly contain or avoid, is thus one of the “publics” to which my title refers. But “going public” has another valence of course, resonant with the language of corporate capitalization strategies. When a company goes public, it opens itself up to public ownership by selling stock to individuals who “buy in.” Going public is a way to raise money, but this kind of capitalization also comes with multiple (and often illusory) promises attached: publicly held stocks promise a kind of inclusivity (conceivably, anyone can buy in), certain modes of corporate accountability to shareholders, and dividends in the future. The first generation of bioprospecting agreements that emerged in the early 1990s was quite explicitly being proposed in such terms.

We will see in chapter 2 that the policy makers and scientists who envision prospecting as a conservation strategy, including the directors of the

ICBG program, effectively frame it as a strategy for taking nature “public”; they do so by posing biodiversity as an economic resource that can bring dividends to a wide range of prospecting participants, including pharmaceutical companies, governments in biodiversity-rich nations, and the local people who are envisioned as the ground-level “managers” of natural resources. Prospecting is explicitly figured as a way to increase the number of stakeholders and managers in biodiversity (World Bank 1997; McNeely et al. 1990). Consider, for example, the much commented upon creation of a corps of “parataxonomists” by Costa Rica’s prospecting engine, INBio: these Costa Rican citizens, retrained en masse in field collection and taxonomic practice, are meant to serve as an autochthonous workforce for INBio’s ambitious inventorying and prospecting endeavors. But they are also key emblems of the Institute’s efforts to produce a diffuse Costa Rican investment in biodiversity itself. Two of the Institute’s chief architects explain: “INBio assumes that Costa Rica’s biodiversity won’t be highly valued and appropriately managed in the long run unless the Costa Rican populace on whose lives it will have the largest . . . impact are involved” (Sittenfeld and Gámez 1993: 85; see also Takacs 1996). When these parataxonomists’ labors “add value” to the resources that leave the country, they also, Sittenfeld and Gámez assume, become stakeholders themselves.

Along with this language of stakeholding comes a certain provisional language of representation and participation, expressed through the intertwined idioms of compensation, investment, and incentive-building. Rural people, “third world” scientists, developing country governments, and even pharmaceutical companies are all encouraged to buy in to the globalizing project of biodiversity conservation with the promise of dividends dangling in the future.

This book shows how these market-mediated languages of social action, participation, and inclusion are bearing out in the context of bioprospecting in Mexico, and to what effect. In so doing, it aims to help us understand scientific knowledges, practices, and even research methodologies, as intimately entwined in prospecting’s neoliberal modes of participation. As I’ll discuss at length in chapter 1, this question points us beyond the horizons identified in many recent and insightful critiques of the commodification of science. Many chroniclers of the life sciences have pointed to momentous shifts in the relationship between science, industry, and regulatory bodies in the United States (and parts of Europe) since the early 1980s, when the Reagan and Thatcher administrations helped pave the way for current trends linking molecular biology research and biotechnological research and development (Etzkowitz and Webster 1995; Wright 1994; Rabinow 1996; Yoxen 1981). Increasingly, direct links between university researchers and corporations (as well as venture capitalists)

have contributed to a sense that knowledge itself is being “capitalized” (Etzkowitz and Webster 1995: 488).

Bioprospecting provides an opportunity to understand what the “capitalization of knowledge” means, not only for the structure of research and development in the United States and Europe, but in much wider terms. In the context of bioprospecting, scientific knowledge is not simply capitalized; it is politicized in the very particular sense of being inscribed with specific kinds of accountabilities, social relations and potential property claims, and interests. We might say it is neoliberalized—a state of affairs which, I argue in chapter 1 and throughout this book, holds implications for prospecting politics and social theory alike.

### Sites

Looking to science as a site of anthropological analysis has prompted much reflection on the nature and implications of conducting multisited research (Marcus 1995; Fischer 1999; Downey and Dumit 1997). The move away from conventional ethnography, fixed in one locale, has been identified by some chroniclers of anthropology as a necessary adjustment to the rapidly moving world that we set out to understand, and in which we live. As George Marcus argued in 1995, the old concerns of anthropology are playing out in, and creating, new spatial canvases, and our commitment to understanding those processes up-close, and in all their quotidian detail, means discovering new paths of connection: “[e]mpirically following the thread of cultural process itself impels the move toward multi-sited ethnography” (Marcus 1995: 3, 6). Whereas this kind of research is indeed relatively novel in relation to anthropology’s time-honored conventions (though arguably, the processes of movement that we purport to track are not themselves altogether new), the ethnography of science has always had a hefty dose of “multi-sitedness” built into it.

An iconic interest in laboratory-based practices notwithstanding, sociologists of science have been particularly concerned with the ways that knowledge is constituted *in travel* across domains both geographic and institutional.<sup>5</sup> One of the crucial analytical apparatuses that has been used in science studies, and especially in the Actor-Network Theory (ANT) elaborated by Bruno Latour and Michel Callon (among others), to talk about this kind of multisitedness is the notion of the network, by which they mean the more or less robust constellations of people, things, institutions, and interests that literally constitute scientific knowledge and artifacts. As I’ll discuss more in chapter 1, the idea of the network serves, in science studies, as a methodological imperative (see Riles 1999).<sup>6</sup> If every scientific fact or research object is itself full of hidden, or latent, networks



istry departments involved in the prospecting project, and I continued to work closely with these scientists throughout the year. This meant spending a great deal of time in the ethnobotany labs and the chemistry labs. I conducted taped interviews with Drs. Bye and Mata, while most of my time was spent with the biologists, ethnobotanists, and chemists working under them.

I also accompanied the ethnobotanical research team on their collecting trips to the north of Mexico. These field excursions were crucial parts of my research. Not only did these trips teach me an enormous amount about ethnobotanical collecting practices, they also offered the opportunity to be a part of a complicated, early stage of the prospecting project, in which Bye's team was laying the groundwork for establishing relationships with "local participants." These were, of course, formative moments in the fashioning of this emergent if not, as we shall see, choppy network of resource providers and potential long-term claimants.

I later returned, on my own, to some of the urban markets and rural communities where the UNAM ethnobotanists had traveled to collect plants and establish contacts. I went to these sites to gain a better sense of the contexts into which emissaries of this prospecting project entered and left in short but frenzied bursts of activity. And so I spent time in one urban market getting to know the vendors, some of whom had sold plants to these researchers, and some of whom had not had any dealings with them at all; I met and interviewed rural collectors who brought these plants to the cities; I stayed in two small towns where Bye was setting up projects (school improvement and community cultivation projects) as preliminary examples of the kind of benefit offered through this prospecting agreement, and I spoke extensively with the contacts with whom he was arranging these projects.

In May 1997, I participated in an international symposium in the Mexican Senate, designed to lay the groundwork for drafting national legislation on access to genetic resources. My research in Mexico City also led me to the offices of many public officials, researchers, activists, and graduate students at UNAM and other central Mexican universities, who taught me about the history and politics of ethnobotanical research in Mexico, its relationship to transnational pharmaceutical interests and current biodiversity politics, and the effects of national and international shifts toward neoliberalism and sustainable development in rural Mexico, among other things. In June, an ICBG annual meeting in Tucson gave me the opportunity to situate my analysis of this Mexican prospecting endeavor more fully in the context of the wider collaboration of which it is a part. There, I interviewed participating researchers from Arizona and the countries of Chile, and Argentina, as well as U.S. government officials and a corporate representative to the project. At this project meeting, a

remarkably dispersed network congealed, partially, in one place, allowing me to understand better how the resources and processes with which I was concerned in Mexico translate and travel as they enter other nodes of this project.

As many critical accounts of ethnographic work have suggested in other contexts, the very act of trying to "follow the networks" often makes us party to their materialization. I found, in many cases, that my own attempts to make this project an explicit object of attention and ground for conversation and shared analysis simultaneously had the effect of extending the webs of people for whom it would be a matter of interest in the first place. Many scientists and activists with whom I spoke in Mexico in the early years of my research had not heard much about the UNAM prospecting project, if anything at all—a situation that implicitly made me the project's "representative" in many interviews. In this way too I became an informant of a sort for the UNAM chemistry lab technicians, as my inquiries seeking to tie their practices to wider contexts gave them a warrant to ask me about what went on "over there" in ethnobotany, what the field excursions were like, and too, what was happening in other nodes of the prospecting project in the United States, Chile, and Argentina.

And, in my travels north to potential or actual "community sites," I became in many cases inescapably associated with the very project I was hoping to study, in the eyes of the plant vendors, collectors, and community members I first met while traveling with Bye's team. Though I tried to make clear that I was not part of that project but rather conducting my own independent research, this naïve attempt at boundary-making did little to sway some of these very generous men and women from treating me as Bye's emissary. And thus I found myself treading some strange ground, inescapably partaking of the benefits of Bye's good name and, perhaps, the promise of benefits (or purchasing power, in the case of market vendors) with which he was associated. This also meant treading with care in terms of my representations of the project itself or, if the question came up, Bye's intentions—for I had made a commitment that, should I go speak with people with whom he was beginning to set up relationships, I would not attempt to compromise or sabotage those efforts. And again, in this way, the prospecting network I was hoping to trace traveled with me.

### Chapter Preview

The book is divided into three sections. The three chapters in part 1, "Neoliberal Natures," outline bioprospecting as a social practice and institutional formation; as such they also lay the groundwork for understanding the particular approach I've taken in this analysis. Chapter 1 explores in

greater detail the implications of framing an ethnography of prospecting as an ethnography of science; in the process, it also charts some of the institutional shifts in the political economies of “knowledge production,” in the United States, Mexico, and internationally, that have prompted me to shape my inquiry in a certain way. The next two chapters lay out bioprospecting’s conditions of possibility—and increasingly, its conditions of impossibility—in Mexico and internationally. Chapter 2 characterizes bioprospecting as a firmly neoliberal construction of both nature and human nature, in which globalizing models of intellectual property rights, proprietary local knowledge, and individual entrepreneurship figure strongly. Chapter 3 outlines the constellations of “risk,” rights, and regulation that surround prospecting in Mexico. Alongside a discussion of legislative and neoliberal policy shifts that help constitute prospecting-mediated “governance” in Mexico, I outline the recent controversies over prospecting, as well as some of their historical precedents. Together, these discussions show how national and nationalist histories make an indelible mark on the shape of current prospecting practices.

Part 2, *Public Prospecting*, takes us on a detailed tour through some of the “public domains” named and mobilized in the UNAM-Arizona prospecting agreement, and thus aims to show how participating Mexican ethnobotanists’ collecting strategies shape prospecting’s contentious lines of inclusion and exclusion. This section revolves around the ethnobotanists’ controversial decisions to collect in public domains—urban markets and roadsides—rather than in places marked as “communities.” Chapter 4 addresses market collections, arguing that this strategy significantly upsets the intellectual property-inflected notions of compensation underwriting this prospecting agreement, while providing an opportunity to track how “local knowledge” is itself localized in the context of a benefit-sharing agreement. Chapter 5 moves to roadside ditches and highway shoulders across the north of Mexico, weaving a profile of the kinds of value, knowledge, and property claims that are both enabled and disabled through collecting in this heterogeneous “public” space. I investigate these sites as newly desirable sources of biodiversity, as places that researchers identify (with much hope) as being laden with enhanced biochemical promise and relatively few political entanglements. These chapters thus address the question of prospecting in public through an exploration of what these choices of collecting sites both disable and enable: what kinds of knowledge about “nature” are produced through collecting in these sites and not others, and what modalities of enfranchisement emerge as well as recede here.

Part 3, *Prospecting’s Publics*, articulates the long-standing, corroborative project of transforming “folk knowledge” into pharmaceutical value with the novel conditions of a benefit-sharing agreement, in which

the providers of such knowledge are to be rewarded for their contribution to patentable drugs. My focus here is less on how scientists determine the insides/outside of prospecting networks than on how we might understand different actors’ proximity to the industrially mediated value that looms promisingly on the horizon within prospecting collaborations. Chapter 6 approaches this question through a detailed analysis of the history and politics of a particular test organism (the humble brine shrimp) inhabiting the Mexican chemists’ laboratories. Brine shrimp turn out to be uniquely efficacious tools for producing these translations between the “vernacular” and the pharmaceutical; as such they serve as key mediators in the production of potential claims to entitlements, both for these chemists themselves and for the rural interlocutors whose interests they are to represent. Chapter 7 traces how ethnobotanical knowledge fares as a shortcut to drug discovery and a token of myriad potential interests and claims. In so doing, it illuminates the powerful effect not of property claims themselves, but of the threat of property out of place: the agreement’s internal confidentiality provisions keep ethnobotanical information out of the hands of the participating companies, in effect interrupting the networks along which ethnobotanical knowledge and the local interests it represents are supposed to travel.

With this book, I hope to make a distinctive intervention into some complex and highly polemicized terrain. The effects of bioprospecting contracts are far from straightforward; indeed, the kinds of alliances and modes of resource appropriation undertaken in their name might surprise us. A cavalier or even deeply committed dismissal does not help us understand the practices and relationships, the interests and investments, and the kinds of social action and knowledge production that are unfolding in the name of bioprospecting and in the shadow of its promises. The analysis I present here is devoted to understanding these processes.



## Chapter 1

### Interests and Publics: On (Ethno)science and Its Accountabilities

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What does it mean to conduct an ethnography of bioprospecting as an ethnography of science? In this chapter I introduce some of the theoretical approaches and conceptual concerns that run through this account, and that inform my interest in placing academic scientific research at the very center of my inquiry into the machinations and effects of bioprospecting. In particular, I lay out what I think a science studies-inflected anthropology can contribute to an understanding of bioprospecting—as well as some of the challenges prospecting poses for science studies.

I introduce two intertwined sets of concerns that run through this chapter and shape the book as a whole: *interests* and *publics*. By interests, I refer to the idea that knowledge and bioartifacts contain, reproduce, or represent people's interests—a crucial claim for science studies that takes on new dimensions in the context of bioprospecting. Alongside this concern, I want to open up the question of the myriad publics that “science” and scientists produce and must answer to in the context of bioprospecting and beyond.

Both sets of concerns have everything to do with contemporary conditions of bioscience research, in which the “representative” work that science does has taken on some new and pointed significance. This chapter does double service then, introducing key theoretical questions and also charting some of the institutional shifts in the political economies of “knowledge production” in the United States, Mexico, and internationally, which have prompted me to shape my inquiry in the way I have. Central to the story is my situating bioprospecting (and the social studies thereof) in some distinctive institutional landscapes of academic knowledge-production, which are marked by the increasing prevalence of pri-

vate-public “partnerships,” the development of new ethical codes for the ethnoscience, and the prominence of knowledge as a vivid site of struggle for indigenous peoples and southern and northern nation-states alike.

### Science Studies: On Having Interests in Knowledge

As we will see in great detail throughout the rest of this book, central to the politics of bioprospecting is the question of who shall be able to stake a claim in knowledge or plants that are collected in the south and industrialized in the north. If this is very clearly a political question, it is also a theoretical one. We might, in this vein, pose prospecting's central dilemma as a question of the capacity of knowledge and artifacts to represent interests: How do scientists, rural Mexicans, national governments, and corporations claim, activate, or deny interests (their own or others') in knowledge and nature? These are questions with much resonance in science studies, an interdisciplinary field that has long-concerned itself with the question of the political and social interests that “reside” in knowledge and bioartifacts (among other things) (Latour 1987).

“Interest” is a term with a dense legacy in liberal theories of why people do the things they do. Arguably its most powerful association over the past one hundred and fifty years has been with economic (self-)interest, and the accompanying presumption that we are all rational actors whose behavior can be attributed to efforts to calculate and maximize our own gain (whether measured in the accumulation of capital, or in other currencies such as reward, reputation, or credibility). As Albert O. Hirschman argues in his *Passions and the Interests* (1977), this narrow notion of interest is a relatively recent achievement, but it has held remarkable sway, not just in political science and economics, but in social theory more broadly. This is certainly the case in some prominent strands of science studies, which have drawn extensively on the metaphor of interest (and its presumption of maximizing rationalities) to address its central concern: explaining the processes through which a fact becomes a fact. At their most iconic (and basic), interests, in the hands of Bruno Latour, work like this:

Suppose that . . . Boas, the American anthropologist, is engaged in a fierce controversy against eugenicists, who have so convinced the United States Congress of biological determinism that it has cut off the immigration of those with “defective” genes. Suppose, now, that a young anthropologist demonstrates that, at least in one Samoan island, biology cannot be the cause of crisis in adolescent girls because cultural determinism is too strong. Is not Boas going to be “interested” in

Mead's report—all the more so since he sent her there? Every time eugenicists criticize his cultural determinism, Boas will fasten his threatened position to Mead's counter-example. But every time Boas and others do so, they turn Mead's story into more of a fact. . . . By linking her thesis to Boas's struggle, Mead forces all the other cultural determinists to become her fellow builders: they all willingly turn her claims into one of the hardest facts of anthropology for many decades (Latour 1987: 109).

Though I've chosen an example from the social sciences, the point remains the same for physics, biochemistry, and the rest of the hard sciences: what makes a fact authoritative is not merely its resemblance to “nature” but rather the robustness of the social interests that can be enrolled in its support (Callon and Law 1982; Latour 1987). It is with this notion in mind that science studies scholars have made one of their most iconic arguments: that (scientific) knowledge does not simply represent (in the sense of *depict*) “nature,” but it also represents (in the *political sense*) the “social interests” of the people and institutions that have become wrapped up in its production (Latour 1993; Callon and Law 1982). This argument, in turn, opens up a distinctive analytical mandate. The task for science studies becomes, in this view, to identify, uncover, or reveal the interests that are wrapped up in knowledge and artifacts.

There is, of course, a great deal in this approach that has drawn extensive critique: the view of scientists as rational actors driven in Machiavelian style by their interests (Woolgar 1981; Haraway 1997); the lack of attention to lexicons of identity, difference, and power that produce credible knowledge producers or “witnesses” in the first place (Haraway 1997); the extensive use of economics metaphors (scientists vying for reputational reward, credit, and credibility) in the service of an ostensibly and explicitly “non-economic” analysis (Knorr-Cetina 1982). Indeed, though oriented toward the accumulation of credibility and reputation rather than capital, this analytic framework is close kin to the rational actor model underlying the kind of conservation discourse that has given birth to bioprospecting; mainstream science studies and neoliberal biodiversity discourse share a fascination, it would seem, with *Homo economicus* and his rational, interest-maximizing behavior (see chapter 2).

My own interest in this genealogy of inquiry within science studies stems precisely from the ways in which science studies' concern with knowledge as a repository of “interests” is explicitly writ both large and small within the world of bioprospecting itself. That is, I argue here that prospecting contracts (and their attendant controversies) themselves actively call up, animate, and lay bare for contest and debate the idea that knowledge and biological material are bevvies of claims and interests.

These cominglings have some bearing on how we might think about the capacity of interests themselves to “explain” social processes. Anthropologist Sylvia Yanagisako has recently argued that the notion of interested subjectivity has remained woefully underexamined in anthropology and social theory; her work on family firms in Italy seeks to understand how certain values or actions come to be seen as “in the interest” of bourgeois actors in the first place (and to this end she proposes that we look to the productive capacities of sentiment; Yanagisako 2002).<sup>1</sup> Two decades ago, and in a very different way, sociologist of science Steve Woolgar also took some of his colleagues to task for their use of interest as a self-evident explanatory framework (Woolgar 1981). Woolgar argued that an unexamined notion of interest, impressively pedigreed though it may be in political-economic thought, is a far from transparent guide to understanding why scientists do what they do (and thus how facts get assembled as such). Unlike Yanagisako, Woolgar was not interested in the meaningful content of the term (nor in posing alternatives) but rather in its mobilization: he argued that the construction and use of interest, its attribution and anticipation, “demands treatment as a phenomenon in its own right” (Woolgar 1981: 371). “Interest-work,” he wrote, is constitutive of scientific practice.

Together, Woolgar and Yanagisako’s very different analyses set the stage for thinking about interest in the context of bioprospecting, not as an explanatory device but rather as an ethnographic object, or a term that does a great deal of work “on the ground.” Insofar as plant collections now come with benefit-recipients attached, prospecting agreements do some noteworthy things with the science studies axiom that “knowledge” represents both nature *and* the political and social interests of the people and institutions that are wrapped up therein. I’ll elaborate on this argument below, but I simply want to highlight my own point of entry here: my concern with the science studies notion of interests and representation does not lie in my intention to use this framework in any straightforward manner to *explain* (the construction of facts, for example). Rather, I am interested in the ways in which precisely this dual notion of representation—claims *to* and *about* biological material and knowledge—now lie explicitly at the heart of contemporary social imaginaries and practices of participation and marginalization.

If this is a concern that I draw, in somewhat oblique fashion, out of science studies, I take a cue here as well from anthropology, and particularly from the kinds of feminist kinship theory that have been so central in the development of the anthropology of the biosciences (see Franklin 1995).<sup>2</sup> One important focus of this work has been to understand biological material as a powerful and contested mediator of social relationships, broadly conceived. It is in this vein that I seek to understand bioprospect-

ing in terms of how its managements of knowledge and nature mediate both new and old forms of relationship. I do not invoke relations in the strict familial sense but in the broader terms of inclusion and exclusion vis-à-vis new, intellectual property-mediated modes of laying claim to access to resources (see Strathern 1999b and c; Hayden 1998).<sup>3</sup>

In fact, broadly speaking, where science studies is concerned, the current prominence of intellectual property within the conduct of academic bioscience shifts the analytic and ethnographic terrain a bit—it both requires and produces new questions.

#### ECONOMIES OF KNOWLEDGE: SCIENCE AND SCIENCE STUDIES

Talk of the “knowledge” or “information economy” has become ubiquitous in popular, policy, and academic circles in Latin America, the United States, Europe, and elsewhere. In the words of two of the many chroniclers of the knowledge economy and some of its myriad effects, “the world economy has embarked upon a new stage of economic growth with knowledge and therefore intellectual property as the engine of industrial development, replacing traditional elements such as monetary capital, natural resources, and land as the driving force” (Etzkowitz and Webster 1995: 481). It is a commonplace and powerful formulation—not just that we live in a knowledge economy, but that in such an economy, the usual cumbersome sites and modes of capital accumulation have been supplanted by something a bit lighter on its feet, called knowledge or information. Among the many caveats we might want to add to these sweeping epochal characterizations, we might point out that “nature” does not disappear as a source and site of value, even as “knowledge” looms ever larger. The ostensible capitalization of knowledge instead has gone hand in hand with the capitalization of a new kind of nature: not the usual timber, land, minerals, or petroleum, but something that gets called “life itself” (Franklin, after Foucault)—DNA, genetically modified organisms, gene sequences.<sup>4</sup>

In the 1970s, the development of molecular biological techniques for recombining, “engineering,” and otherwise manipulating DNA opened up new fields of technological manipulation and effected some fairly noteworthy shifts in the imagined horizons of biomedical research and biological applications (Rabinow 1991 and 1996; Haraway 1997). Central to these seismic shifts in the field of the possible have been technical feats of much public fascination and chagrin—cloning, the Flav-R-Savr tomato, and OncoMouse™. Intimately related to these new developments have been crucial changes in the forms of life that the U.S. government, in particular, has been willing to consider as subject to patent claims. If patents are

among “the traditional means of ‘securing value’ from knowledge” (Etzkowitz and Webster 1995: 482–83), then, since the early 1980s, they have also been a key instrument for “securing value” from biological matter as well. As we shall see in the next chapter, patents are crucial to the imagination of biodiversity itself as a kind of nature that is specifically amenable to biotechnological enterprise; and not only that, but also to new kinds of participation for a wide range of knowledge providers and producers.

The participatory aspect of intellectual property rights (IPR) is a question to which I will turn later in this chapter; for the moment, let me say a bit about how intellectual property—in knowledge and nature—works. For now, IPR will look anything but inclusive. Patents, like other forms of intellectual property, are in fact meant to be tools of exclusion: they grant exclusive property rights of a particular kind, not to a thing but to an idea, technique, or process. (If you patent an elevator, you are granted rights not to an elevator itself but to the design or idea, which you are then entitled to license to whomever you wish; anyone who uses your design without your authorization will be subject to prosecution for patent infringement.) Granted and protected by the state, patents have always been tools not just for encouraging individual (and now, overwhelmingly) corporate reward, but for nation-building through the production and protection of national storehouses of intellectual capital and innovation.

The key criteria for issuing a patent—novelty, nonobviousness, and utility—give us a view of what is entailed in this modernist commitment to innovation and progress (Chon 1993): the idea in question must be new, and not a reiteration of an existing thought, or mere discovery of an existing phenomenon. Based on Locke’s Enlightenment notions of property in the self (the idea that one should benefit from the fruits of one’s labor), the kind of invention rewarded by a patent is figured as the mixing of the inventor’s creative, intellectual labor with something taken out of its “natural state.”<sup>5</sup>

We might note that while the trope of discovery has a potent and bloody history in the annals of conquest and colonialism, in the domain of intellectual property rights, discovering something formally earns an erstwhile patent holder no rights at all; it is a *disabling* concept. Like replication in the realm of copyright and written work, the mere discovery of existing ideas does not, ostensibly, merit the label of innovation, nor the reward of temporary monopoly. Not surprisingly, then, the boundaries between the appropriable public domain of the “already existing,” and the privatizable realm of novelty and innovation, are themselves heavily policed by corporate entities and hotly contested by their would-be challengers.

If this is true in most arenas, it is particularly pointed in the realm of biodiversity prospecting, where the lines between discovery and invention are the subject of powerful tugs of war among and within the UN, multi-

lateral trade agreements, national laws, and civil society/activist mobilizations. Until the UN Convention on Biological Diversity in 1992, for example, cultural knowledge and wild genetic/biological resources were among the many resources considered internationally as common heritage—a de facto part of the appropriable public domain, and thus, resources freely available to be taken out of their natural state, innovated-upon, and patented. But recent changes in the status of this common heritage, which I will outline in greater detail in the next chapter, have provided a basis for mounting counterclaims to corporate characterizations of just what should count as appropriable discoveries and privatizable innovations.

Consider the ways in which corporate patenting practices have recently run headlong into concerted resistance where cultural knowledge is concerned. Indigenous coalitions, joined by southern and northern NGOs and legal counsels, have mounted successful challenges to several corporate patents on chemical compounds that were derived from plants with well-established folk or indigenous uses. On May 11, 2000, the European Patent Office overturned W. R. Grace’s patent on a fungicidal compound from the East Indian neem tree, widely used by Indian farmers for this purpose among many others. The Office conceded that W. R. Grace’s neem patent was simply a repackaging of established knowledge—it was based on prior art, and not corporate innovation, as the company had argued (and with which the patent examiners had originally agreed, CSE 2000). On the same grounds and in the previous year (1999), a U.S. seed company’s patent, on a vine used by mestizo and indigenous communities in the Amazon basin to prepare the hallucinogenic beverage *ayahuasca*, was overturned by the U.S. Patent and Trade Office (PTO). As with the neem patent, this challenge was based on the argument that the patent contained no new innovation, but rather was based wholly on well-established knowledge. The fate of the *ayahuasca* patent continues to take some odd turns, however; the PTO’s ruling was subsequently overturned on appeal—the patent has now been reinstated.<sup>6</sup>

If the lines between already existing and novel knowledge are fraught with contest, the question of whether and how nature might be understood as itself an innovation has been positively explosive. Until the early 1980s, the consequential yet always malleable distinction between discovery and innovation was in part grounded on the bracketing of nature as always already existing and, thus, not a (human) invention. That is, the logics of patent law received a formal boost in the United States and internationally through the “products of nature” doctrine, which, until recently, excluded extant life from the realm of ownable innovation. Needless to say, as in the above cases, this line has long been open to re-engineering. The drug industry has grown from over a century of patents on enzymes and chemical compounds (as long as they were “isolated” and “puri-

fied"—actions taken by patent examiners for over a hundred years to signify innovation and novelty), and on microbiological processes. Similarly, in agriculture, patent-like protection on plant varieties has been recognized by the United States government since the 1930s (see Juma 1989). But, since 1980, the United States, more than any other nation, has re-set the always fuzzy line between nature and artifice in some markedly more spectacular ways, designating a wide range of "forms of life" as patentable subject matter. Human genetic material, bioengineered microorganisms, and transgenic, multicellular organisms (such as Dupont's Onco-Mouse™, engineered to contain a human breast cancer gene) have been ruled by the U.S. Patent and Trade Office to be patentable innovations, rather than simply discoveries of already existing forms of nature. (And, industry representatives argue loudly and often that without such patent protection, their incentive to invest in research and development would disappear: the patent is necessary, they argue, to guarantee returns in order to entice them to continue innovating.)

The 1980 U.S. Supreme Court decision, *Diamond v. Chakrabarty*, was an important catalyst in this amplification of the realm of nature subject to ownership. In this decision, the Court ruled that a genetically engineered microorganism designed for cleaning up oil spills could indeed be patented as if it were an inanimate invention (overturning, it is worth noting, the PTO's original ruling to the contrary). The Court justified this particular construction of commensurability with a remarkably broad interpretation of patentable subject matter, as "anything under the sun that is made by man" (*Diamond v. Chakrabarty*, 447 U.S. 303). The *Chakrabarty* decision thus literally enabled the emergence of a whole new class of property by prying wide open an already thinkable (and yet still head-spinning) gap between "things of nature that occur naturally" and "things of nature that occur by man's handiwork" (Sherwood 1990: 47). As such, it is often recognized as an indispensable spark for the then-fledgling but soon to be incredibly lucrative U.S. biotechnology industry.

The anthropologist Paul Rabinow comments on the significance of the *Chakrabarty* decision, not just for the status of life as property, but for the status of the life sciences as a locus for new modes of biopolitical production: "The Supreme Court's ringing proclamation that 'congress intended statutory subject matter to include anything under the sun that is made by man,' coming as it did in the same year as the election of Ronald Reagan as president of the United States and the massive influx of venture capital into the biotechnology world, not only opened up 'new frontiers' in the law but can appropriately be seen as an emblem of an emerging new constellation of knowledge and power" (Rabinow 1996: 21). Institutionally speaking, *Chakrabarty* was indeed central to a momentous reorganization in the relationship among public bioscientific re-

search, venture capital, and industrial research and development in the United States and internationally. Emblematic of this reorganization were not just new definitions of property, but also changes in the regulatory structure of the biosciences in the United States, which aimed to encourage (if not to effectively force) an increasingly enterprising approach to academic research (see Wright 1994). Chief among these "reforms" was the U.S. Congress's *Bayh-Dole Act* of 1980, which effectively required universities and university researchers to patent and commercialize results derived from federally funded research (Etzkowitz and Webster 1995: 483; see also Rabinow 1996: 19–22). As Rabinow notes, "although debates about the social and ethical consequences of the biosciences often turn on the pivotal role of business, it is worth remembering that the initial major impetus for bringing applied and pure research in the biosciences into a closer, more productive relationship came from the U.S. government" (1996: 22). This consideration does not, in my view, constitute an argument to stop critically analyzing corporate practices. Rather, the lesson I take here, and one of the points of this ethnography as a whole, is that we need to be attuned to the complex alliances that in many cases provide the indispensable fuel for those practices. The shifting and permeable boundaries among the public domain, publicly funded research, and the private sector are key places to look in this regard.

Fittingly, along these lines, the U.S. government's move to produce tighter links between industry and academia has been accompanied by some ancillary actions, most notably, the progressive withdrawal of government funding for university-based, basic scientific research in many fields. These twinned developments, as prominent in Mexico as they have been in the United States and Europe, have created a situation in which academic researchers and institutions have been increasingly expected to enter into partnerships with the private sector not just to commercialize their *results* but also to cobble together research funding in the first place (see Schoijet and Worthington 1993). The capitalization of knowledge or life has thus meant, very directly, an intensification of the "enterprising-up" of academic scientific research (to contribute to the long chain of flexible borrowings of Marilyn Strathern's [1992] fortuitous phrase) (Soley 1995; Yoxen 1981; Rabinow 1996).

A 1998 agreement between the University of California, Berkeley, the state's flagship public university, and the life sciences firm Novartis, is a vivid example. Solicited by the university, this agreement gives Novartis unprecedented access to the research results of faculty and graduate students in the Plant and Microbial Biology department, in exchange for \$5 million per year in research funds (with Novartis representatives having a significant say in which proposed research is awarded these funds). Even as it has caused an uproar in some academic and activist circles, other

universities around the United States are looking to enter into such contracts, in large part as a way to bring not just capital and equipment to their campuses but also access to corporate databases—an important resource given the increasing amount of biochemical information being cordoned off in these proprietary domains.

Developments like this one have prompted reflection on the part of science studies scholars not just about the state and fate of university-based scientific research, but about the analytical remit of science studies itself. In their article, aptly entitled “Science as Intellectual Property,” Henry Etzkowitz and Andrew Webster write: “Formerly, academic scientists were content to capture the reputational rewards and leave the financial rewards of their research to industry; this division of institutional labor is breaking down, hastened by financial pressures as professors and universities view their research enterprises as akin to businesses that must generate revenues to survive. . . . [In a knowledge economy], science policy and industrial policy merge into one” (1995: 481). Referencing a shift from reputational to financial reward, Etzkowitz and Webster comment directly on the tradition in science studies that has been so concerned with the accumulation of “credibility” and interests as a way of explaining how science gets made and done. We might join them in arguing that in a knowledge economy it no longer makes sense (if it ever did—a much debated question [see Haraway 1997; Knorr-Cetina 1982] to understand science as an exercise in amassing symbolic or reputational credit. Certainly, when university researchers routinely patent their research results; or when entire academic departments in public universities sign funding and benefit-sharing contracts with transnational life sciences firms, science studies’ economic metaphors of interest-bearing knowledge reassert themselves, appearing both all too literal and, in the harsh light of the increasing imbrication of the private and public sectors, even a bit pale. It is with these concerns in mind that some chroniclers of both science and science studies have asked what the commodification of science and university research in general means for the practice of science and the social studies thereof (Etzkowitz and Webster 1995; see also Knorr-Cetina 1982).

#### BIOPROSPECTING: KNOWLEDGE ENTERPRISED-OUT

Bioprospecting contracts, I argue here, require a distinct kind of critique. These contracts, which set up chains of entitlement and access between drug companies and southern resource providers *via* academic scientists, point us to concerns that are not easily contained by the moniker, “commodification.” As I noted in the introduction, knowledge—*provided* and

*produced*—is not simply capitalized here. It is politicized in a very particular sense: it is being inscribed with new kinds of obligations and opportunities, new kinds of potential claims and exclusions.

We might say then that if university-based research is being enterprised-up in this context, it is also being *enterprised-out*. In these prospecting collaborations, laboratory as well as field science serve as distinctive kinds of “representational” projects, ones where the presumed interests of a wide range of parties hang suggestively in the balance. With new contractually mediated obligations—to collect not just plants but the benefit-recipients that “come with” these plants—come some crucial shifts: the UNAM scientists with whom I work are brokers of access not just to credibility but to provisional promises of “value”; and this value is to be delivered not just to themselves but to the rural people whom they ostensibly represent in these agreements.

If science studies has long held as one of its central axioms the idea that nature and knowledge are chock-full of “social interests,” bioprospecting contracts instantiate this critique to such a degree that it (almost) becomes redundant. For, through benefit-sharing agreements that trade plants, extracts, and knowledge for future royalties, prospecting contracts make incredibly explicit the idea that biodiversity and chemical compounds, among other things, come with interests and social relationships attached. What’s more, as we shall see in chapters 4 and 5, these compensation agreements nearly *demand* that social relations (authors, owners, benefit-recipients, resource providers) be produced or identified for each plant collected by the Mexican researchers.

At the same time, these contracts do not, of their own accord, answer questions about the kinds of subjects, objects, and relationships that are engendered through this brand of politicized scientific research. As much as prospecting might make explicit the sociality of both knowledge- and value-production, we still confront the matter of *how* “interests” are animated, anticipated, and constructed through benefit-sharing contracts, and to what effect.

My purpose is to track the ways in which a host of political liabilities and property claims, accountabilities and social relationships are being actively written *into* routine scientific practices, tools, and objects of intervention and back *out* of them again, in ways not quite anticipated by a traditional science studies approach. The latency of Latour’s networks of interests and collaborations is not the primary challenge here. I see the key task for science studies in this context as one of analyzing how such relations are being activated and fashioned in articulation with neoliberal, entrepreneurial modes of participation—for a wide range of actors, including scientists and their rural and indigenous interlocutors.

## Ethnoscience and Its Accountabilities

Significantly, for this line of argument, the idea that “knowledge” might represent (“other”) people’s interests has long been at the very center of the kinds of field research and laboratory-based endeavors that now feed contemporary bioprospecting collaborations. In both the United States and Mexico, ethnobotanists and plant chemists have long treated the knowledge they produce as something that can help defend or promote the interests of the peoples with whom they work. Such modes of intellectual alliance-building have a heterogeneous legacy within North American ethnobotany, and they are finding a new, enterprising outlet in some ethnobotanists’ visions of the promises of bioprospecting contracts to turn traditional knowledge into dividends that can come back to indigenous peoples themselves. Mexican ethnobotany has its own trajectory of advocacy and political mobilization, one in which the study of traditional knowledge has been calibrated as much toward the defense of indigenous communities against the state, as the defense of the nation against foreign (particularly U.S.) economic imperialism (see chapter 3). These intertwined legacies come together anew in some important and direct ways in current bioprospecting endeavors in Mexico. And they raise some crucial questions about the modes of partnership, collaboration, and indeed representation offered through scientific research and claims on knowledge, both provided and produced.

### EPISTEMOLOGICAL ADVOCACY

As we know from the intertwined histories of colonialism, natural history, and botany, the study of plants and knowledge about their use has a long and complicated legacy in which resource extraction has unquestionably played a prominent role (see MacKay 1996; Miller and Reill 1996; Koerner 1994). Since the late nineteenth century, a field that has come to be known as economic botany has been devoted precisely to turning these resources—plants (and sometimes, local knowledge)—into industrializable products. This project (and its inescapably national[ist] resonances) has direct links both to contemporary bioprospecting initiatives and to the funding opportunities that have been available to ethnobotanists (scientists interested in local knowledges and uses of plants) in the second half of the twentieth century. Thus, during and after World War II, American botanists, ethnobotanists, and other scientists were sent forth to scour the tropical world for natural sources of rubber and penicillin; more recently, academic ethnobotanists funded by the U.S. National Cancer Institute

(NCI) have been called upon to take the lead in ethnobotanically guided searches for leads to drugs that might combat cancer and HIV. These have been endeavors based on a certain kind of “translation”: turning plants and often, though not always, knowledges about their uses, into industrially useful, biologically active chemical compounds.

Yet ethnobotany is not, by any stretch, a field geared entirely toward resource extraction and the identification of bioactive compounds. Many ethnobotanists and ethnobiologists, as well as ethnoscientists working in the tradition of American structuralism, have conceived of their role as chroniclers and “translators” of local knowledges in markedly different ways.<sup>7</sup> I refer to work in which studies of indigenous or traditional classification schemes and/or modes of managing resources have been rendered to demonstrate their scientific veracity, rationality, efficacy, or (more recently), sustainability. In many different ways, legions of ethnobotanists and ethnoscientists have used their field studies and laboratories precisely as if they were courtrooms—as staging grounds for proving the legitimacy of local knowledge and, in turn, using these validations as tools for the advocacy and defense of the communities with whom they work.

The Colombian ethnobotanist and historian, Adriana Maya, analyzes precisely these dynamics in her discussion of the role of ethnobotanists as “intellectual allies” in struggles for indigenous and Afro-Colombian rights (Maya 2000).<sup>8</sup> Drawing on her formulation, I want to draw our attention to a particular kind of alliance-building which I call epistemological advocacy—a term that points vividly to several formulations of “defense” premised on the parsimonious relationship between indigenous knowledge and Western science. Consider, as an incredibly explicit example, ethnobiologist Eugene Hunn’s reflections on his experience as an expert witness for the Squaxin Island Tribe in Washington State (U.S.), in a court case involving tribal access to tidelands for harvesting shellfish. Hunn writes that his research proved an effective tool for supporting indigenous claims precisely because of the correspondence of native knowledge with Western science: “ethnobiological testimony with rare exceptions is supportive of native claims. This is by virtue of the fact that indigenous knowledge is, as ethnobiologists have shown, essentially scientific” (Hunn 1999: 11).

This particular brand of defense is part of a liberal, even structuralist project within the ethnosciences, in which studies of classification systems and resource management have been calibrated to provide evidence for the fundamental unity and rationality of knowledge about nature (see Berlin 1992). If, in these classificatory studies, attaching indigenous knowledge to science is seen as a way to shore up the former’s truth claims, rarely does the reverse formulation come into play. What, we

might ask, does “science” get out of the exchange? (see Grove 1991; Anderson 2000).<sup>9</sup>

But there have been other modes of epistemological advocacy in motion within ethnobotany and its sibling disciplines. In Latin America, these have taken on a particularly distinctive regional character, as scientists have sought ways to intervene in the often fraught relationships between indigenous communities and nation-states. One way they have done so is by opposing the well-sedimented ideological move—by the World Bank, international conservation groups, and developing nation governments—to justify interventions into peasant and indigenous communities by labeling their practices and beliefs as backward, dangerous, and/or environmentally destructive. In the context of a broad history of such interventions, many Northern ethnobotanists and ethnoecologists have joined their Latin American colleagues in making strong cases for indigenous cultivation and management techniques as examples of sustainable forestry and agriculture, and as models for locally based development and conservation plans (Posey 1985 and 1992; Alcorn 1995 and 1984; Toledo 1986; Caballero and Mapes 1985). This, then, is a second version of epistemological advocacy, in which explicitly politicized defenses of marginalized peoples and practices have been calibrated to the notions of sustainability and conservation that have permeated international development discourse in the last two decades (see chapter 2).

But, returning to the issue with which I opened this section, epistemological advocacy and resource extraction are not necessarily mutually exclusive modes of doing ethnobotany. In fact, some ethnobotanists, chemists, and pharmacologists have seen the project of “translating” traditional or folk medicine into chemical compounds as a mode of advocacy itself, on par with the kind of work mentioned above. Here, resource extraction and industrialization become instrumental to the production of the “credibility” of (and now, dividends for) traditional knowledge.

This combination has come together in one, very particular and contentious articulation of ethnobotany as an activist discipline: that forged by the late Richard Evans Schultes, an iconic figure in North American ethnobotany, a 1960's counterculture icon, and former mentor to many prominent ethnobotanists (including UNAM researcher Robert Bye), several of whom are now active champions of the use of ethnobotany in the drug discovery process.<sup>10</sup> Like many anthropologists, Schultes and his legions of students also figure themselves as advocates—culturally sensitive plant-hunting Davids, taking on the Goliaths of Western ethnocentrism, scientific hubris, modernizing violence, and bureaucratic idiocy (see Davis 1996). If Schultes's work with Native American tribes in the United States has taken him to the courtroom on more than one occasion, his legacy as an advocate is also inseparable from his commitment to teasing

out and revealing the biochemical bases of myriad traditional or folk remedies—and particularly, hallucinogens (including LSD), for which he has had a particular fascination (Sheldon and Balick 1995: 50).<sup>11</sup>

Studies of the biochemical rationality and efficacy of indigenous or folk knowledge are, of course, complex and powerful iterations that have been directed, at varying moments, at skeptical pharmacologists, courts of law, recalcitrant government agencies (Mexican, American, or otherwise), and sympathetic anthropologists, ethnobotanists, and lay readers. In the 1990s and later, the kind of epistemological advocacy we might tentatively identify in such corroborative studies has taken on a distinctly enterprising hue, particularly but not exclusively among the visible and loquacious cadre of ex-Schultes students circulating in the world of North American ethnobotany.

In the midst of a powerful set of turns—in international development and conservation attention toward biodiversity conservation, market-oriented sustainable development initiatives, and (endangered) cultural diversity—ethnobotanists such as Mark Plotkin, Michael Balick, and Paul Cox have become vocal proponents of benefit-sharing programs such as the ones supported by the U.S. International Cooperative Biodiversity Groups program and the short-lived ethnobotanically driven drug discovery enterprise, Shaman Pharmaceuticals (see Plotkin 1993). These researchers have, indeed, found a major source of support in the U.S. National Cancer Institute (NCI), one of the world's most important institutional homes and funding sources for the twinned project of “valorizing” traditional knowledge by channeling it into pharmacological pipelines.

Among the only consistent supporters of natural products and ethnobotanical screening in the United States (in stark contrast to corporate industrial priorities), the NCI is part of the National Institutes of Health (NIH)—the primary sponsor of the ICBG prospecting program, which funds the prospecting collaboration I'll be discussing in detail in subsequent chapters. The NCI has had a long-running mission to search for plants, and now microbes, containing compounds that could lead to anticancer drugs. From 1960 to 1982, and again from 1986 through the late 1990s, this U.S. government program has supported basic research, contracted with collectors in tropical countries, and entered into licensing agreements with companies once a promising lead is fleshed out (see Aseby 1996; Chapela 1996; Cragg et al. 1994; Goodman and Walsh 2001). In this capacity, the NCI has held an absolutely central place in the annals of plant and ethnobotanically based screening in the United States, and in the shaping of current bioprospecting initiatives.

It is often NCI-funded studies and screens that provide the basis for many contemporary arguments that “diversity”—cultural and natural—holds the secret to global planetary and human health. Drawing on the



results from his work with the Institute, Paul Cox shows that 86 percent of the medicinal plants used in Samoa demonstrate significant pharmacological activity; Cox's colleague, Michael Balick, working with an NCI screen for anti-HIV activity, found that a sample of plants used by one healer in Belize showed four times as many "hits" as an HIV screen on a random collection of plants (Balick and Cox 1996: 39). In the view of these prominent U.S. ethnobotanists, bioprospecting offers a chance not just to show the (pharmacological) value of traditional knowledge; it is also a way to turn this epistemological and biochemical correspondence into a revenue stream for the stewards of traditional knowledge themselves (Plotkin 1995; Balick and Cox 1996). Benefit-sharing agreements thus figure here as obvious and enterprising twists to well-entrenched and heterogeneous disciplinary commitments to "advocacy," epistemological and otherwise. This promissory equation gives us a pointed reading of the representational work that knowledge is being asked to do in this formulation: knowledge is posed here as a resource with a capacity to represent and reproduce indigenous peoples' interests as it travels through drug discovery circuits.

"ACQUISITION AS REDRESS?"<sup>12</sup>

Like scientists involved in other controversial "diversity"-based enterprises, such as the Human Genome Diversity Project (HGDP), these researchers place themselves in what often turns out to be a messy position: they claim a space as champions of an embattled, liberal scientific effort to "promote and maintain diversity" in the face of some of the most profitable and resource-intensive sampling and mapping projects of the late twentieth and early twenty-first centuries (see Haraway 1997: 248).<sup>13</sup> The "defense" of diversity, articulated through projects like the HGDP or benefit-sharing, makes for an arguably contradictory bid at representation: an insistence that indigenous people and biological diversity too be considered valuable resources for industrial research and development; or, a faith that inclusion in scientific and biomedical research would itself be a transparent and desirable proposal to which indigenous peoples would consent, if only they understood what the benefits "to humanity" would be (Reardon 2001). Not surprisingly, indigenous activists have had quite a lot to say about the shape that such enterprising salvage projects threaten/promise to take. Where the Human Genome Diversity Project is concerned, the spectre of U.S. government patents on "indigenous (human) DNA" have mobilized a powerful response by North American Indian organizations against what they label as "the vampire project" (Harry 2000; Reardon 2001). Refusing to be "museumified" in the

HGDP's modernist discourse of nostalgia and loss, indigenous activists have argued that money should be spent not on preserving indigenous peoples in genetic databases, but rather on channeling funds to help those communities participate in the world in ways that they themselves might choose (Spiwak 1993). As we shall see in greater detail in chapter 3, analogous arguments about the nature of representation on offer have marked the biopiracy wars in Mexico (but also more broadly); what some scientists with a liberal commitment to diversity have earnestly but perhaps naively called "inclusion, representation, and better (pharmacological) science," many indigenous activists see as new forms of old histories of piracy and colonialism.

Academic research practice—collecting strategies, professional society ethical protocols—in fact, stands as one of the most significant sites in which the politics of prospecting is being fought out at a practical level, in two intertwined senses. If some ethnobiologists and ethnobotanists, among others, have been at the very center of collecting, "translating," promoting, and facilitating access to indigenous knowledge and resources as leads for industrial research and development, so too have researchers hailing from these disciplines pioneered significant, institutionalized shifts in what counts as ethical research practice. A growing politics of "compensation," of which bioprospecting contracts are in fact a part, has come into being in some important measure through this complicated academic legacy which has long mixed takings and givings (see also Povinelli 2000).<sup>14</sup>

Prominent in this legacy and its renewed, late-twentieth-century charter, is the Declaration of Belém, a combination call to arms (for academic researchers to join in the struggle to save both cultural and biological diversity) and statement of professional conduct issued by the International Society of Ethnobiology (ISE) in 1988. Academic members had invited indigenous and traditional representatives to their meetings in Brazil to "discuss a common strategy to stop the rapid decrease in the planet's biological and cultural diversity." The presumption of common cause took a slight detour, as what arose in the ensuing discussions were indigenous concerns not about conservation per se but rather about the protection, control, and access to their knowledge, resources, and modes of resource management. The resulting Declaration of Belém arguably took up the challenge: listing as its founding premises, that "native peoples have been stewards of 99 percent of the world's genetic resources and that there is an inextricable link between cultural and biological diversity," the Declaration recommended that mechanisms be developed for compensating traditional peoples for use of their resources (ISE 1988; see Posey 1996).

Itself a complicated statement of "interest"—tying a "globalist" concern with biodiversity conservation to indigenous rights to resource management—the Declaration of Belém was among the first academic proto-

cols to place compensation of native peoples for their genetic resources on the menu as a form of *responsible research practice*. At a subsequent ISE gathering in Kunming, China, the Society founded The Global Coalition for Biological and Cultural Diversity as a mechanism to put the Declaration of Belém into practice (Posey 1994: 238). The matter of compensation has since, without a doubt, become absolutely central to biodiversity and indigenous politics.

Within academic and legal forums, indigenous congresses, and UN circuits, a range of mechanisms have been experimented with and debated since the late 1980s in order to institutionalize an acknowledgement of the mixtures and entanglements that are indeed integral to biodiversity and cultural knowledge—those former denizens of the “global commons.” The U.S. National Cancer Institute developed a “Letter of Collection” in the late 1980s to implement benefit-sharing measures with source countries and collectors (Cragg et al. 1994); the International Society of Ethnobiology, alongside a host of other professional academic associations (the International Society of Chemical Ecology, the Society of Economic Botany, and the American Society of Pharmacognosy among them), devised protocols to set up ever more responsive codes of good research practice; new as well as already established UN initiatives (including the 1992 Convention on Biological Diversity and UNESCO’s 1970 declarations on cultural property) were called into action as the bases for claims-making; and, indeed, within this heady mix of initiatives, bioprospecting contracts themselves came onto the stage.

It is important to note that these developments have arisen alongside, and indeed as part of, a growing trend in which traditional knowledge, like biodiversity (see chapter 2), has been given a great deal of institutional life as both an identifiable, codifiable thing, and as a resource, in all the senses. In the World Bank’s Indigenous Knowledge for Development Initiative, the 1992 UN Conference on Environment and Development, the UN World Intellectual Property Organization (WIPO)’s working group on Indigenous Intellectual Property, and a host of other multilateral initiatives that took shape in the 1990s, “traditional knowledge” became sedimented as an object that can/must be drawn upon to make development projects work better, or to make drug discovery go faster, or to conserve biodiversity (see Cooke and Lothari 2001). And indeed, precisely in tandem with its newly appropriable value—economic and otherwise—traditional knowledge has also become thinkable as an entity to which its original stewards might well be able to claim property or property-like protection (see Long Martello 2001). The representational field has opened up a bit, we might say, with the idea of indigenous intellectual property rights now on the menu.

## KNOWLEDGE ACTIVISM

Without a doubt, knowledge, biological material, and intellectual property are central points of contest not just in and between corporate boardrooms and academic laboratories, but as part of the palette in which contemporary social struggles are being painted. Certainly, many critics of globalization argue that the stunning expansion of corporate patent claims on Southern biological material represents the primary danger that the “capitalization of life” holds for the developing world and for indigenous peoples (see Aoki 1998; Shiva 1993). The long reach of corporate patents—and their counterintuitive exclusions—looms large in current activist mobilizations against biopiracy.

At the same time (and perhaps not surprisingly), intellectual property has also become central to recent struggles to grant indigenous peoples new kinds of rights, and thus, we might say to imagining new kinds of inclusions (and their corresponding exclusions) as well. As I noted earlier, the key axis of entitlement in the realm of intellectual property is not physical property claims (i.e., whose land is that plant on?) but the question of intellectual labor, and contributions to innovation. This distinction, in the hands of indigenous and academic activists, is now being mined for some novel possibilities. The *idiom* of intellectual property (the idea of protections for demonstrable innovations and intellectual labor) is being used in many different ways now to imagine how native and indigenous resource holders might become new kinds of participants or rights-holders in a so-called global knowledge economy. In their efforts to secure intellectual property rights and/or related forms of protection for “traditional knowledge,” indigenous activists, engaged ethnoscientists and legal scholars, and nongovernmental organizations have thus attempted to pry open the exclusive hold that Northern, corporate entities have had on intellectual property rights (see Posey 1996; Brush and Stabinsky 1996; Greaves 1994). Why, the question goes, should corporate innovation be the only form recognized and granted protection under intellectual property law? Should not traditional knowledge, folklore, artisan works, and medicinal plants (among other things) be worthy of protection for its “original” holders?

The application of intellectual property to cultural knowledge is not a simple proposition and many of the people involved in these discussions are skeptical of the potential of intellectual property *itself* to serve as a tool of enfranchisement.<sup>15</sup> Among the most prominent academic voices in these discussions has been ethnoecologist Darrell Posey, based in Oxford. In the early 1990s, Posey repeatedly noted that IPR certainly was unlikely to solve the threat that “consumer society” posed to the world’s biological

and cultural diversity—but it might “at least buy some time” (1994: 226). In this often pragmatic spirit, since the late 1980s, the idea of compensable rights to and in knowledge has provided a notable and expansive template for framing social struggle.<sup>16</sup> Both within and outside of UN-level and multilateral policy discussions, anthropologists have charted the merits and pitfalls of granting indigenous peoples copyright protection for cultural knowledge and folklore (Brown 1998); policymakers and critical legal scholars have pondered whether IPR for indigenous peoples can be framed as a question of human rights (Coombe 1998b; Chapman 1994); Posey has led an international grassroots effort, stemming from ongoing ISE working groups, to develop “Traditional Resource Rights,” a broader and more flexible framework of entitlements than IPR itself permits (Posey 1996).

These efforts were, in the late 1980s and early 1990s, largely made by Northern academics and activists and not widely taken up by indigenous peoples themselves.<sup>17</sup> This has changed in the intervening years, as indigenous working groups under the auspices of the UN Convention on Biological Diversity, the UN Economic and Social Council (ECOSOC), Native American tribes in the United States, “First Peoples” groups in Canada, and indigenous organizations across Latin America and elsewhere, have, in conversation with a range of academic and activist advocates, explicitly turned the questions of intellectual property, *sui generis* protection for knowledge and resources, and “ethical research” into central axes of mobilization.

Examples are rife, and take many forms. In 1992, the newly formed International Alliance of the Indigenous-Tribal Peoples of the Tropical Forests held its first meeting in Penang, Malaysia; its charter included an explicit nod to intellectual property and a democratized claim on privileged modes of industrial production: “Since we highly value our traditional knowledge and believe that our biotechnologies can make an important contribution to humanity, including ‘developed’ countries, we demand guaranteed rights to our intellectual property, and control over the development and manipulation of this knowledge.”<sup>18</sup> Consider, too, the 1997 move by Seri Indians in the north of Mexico to register their wood carvings with the trademark, *Arte Seri*<sup>TM</sup>, to defend their hold on the “green” tourist market against incursions being made by enterprising mestizos in the region. And alongside other, related moves, such as applying trade secret protection to indigenous knowledge, tribal confederations and coalitions in the Americas and beyond have established charters setting the terms in which they will allow researchers to publish, commercialize, and access cultural knowledge of varying kinds. The Indigenous Research Protection Act, drafted by a Native American organization, the Indigenous Peoples Council on Biocolonialism, asserts de-

terminatively that ultimate decision-making power about research and collections of varying kinds rests with tribal groups. Respecting “traditional copyright” is a fundamental aspect of their ethical template.<sup>19</sup>

While many of these efforts and associated debates have revolved around cultural knowledge, folklore, and material productions (Australian aboriginal designs that now adorn tourist tee shirts; Seri ironwood carvings), an enormous amount of attention within these discussions has been devoted to the specific question of biological resources and patents on drugs. In fact, among the first levers that was used to pry open indigenous access to intellectual property rights was biodiversity conservation. Central here has been the formulation codified in the Declaration of Belém—one that remains a point of contest in development and conservation arenas—that indigenous peoples’ knowledge is integrally woven into the very fabric of biological diversity itself, and thus any efforts either to conserve or to industrialize these resources (or both) must take into account the prior rights, interests, and claims that reside within them.

Rural sociologist Jack Kloppenburg, active in efforts to protect the rights of Southern communities and farmers, states the case this way: “Genetic and cultural information has been produced and reproduced over the millenia by peasants and indigenous people. Yet, like the unwaged labor of women, the fruits of this work are given no value despite their recognized utility. On the other hand, when such information is processed and transformed in the developed nations, the realization of its value is enforced by legal and political mandate” (Kloppenburg 1991:16). If “value already exists in the collected materials,” Kloppenburg argues, then people who have put labor (intellectual and otherwise) into them should be granted rights of ownership and compensation. Genetic resources are, in this argument, *already* mixtures of labor and nature, and the people who have cultivated, experimented with, and otherwise managed these resources also deserve some share—materially—in profits derived from them.

Given the vicissitudes of intellectual property law and the potential fortunes that reside therein, the argument that “wild” resources (“nature”) are in fact always already-managed ones (“innovations”) is a potent political claim. (Witness the *ayahuasca* and neem patents.) Current battles over bioprospecting seize on this point: in its proposed code of ethical conduct aimed at bioprospectors, the ETC group, a North American NGO (formerly RAFI), lists as its first point, “No ‘Wild Kingdoms’: Bioprospectors must assume—unless there is proof otherwise—that all materials they encounter have been nurtured and enhanced by communities.” (RAFI 2000)

While arguments that so-called wild (appropriable) resources already come with claims attached find widespread resonance in indigenous rights movements and allied activist and academic efforts, the question of what

mechanisms shall be used to recognize and protect these claims remains an open and charged one. Do “indigenous community interests” travel transparently or easily along IPR-mediated networks? Not all indigenous activists, nor concerned academics, are enamored of this particular mixture. The mechanisms of bioprospecting contracts in particular show us, perhaps, some of the limitations of the *logics* of IPR as a mode of enfranchisement and protection.

### Innovation as Participation?

Benefit-sharing contracts, for some of their proponents in the worlds of sustainable development and ethnobotany, constitute a bid to include people by “including their knowledge” in the drug discovery process. But include people in *what?*, we might ask. The question of the capitalization, or perhaps the neoliberalization of knowledge, comes back to us here in technicolor. There are some very particular notions of participation or inclusion at stake in prospecting contracts. Among them is, effectively, the quantification of contributions to innovation as a primary criterion for determining who shall be a benefit-recipient. In prospecting contracts, the Lockean calculus that undergirds intellectual property law (nature + intellectual labor = value) is, it turns out, on vivid display as a promise of inclusion as well as a threat of exclusion.

In most cases, prospecting contracts reward their interlocutors—whether indigenous communities, biodiversity-rich governments, or research institutions—for their distinctive but still fairly “raw” contributions to product development (manifested in their labor, knowledge, or provision of plant material itself). In some situations, source institutions negotiate differential returns according to the relationship between the inputs and the eventual outputs—thus, they receive higher royalty payments for specimens that lead directly to a marketable product, and lower returns if the participating company has to work harder to squeeze a marketable product out of the chemical compounds sent their way. In one such agreement, Costa Rica’s INBio is slated to receive 60 percent of the royalties if a patentable product is developed directly out of compounds discovered in Costa Rica, and 51 percent if a drug results from a “significant chemical modification” of that substance (Joyce 1991:38). As we shall see in chapter 4, in particular, the demands and practical implementations of prospecting contracts lay bare the contingencies (and active refashioning) of these ever-active lines between invention and discovery, labor and innovation, nature and artifice (Rabinow 1991; Haraway 1997; Strathern 1999b). But they also lay bare the assumptions required to peg enfranchisement to intellectual property: that is, an identifiable claim on

innovation that holds as its model the idealized Lockean subject (an individual who shall retain right to his intellectual labors). This is not, as many indigenous activists and allied academics have pointed out, a model that is particularly well suited to granting protections to collective, cosmopolitan, knowledges—as such, it could just as well have disabling effects (see Brush 1999).

Indeed, while many indigenous organizations, alliances, networks, and working groups have signed onto the language and potential of intellectual property, such commitments do not come without their conflicts of opinion and approach. Among the many forums in which such differences have emerged is in the International Indigenous Forum on Biodiversity, a group that meets before each Conference of Parties to the UN Convention on Biological Diversity. This forum is largely oriented towards drafting frameworks for implementing Article 8j of the Convention, which declares the rights of traditional communities to claims in their biological and cultural resources. Many of its members have seen commodifiable notions of traditional knowledge as a promising point from which to negotiate communities’ access to benefits and compensation. But others, including Lorenzo Muelas Hurtado, a Guambiano Indian and former Colombian senator, have come down hard on this tendency to “negotiate” in the terms set by Northern nations. In an argument echoed in many indigenous debates on the topic, Muelas Hurtado argues that the very premise of benefit-sharing relies on a separation of “biological resources” and “traditional knowledge,” a distinction that runs in fundamental contradiction to indigenous principles. In his appeal to both indigenous and non-indigenous members of the UN Working Groups, Muelas Hurtado reminds his audience of a number of clear statements generated by previous meetings of the International Indigenous Forum on Biodiversity. Among these is the declaration that CBD members should “impose a moratorium on all bioprospecting and/or the collecting of biological materials in the territories of indigenous peoples and protected areas and on the patenting of these collections” (cited in Muelas Hurtado 2000: 3).

Muelas Hurtado has expressed frustration that the spirit of these kinds of statements has been compromised by the willingness of some delegates to use their entry into the 8j Working Groups to negotiate corporate access to indigenous resources in exchange for compensation. “That Working Group was a space that we fought so hard for. It was meant to provide an arena through which we could discuss with world governments and help them understand our vision of the universe and our thoughts about what they call “biodiversity.” But it seems it will only serve as a negotiating arena, over our wealth and our knowledge, between some indigenous groups and the governments” (Muelas Hurtado 2000).

Muelas Hurtado's lament is of course a testimony to the fact that indigenous activists, like any other heterogeneous group of actors and organizations, do not inherently share a single approach to the question of benefit-sharing. But, just as importantly, his position and that taken by many other indigenous delegates to the UN Working Groups, as well as activists working outside of that framework, powerfully questions the degree to which linking indigenous knowledge to pharmaceutical companies can itself represent indigenous "interests," heterogeneous and contested as they are. Insisting on the right to refuse bioprospecting also means being able to refuse the market-mediated modes of participation offered through the CBD; for these organizers, the "equitable distribution of benefits" is not itself a transparent good. The capacity of "traditional knowledge" to represent the interests of indigenous peoples is, in these discussions, by no means assured or assumed through its reification as a resource of potential value to the pharmaceutical industry.

### Ethnobotanical Nationalism

Significantly, not all forms of ethnobotanical advocacy have been so enamored, either, of drug development or intellectual property as the ultimate arbiters of the "value" of indigenous knowledge. Mexican ethnobotanist Victor Toledo reminds us that his discipline is beholden to a powerful colonial legacy, one that remains all too visible in a persistently instrumental and extractive North American ethnobotany (Toledo 1995). In contrast, he argues that Mexican scientists at the UNAM and elsewhere have been pioneers, since the invigoration of indigenous struggles in the 1970s, in fomenting a political ethnobotany that foregrounds researchers' accountability to the people with whom they work in some distinctive ways (Toledo 1995).<sup>20</sup> Focusing on ethnoecology, or the ways that indigenous peoples manage forest lands and agriculture; putting ethnobotany to work for Indian communities first (for example, by incorporating ethnobotanical courses into popular education programs supported by the government); and making an attempt to "revert" knowledge to communities—these are important modes through which Mexican ethnobotanists (and many of their Northern colleagues) have become "intellectual allies" to indigenous movements in Mexico and across Latin America.

In Toledo's view, ethnobotany's representational capacity is best realized not when calibrated to the logics of innovation and the corroborative apparatuses of pharmacology labs, but rather when pegged to specific understandings of indigenous relationships to Latin American nation-states. But Toledo gives this argument another, familiar postcolonial turn: Mexican ethnobotany must be oriented toward "national development"

rather than allied with the economic botany that has helped transfer Latin American plants to North America, with little to show in return. In his formulation, ethnobotanical knowledge should work in the interest of indigenous peoples in their struggles against the nation-state, and/but also in the interest of the nation, against the neocolonial North.

And with this formulation, in which "the nation" is central—that is, in the middle, between indigenous peoples and transnational companies—comes an ambivalent story about the place of "the indigenous" within the nation. This ambivalence is a deeply sedimented one in Mexico that feeds back into the representational politics of prospecting in some complex and significant ways. For, in fact, one of the most active fronts of ethnobotanical and plant research in Mexico has been an ongoing legacy of nationalist projects with the goal, precisely, of turning *traditional* knowledge into a *national* resource base for pharmaceutical development—not for foreign companies, but rather in the name of the Republic.

If the U.S. government was among the only consistent sources of interest in plant-based drug discovery in the United States for the latter half of the twentieth century, so too has the Mexican government played an absolutely central role in the industrially oriented study of plants and knowledge about their uses in Mexico. The translation of indigenous knowledge into pharmacological outputs has been, in Mexico as in the United States, a distinctly nation-building enterprise, though some slightly different tools and discourses have been used toward this end. In 1976, four years before the U.S. Congress decided to try and increase national outputs of intellectual property in the biosciences—by (strongly) encouraging academic institutions to patent and license their research results—Mexico's nationalist-populist president Luis Echeverría was engaged in trying to reinvigorate a fledgling Mexican pharmaceutical industry with some nation-building measures of his own. One of these measures was to rescind patent protection on pharmaceuticals—a move meant to give a boost to national enterprises, if not also, effectively, to drive foreign companies out of Mexico. Alongside this assertion of national sovereignty, Echeverría ceremoniously reinvigorated a century-long effort to rein in the productive power of "traditional" or ethnobotanical knowledge on behalf of the nation. Where the NCI was funding its academic researchers to search the far corners of the globe for plants that might cure cancer, the Mexican effort was dedicated precisely to recuperating and indeed (re-)nationalizing its storehouse of ethnobotanical knowledge, with the goal of building an interdisciplinary, plant-based domestic drug industry. A significant part of this effort has been spent compiling indigenous knowledge into a material and discursive entity, which is now often and easily referred to as a national patrimony.

As we shall see at length in the ensuing chapters, the bioprospecting agreement that is the focal point of this ethnography sits precisely—if uneasily—at the juncture between these two distinctly public, national efforts to “valorize” traditional knowledge by harnessing its potential for national pharmaceutical interests. The NCI is powerfully present here insofar as the ICBG program draws directly on the mechanisms, experience, and models of its sibling/participating agency’s long-running ethnobotanical and plant-screening program. And in the implementation of one ICBG project in Mexico, the material and discursive products of earlier Mexican efforts to “nationalize” medicinal plants figure strongly as guides to valued flora, knowledge, and interlocutors. Through this strong and complicated national(ist) ethnobotanical legacy in Mexico, medicinal plants have emerged, at the beginning of the twenty-first century, as powerful signifiers of the nation and all of its “hybrid” mixtures. This legacy is something I will address in detail in chapter 3; here, I want to use the invocation of the nation to introduce one final opening concern: the issue of prospecting’s publics.

### Publics

Stating his case for why enabling indigenous peoples to copyright traditional knowledge is not necessarily the way forward, anthropologist Michael Brown makes an appeal to a “wider principle” than that offered by the exclusions that come with intellectual property protection. “Conspicuous in its absence [in indigenous IPR proposals] is a vigorous defense of the concept of a public domain,” he writes (Brown 1998:205; see also Brush 1999). Brown argues that it is a robustly protected right to the free flow of information and knowledge—the principle hallmarks, after all, of liberal democracy—for which we should “all” be fighting, rather than a (potentially counter-productive) balkanization of intellectual fiefdoms in the name of indigenous rights.<sup>21</sup>

It is a provocative claim, and one that I find problematic on several fronts (more on that below). But it does provoke me to ask, with the previous pages’ discussion in mind, Who and what are the (ethno)sciences’ *publics*? I have already laid out some dimensions thereof in my mapping of the question of knowledge, nature, and their capacities to represent something called “interests.” We might say that the representational/advocacy claims of some enterprising activist ethnobotanists constitute, in various ways, indigenous peoples, drug companies, and the nation as the “publics” whom they serve, or to whom they are accountable. Similarly, in the significant reorganizations of industry-academic relations I outlined in the first half of the chapter, we can identify a situation in

which public sectors and public funds hold a particular, and important, place in the processes we gloss as privatization.

But, as Brown’s argument reminds us, slicing right through this topography of accountabilities and sectors is yet another kind of public: the juridical public of the “public domain.” In legal terms, *this* public is usually associated with the absence of private property claims—it is understood as an arena where, simultaneously/alternately, everyone and no one might have a claim. (This, then, is the same public that constitutes the raw, appropriable material for patentable innovation or copyrighting [see Coombe 1998].) The public domain is also, like private property, an entity that owes its existence to state power. As such, if we want to commit the epistemological error of imagining the public domain as a fixed spatial entity (see Boyle 1996), we would do well at least, in this context, to imagine it as nation(s)-shaped.

The national public domain is, as we shall see throughout the chapters to come, increasingly central to the ambivalent ways in which bioprospecting agreements activate (and, we might say, de-activate) the “representational” capacities of knowledge and nature. This is not without its consequences. In Latin America as elsewhere, the public domain has long been an axis through which national claims have been made over and above indigenous sovereignties. The ethnobotanical nationalism to which I referred briefly above is an excellent case in point. As we will see in chapters 3 and 4, the characterization of medicinal plants in Mexico as a widely diffuse, national legacy very easily doubles as a formulation that explicitly takes these resources out of the potential reach of “community” claims.

Whether by project design or the complex renegotiation of benefit-sharing mandates by participating scientists themselves, this divide is constantly being reproduced in the representational dilemmas anticipated and set in motion through prospecting practice. Most pointedly, declaring themselves *daunted* (rather than, we will note, moved to direct representational action) by the prospect of negotiating benefit-sharing contracts with indigenous peoples, many companies, Latin American biodiversity officials, and university researchers have stated a clear preference for screening resources considered “safely in the public domain.”

This safety zone is, it would seem, variously and well-populated. Microbes on government protected lands and medicinal plants sold in urban markets, weeds on the sides of roads and knowledge published in anthropologists’ articles, petri dishes in private university laboratories and vines growing in backyards—these are just some of the sites that Latin American researchers are activating in a range of agreements I have been tracking. What allows researchers to identify this assortment of sites, some of which are indeed private property, as effectively public? Their denomination as such takes shape against what they are not: it’s not the

private that is other here, but the *ejidal*, the communal, and the indigenous—and a host of national(ist) specificities and histories that give those categories their shape. These articulations of entanglement have been made possible not just through complex histories of nationalism in Latin America but also through some new institutional configurations, most notably the UN Convention on Biological Diversity. While recognizing communal rights, the CBD also renames biological resources and cultural knowledge as “national sovereignty,” and thus, in some sense, sets up communities and nations as competing publics to whom benefits must be returned (see chapter 2; see also Brush 1999).

The potential for advocacy and inclusion that some North American scientists and policy makers see in benefit-sharing contracts thus takes some significant and complicated detours through public domains and their national(ist) contours. (Ironically and fittingly, published academic knowledge is one of the most frequently called-upon destinations/sites for such detours.) Left untouched in the course of this detour is the idea that knowledge and nature are teeming with social/property interests; to the contrary, it is precisely in fear of the “complexity” of the entanglements residing in and emanating outwards from these resources that bioprospectors are articulating and indeed producing a curious and ever-expanding topography of public domains.

The conceptualization of the national public as a (safe) “benefit-recipient” sets up an intriguing theoretical situation as well. The public, considered in Habermasian theories of the public sphere to be a site of contest and debate (Habermas 1989), is in fact being considered by many people implicated in prospecting as a site of refuge—not only from the “community” interests that are ostensibly to be represented through prospecting contracts, but from the public debate and anxiety that, prospectors fear, will *come with* “community resources.” The idea that the public can be a site of refuge is not without its precedents; certainly, many political activists, hackers, and others with some distinctly oppositional projects in mind also invoke the notion of the public as refuge—from privatization, and from state surveillance and repression (see Coombe 1998; Warner 2002).<sup>22</sup> The invocation of the public as a safe space in *this* context takes on a decidedly different tenor. I should in fact emphasize here how deliberately and indeed self-reflexively some of the researchers with whom I’ve spoken invoke such “public-ness.” They do so precisely as a defense against the anticipated charge that, as bioprospectors, they are involved in the theft of traditional knowledge and community resources. The constitution of prospecting’s publics thus enrolls a few more dimensions here: not just an “ownerless” juridical space, but an anticipated and messy public sphere of contest, debate, and protest, which may ostensibly be

avoided or closed off through recourse to the safe publics of non-community resources.

These are significant points that any “vigorous defense of the public domain” must take very seriously into account. Brown argues as much when he imagines why an undifferentiated public domain has not become a rallying cry for indigenous peoples; postcolonial scholars, he notes, would surely ask some difficult questions about *whose* civic entity and rights these are (1998: 205). And certainly, the question of “whose public?” is far from incidental here. While I am deeply sympathetic to a rally around the public, I think there are some pressing questions we must ask in this context. How, to start, are various sites and resources being animated or reified *as public* in their very articulation with prospecting’s circuits of exchange?

A running concern throughout this book is thus precisely the question of how, in the *production* of prospecting’s publics, the sectors, accountabilities, and juridical aspects of public-ness mix and mingle. With prospecting-mediated contests over rights, obligations, and interests in mind, this book asks not just *whose* public is at stake, but also *how*? How are myriad constructions of publics given life in the context of bioprospecting, by whom, and to what effect? It is these processes of “public-ization” that weave their way through the chapters to come.